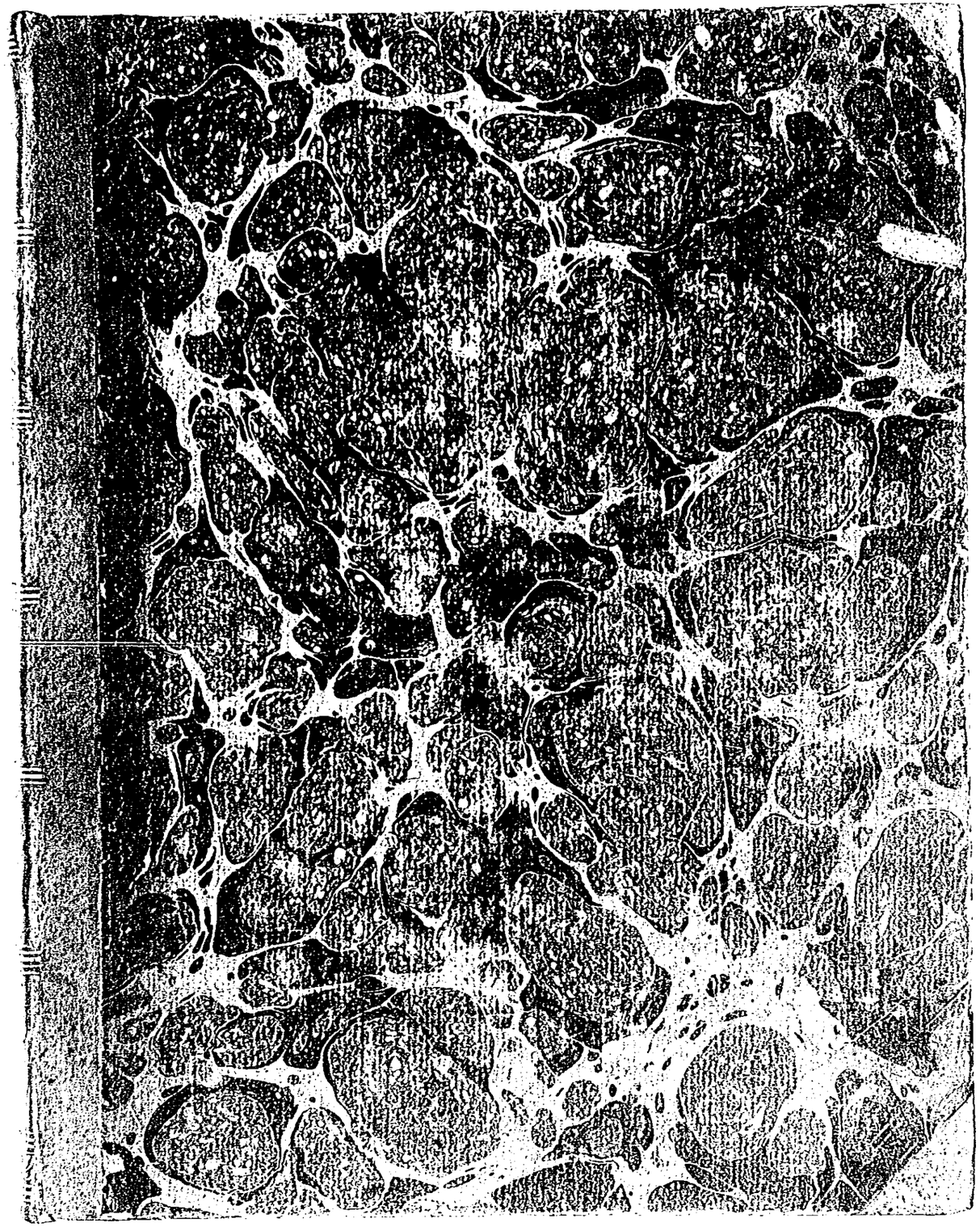

THOMAS BEDDOES M.D.

MEMOIRS

OF THE LIFE OF

THOMAS BEDDOES, M.D.

WITH AN

ANALYTICAL ACCOUNT OF HIS WRITINGS.

By JOHN EDMONDS STOCK, M. D.

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PREFACE.

VARIOUS circumstances have delayed the appearance of this volume, far beyond the time originally contemplated. The Author is sensible that this delay must in a considerable degree have impaired the interest, which it might perhaps have excited had it appeared twelve months ago. He was, by no means, aware of the extent of his task, when he first undertook to give to the Public a Memoir of the life and writings of Doctor Beddoes. He felt however that an Author has no claim upon their indulgence, if either from haste to appear before them, or from the affectation of such powers as render laborious preparation unnecessary, he be induced to omit any exertion which may tend to render his work less unworthy of their notice. Of

haste or of want of diligence he cannot accuse himself. He has laboured it to the best of his ability; although upon a review of it since it has been completed, greater experience, and a clearer view of his subject, have shewn him parts which he could wish to improve. But other unavoidable causes have operated to the disadvantage and delay of this publication. With some of these it would be impertinent to trouble the reader, but others he may be allowed to state.

In every biographical work there must occur many particulars in which accuracy scarcely entitles a writer to praise, although the want of it may expose him to censure. Notwithstanding the friendly communications of many of the Doctor's friends, it was often extremely difficult to fix a date, or to trace an incident in its exact order and connexion. Doctor Beddoes was so little accustomed to speak of himself, that even those who were in habits of the greatest personal intimacy with him at different periods of his life, were often utterly unacquainted with any incidents subsequent or prior to those periods; and the progress of the Author was frequently stopped by a search for channels of information, which in many cases, in spite of every exertion, he failed to meet with.

In addition to the few incidents of his life, it was

particularly the wish of the Author to give a history of Doctor Beddoes's opinions. These were to be collected from his printed works, and from unpublished manuscripts. In his analysis of both, he has frequently made use of the Doctor's own expressive language. In many instances, indeed, his style was so simple and concise that it scarcely admitted of compression; while in others it was so eloquent and impressive, that it would have been an injustice to his reputation to state his sentiments in any words but his own. In reviewing his published works, it was the Author's wish to give a general idea of their value, without being too minute; to excite the curiosity of the reader, not to allay it. To preserve this medium has been a difficult task. He has felt it so. He has been unable, in many instances, to satisfy himself, and dares not therefore flatter himself that he shall content all his readers.

To procure a complete collection of these works, has been by no means, easy. Many of them were out of print; and so regardless was Doctor Beddoes of his own publications, that, at the time of his death, not one sixth part of them could be found among the many thousand volumes of which his library was composed. The arrangement and analysis of his Manuscripts presented a task still more difficult. The

mind of Doctor Beddoes was incessantly active. It is presumed that few days elapsed without his committing to writing, either the observation of a fact, or the elementary germ of some future speculation. These remarks were often written with the most careless haste, and were scattered about upon detached scraps of paper, of which fragments were frequently wanting. Many hints and speculations were preserved in two small common-place books; but the Author soon discovered that a great proportion of these had been interwoven in works already submitted to the public eye. He was unwilling that any speculations of so original a mind should be lost, yet there scarcely existed, in a single instance, any mark by which he could distinguish such as had been already employed, from such as were only the elements of future labours. Although a careful perusal of the Doctor's numerous publications, has enabled him to separate the greater part of these, it is possible that some which are presented to the public in the ensuing volume as now first brought to light, may have escaped his vigilance. For any error of this kind he solicits the indulgence of the reader.

Doctor Beddoes has somewhere remarked, that in the writings of Montaigne, "the freshness of good sense springs up perpetually under the eye of the reader, like the verdure of a dewy summer." A similar idea rose in the Author's mind when these common-place books first came into his hands. They contained, not unfrequently, additional observations on subjects treated of in his published works. Selections from these observations, are occasionally incorporated in the ensuing volume, with the notice of such writings as they appeared to illustrate. A few remarks of a more detached kind have been inserted in the Appendix. These are submitted to the reader in an unfinished state, and should only be looked upon as memoranda, of which the value must often depend upon the thought, and not upon the style in which it is cloathed. The Author hopes however, that he shall not be found to have explored the recesses of a great mind unworthily, or to have brought to light any speculation so crude as may diminish the lustre of Doctor Beddoes's reputation.

With a consciousness of many imperfections which, however he may lament them, he cannot now remedy, he commits this volume to the Public; in the hope that it contains a tolerably correct view of the life, character and opinions of the eminent Physician who is the subject of it; and that it will exhibit proofs of a versatility of talent, an extent of knowledge and an originality and compass of thought, of which perhaps, some of his most intimate friends were but imperfectly aware.

Bristol, Oct. 17, 1810.

MEMOIRS OF THE LIFE

OF

THOMAS BEDDOES, M. D.

To the generality of readers diversity of incident may naturally be expected to constitute the great charm of biographical writings; and hence those who have undertaken to record the events of a literary life, have frequently commenced their narratives with an apology for the want of it. The tenour of such a life is, in general, too uniform to admit of this source of attraction; its different æras are for the most part, marked only by literary labours or scientific researches. When however these labours or researches have excited a considerable degree of attention, and especially when they appear to have been animated by an unaffected zeal for the diffusion of valuable instruction, and for the relief of suffering humanity; occurrences which have perhaps scarcely deviated from the common routine of life, and which would otherwise have passed without notice, acquire both importance and interest. To objects of this honorable description, the compiler of the following memoir considers the distinguished abilities and splendid acquisitions of Dr. Beddoes to have been uniformly and intensely devoted; and if he be at all successful in tracing the mental progress of such a character, he trusts that it will not be necessary, however scanty the incidents of his life may be found, to offer such an apology.

Dr. Beddoes was originally of Welch extraction: A small estate in the Principality, which has descended through many successive generations, is still in the possession of a member of the family. That part of it however from which he was immediately descended has long been settled at Cheney Longville in Shropshire, of which Thomas, his paternal grandfather, was a younger branch. He married Rosamond, daughter of Thomas Phillips, Esq. of Shiffnall in the same county, by whom he had one son, Richard. Thomas was a man of strong mental powers and of great personal activity; he was engaged in trade as a tanner, and by his industry and enterprize acquired a considerable fortune. Richard married Ann, daughter of Mr. Whitehall, of Hardsley near Ludlow. The issue of this marriage were a daughter named Rosamond, and a son the subject of the ensuing narrative.

Thomas Beddoes was born at Shiffnall on the 13th day of April, 1760. He received the first rudiments of his education at a school in his native town, and from thence was removed to a seminary at Brood in Staffordshire. He is remembered to have read perfectly well at five years old. An insatiable thirst for books and a disinclination to partake of the usual amusements of children of his own age, might, without exaggeration, be called the characteristics of his infant years. His grandfather at an early period noticed the literary propensities of his descendant, and was not only eager to procure for him every advantage of instruction which the neighbourhood could afford, but announced his resolution that he should have an opportunity of completing his studies at one of the Universities. This intelligent relation had great influence in forming the early habits of his mind. Although his concerns in business were so extensive as to leave him but little leisure for improvement either from books or literary conversation, his solid judgment and natural acuteness of understanding were generally known and respected; and he early

habituated his grandson to think and reason. His father was less anxious with respect to his literary pursuits and would probably have been satisfied to have retained him beneath the paternal roof, as soon as he had acquired the elements of the knowledge more peculiarly necessary for business. Fortunately however for the interests of medical science, the prophetic discernment of his grandfather prevailed over every opposing opinion; and his education was commenced upon the broad scale necessary to qualify him for one of the learned professions.

When he was about nine years of age he lost his grandfather, in consequence of a fall from his horse. He was thrown upon some timber within a few yards of his own door, by which his ribs were dreadfully fractured and depressed into the lungs. Universal *emphysema* took place to a degree scarcely ever witnessed, the features of the face being nearly obliterated by distention. An accident in which so valued a relative was concerned was well calculated to produce a powerful influence upon his youthful mind; and the peculiar circumstances by which it was attended must have materially contributed to strengthen the impression. During the short interval which preceded its fatal termination, Thomas was a frequent attendant in his grandfather's apartment, and was also often present when two professional friends paid a melancholy and unavailing visit to the sufferer. Upon these occasions he exhibited such instances of extraordinary acuteness and interest as forcibly attracted the observation of one of these gentlemen,[a] and induced him to treat him with particular attention. Flattered and encouraged by the notice he had met with, he was accustomed, from this period, to pass a great proportion of his leisure hours in the shop and surgery of his new friend. He

[a] Mr. Yonge, surgeon, of Shiffnall; a gentleman to whom I am indebted for the above account and for other valuable information, and whose friendship for Dr. Beddoes continued unimpaired and uninterrupted to the close of his life.

was frequently found making use of the pestle, and evinced such an evident interest in all that was passing there, that he acquired among his acquaintances the name of the little Doctor. This appellation he seemed to receive with peculiar complacency, and whenever interrogated upon the subject of his future profession, he uniformly replied that he would be a physician. It is always interesting to the biographer to be able to trace some minute incident, some secret spring of action, which appears to have eventually influenced every future scene of life. In the present instance, it is probable that the accident which has been mentioned, first gave that bias to Dr. Beddoes's mind which marked his future destination.

About the period of his grandfather's death, he was placed at the Free-Grammar-School in Bridgnorth, under the direction of the Rev. Mr. Harding; a gentleman of whom he was always accustomed to speak with much respect. I have been informed by one of his schoolfellows, that he did not, while at this school, participate in their usual amusements; and yet was scarcely ever seen, out of school-hours, with his book in his hand. In the seasons allotted to recreation, he was accustomed to walk round the playground with an air of thought and reflection which frequently excited the attention of his young companions, who wondered "why he was always thinking." His silence however was not the silence of moroseness, but was frequently interrupted by some friendly remark which he made to one playful groupe after another, as he passed them in succession. He continued under the care of Mr. Harding for three or four years; and his progress in classical learning was so considerable, that although when he quitted Bridgnorth he was scarcely thirteen, he was supposed to be in every respect, age excepted, qualified for admission at one of the Universities.

A friend of more mature age who had many opportunities of intercourse with him, during the vacations, observes of him at this

period, that his external appearance was rather uncouth; his manners blunt and not generally prepossessing; and in his intercourse with strangers, he manifested a painful degree of that shyness and reserve, which all the deference paid to his talents in after life, and his various intercourse with characters alike distinguished for exalted rank and literary acquisition, were unable to efface. But though this reserve might conceal the promise of future mental superiority from the transient observer, his avidity for books, and his sedulous application were known, and his future literary eminence anticipated by all who were personally acquainted with him. He was already distinguished for his great facility in acquiring knowledge, and for a memory almost miraculously retentive; a faculty which he possessed in a remarkable degree in every subsequent period of life. The indefatigable zeal which he evinced in the pursuit of information is the more remarkable, as amongst his immediate domestic circle, he neither met with example to stimulate his efforts, nor sympathy to reward them.

With a view to perfect his classical acquisitions and prepare him for the University, he was placed in the month of May 1773, under the tuition of the Reverend Samuel Dickenson, Rector of Plymhill in Staffordshire, a gentleman of great science and erudition. Here he continued during the space of two years. Application having been made to Mr. Dickenson for any information relative to his late pupil, with which his recollection could furnish him, he very obligingly returned a sketch of his character from which I have selected the following extracts; They will furnish satisfactory proof that the account which has been given of his indefatigable zeal in the pursuit of knowledge, has not been overcharged. "During the period that Dr. Beddoes was under my care" says Mr. Dickenson, "his mind was so intent upon literary pursuits, chiefly the attainment of classical learning, that I do not recollect his having devoted a single day,

or even an hour to diversions or frivolous amusements of any kind. His vacant hours were generally employed in reading Reviews, of which he had access to a very numerous collection." He then proceeds to give a sketch of the peculiar character of his mental powers; he describes his judgment even at that early age, as solid, but observes that his genius did not appear to be "enlivened by any remarkable brilliance of fancy."

In more advanced years it will perhaps appear that Dr. Beddoes exhibited traits of a fancy both brilliant and playful. When, therefore, it is recollected that the above remark was made by a near observer of his character, it will shew that young as he was, he had either obtained no common discipline over his own mind, or that the keenness of his pursuit after knowledge effectually repressed the fascinating illusions of imagination.

To the moral character of his pupil, Mr. Dickenson bears the most ample and emphatic testimony. "Such a sense of rectitude," he observes, "guided all his actions, as never to afford room for reproof, much less for chastisement. His equanimity was wonderful, for I never saw his temper ruffled, nor the passion of anger excited in him upon any occasion; in fine his moral conduct was irreproachable in every respect; so that no preceptor had ever cause of greater satisfaction and delight in the behaviour of a pupil, or more reason to testify with admiring applause to the extraordinary excellence of his character."

After leaving Mr. Dickenson, young Beddoes was removed to Oxford and entered at Pembroke College in Michaelmas Term 1776. The simplicity of his appearance and the rusticity of his manners and address did not excite in his fellow under-graduates any very favorable anticipation of his intellectual powers; but his striking abilities and incessant application soon awakened general attention in the College. At the time of his matriculation, the under-

graduates of Pembroke were divided into small parties, who regularly met in rotation at each other's rooms, to breakfast in the morning, and to take their afternoon's wine. At these parties Beddoes was very rarely present. The hours which his contemporaries devoted to social or convivial intercourse, he employed for the most part in study. He appeared to devote the greater part of his allowance to the purchase of books, and it was observed of him that he had accumulated, during the earlier years of his residence, a collection which both in number and value far exceeded those generally found in the possession of an under-graduate.

The private lectures read in many colleges previous to the late signal and important reform in the discipline of the University, were of a nature little calculated to excite interest. They were better suited to the mediocrity of ordinary talent, than to the ardour of an inquisitive and superior mind. Where all of a certain standing are placed in one class, this must of necessity be the case. In general therefore his attendance upon such occasions was performed as a duty; it was nevertheless remarkably regular, and wherever the lecture suggested any topic of interest, he was accustomed, at its close, to ask the Lecturer a variety of questions tending to elucidate the subject. In like manner, the themes and declamations which are in most colleges required to be produced at stated periods by the under-graduates, are in general complied with as a form, and the students aspire only to escape censure, or to avoid a fine. This negative success however could not satisfy the ambition of young Beddoes. His themes and declamations were remarkable for their elegant Latinity; and his reputation as a classical scholar was soon established among all the members of the society.

At the period of his admission at the University he was acquainted with the learned languages only; to the modern ones he was a perfect stranger. This deficiency he determined to supply by his

own industry. A friend rather of prior standing in the College to himself, who, though he afterwards widely dissented from many of his speculative opinions, never ceased to respect his literary acquisitions, entered his apartment one morning, and found him very busily engaged with a French grammar and dictionary before him. Upon inquiring what was the pursuit with which he was apparently so intently occupied, Beddoes told him that he had resolved to learn French. His friend advised him to procure a master: he replied that it was unnecessary, adding that he thought he could conquor the difficulties of the language in about two months. His friend desisted from further enquiry, but privately noted the date of the commencement of his French studies; and upon paying him another visit at the expiration of two months, took an opportunity of directing the conversation to the subject, and inquiring whether he had mastered the language. Beddoes answered in the affirmative, and upon one of the French classics being presented to him, read it in English to the surprise of his friend, with perfect fluency. He had, however, as yet learnt it by the eye alone; with the pronunciation he was perfectly unacquainted. From the French he proceeded to the Italian language, which of course could present no very formidable obstacle to his progress. He next applied himself to the German. He had here greater difficulties to encounter, but his ardour and perseverance, though still unassisted by any master, enabled him to meet them with success. It should be remembered to his honor, that during his residence in the University, the moral qualities of his mind retained all that excellence which had attracted the admiration of his preceptor Mr. Dickenson. He still preserved the same equanimity which had characterized his earlier years, and although exposed to the contagion of intemperate and licentious example, his moral conduct was believed to be irreproachable.

But the intellectual acquisitions of Dr. Beddoes were not confined

to the knowledge of languages only; he now began to cultivate with equal assiduity studies of a more scientific nature. To chemistry, as a science closely connected with that profession which he had chosen as the object of his future pursuit, he was particularly devoted. Dr. Black had, some years before, opened a new mine for investigation, which the illustrious Priestley was at this period exploring, with a diligence rewarded by daily increasing success, and a series of the most splendid discoveries. These discoveries powerfully impressed the imagination of young Beddoes. He began to study the subject experimentally as well as theoretically, and soon became master of pneumatic chemistry as far as it was then known. So conversant was he with the subject, that before he had completed his twentieth year, he amused a few literary friends at Longville, during one of his vacations, by giving a history of the discoveries that had been made, and exhibiting some of the principal experiments; and his audience were not less delighted with the clearness of perception and explanation of the young philosopher, than by the novelty of the information which he communicated. From pneumatic chemistry he proceeded to the study of mineralogy and botany; in both of which he made rapid advances. Of his love for botany he has left a striking proof behind him, in a manuscript Flora Britannica, which he appears to have written while at Oxford. The elegance and beauty of the penmanship of this little volume would excite both admiration and surprize in every one acquainted with the extreme carelessness of his written character in after life.

His vacations at this period were generally spent in Shropshire, and he devoted much of his time to shooting and whist. To both these amusements he was equally partial. In his long morning rambles with his gun, he was accustomed to unite scientific research with his amusement. He explored every recess of the most rugged mountains; he searched every dell; and seldom returned home without his pockets

filled with mineralogical or botanical specimens. As a whist-player he was much in request: he was supposed to play that game as well as almost any man in England.[b] He sometimes upon these occasions amused his friends by a surprizing effort of memory. He would relate at the termination of a game the exact order in which all the cards were played, and particularize who had played them.

Such were the attainments, amusements and occupations of Mr. Beddoes from his fourteenth to his twenty-first or twenty-second year. He had now taken his degree of Bachelor of Arts, and soon afterwards, as usual, ceased to reside regularly in the University, and began to devote himself to studies more strictly and purely professional. The advantages afforded by the Metropolis for attaining an accurate knowledge of anatomy, attracted him thither in the year 1781. Here he became a pupil of the celebrated Sheldon; and assiduously devoted himself to that study which is so justly deemed the basis of all medical knowledge. The zeal and intelligence which he manifested in this pursuit warmly recommended him to his instructor. He attended several courses of his demonstrations: But he did not content himself with hearing lectures only; he devoted much of his time to dissection, and familiarized himself with the details of practical anatomy. The more generally fascinating enquiries connected with physiology he prosecuted with equal ardour. At first, he exclusively devoted himself to these preliminary sciences, but after a time, in addition to the instructions of Sheldon, he availed himself of the opportunities of attending the classes of some of the most distinguished lecturers in the Metropolis, in other branches of the profession.

[b] His fondness for this game manifested itself at an early period of life. He informed one of his most intimate friends, that when very young, he was accustomed to anticipate as one of the greatest pleasures of manhood, the power of sitting down uncontrouled, and playing whist all day long. After quitting Oxford he seldom played; but if, by any accident he joined a party, he shewed that he had not forgotten the acquisition of his earlier years.

In the course of his physiological studies his attention was particularly arrested by the celebrated dissertations of Spallanzani. They had not yet been translated, and their value was comparatively but little known in England. This deficiency he determined to supply, and accordingly undertook the task of presenting them to the public in his native language. His accurate knowledge of Italian enabled him to perform it with spirit and success. He prefixed to it a short notice of the literary labours of Spallanzani. When the second edition of these volumes appeared, in the year 1790, he was induced by the general approbation with which this sketch had been received, to enlarge and extend it. He added also a variety of observations of his own, and gave an account of several experiments which had been instituted by others, to illustrate the subjects treated of in the work. This additional matter, with a degree of equity of which the purchasers of books have to lament the comparatively rare exercise, he published separately, "for the sake of the purchasers of the first edition, whose advantage every author is bound in justice as well as gratitude, to consult."

Mr. Sheldon was much delighted with these first fruits of the industry and talents of a favorite pupil; and long after their connexion had terminated, whenever he had occasion, in his course, to allude to the experiments of Spallanzani; he was accustomed to refer his hearers to the translation, "so ably executed by his friend and former pupil." This translation, the earliest of his numerous publications, appeared in the year 1784.

In the same year Dr. Edmund Cullen published a translation of Bergman's Physical and Chemical Essays. In a short introduction to this work, it is stated, that on account of the great distance of the Translator from the place of publication, he had entrusted to another person the superintendence of the press. This person being, as he informs the reader, "unacquainted with the Translator's design of

adding annotations at the end of the volume, was himself induced to annex a few inconsiderable observations, such as his recollection could furnish during a hasty perusal of the MS." It is the Annotator himself who speaks thus humbly of his share in the work. The observations alluded to are distinguished by the letter B, and from a perusal of them I feel little hesitation in assigning them to the pen of Dr. Beddoes. They do honor to his industry and acuteness; they evince an extensive acquaintance with all the scientific journals of celebrity, foreign as well as domestic; and every error or deficiency which existed when Bergman wrote, is, as far as possible, corrected or supplied from the lights which were daily pouring in upon a science assiduously cultivated and rapidly improving. Many of the Professor's doctrines or experiments, where the results appear imperfect or unsatisfactory, are corrected or confirmed by original ones by the Annotator himself. The analyses of earthy and saline bodies contained in the section on waters, are opposed to and compared with those of our ingenious countryman, Kirwan. Nor does he fail, when detailing by way of illustration the opinions advanced by names of the highest authority, to point out whatever appears inconclusive or not sufficiently proved.

The opinion that these notes were written by Dr. Beddoes does not rest upon their internal evidence alone. It receives additional support from the faint traditional recollection of the gentleman who first pointed them out to my notice; who was nearly his contemporary, and was, like him, a pupil of Sheldon. Its probability is farther increased by the circumstance that in the succeeding year, 1785, a translation of Bergman's Essay on Elective Attractions, the avowed production of his pen, was published by the same booksellers. A number of notes is added by way of appendix to this volume, characterized by the same industry and acuteness, and the same minute acquaintance with the improvements in physical science made

in foreign countries, which distinguished the annotations in the Elements of Chemistry.

In the year 1786 he appeared again before the public, in the office of Editor (for he lays claim to no higher appellation) of Scheele's Chemical Essays. They had been translated by a foreign friend, who was unwilling to commit to the press a work executed while his acquaintance with the English language was very imperfect. The deficiency arising from this source Dr. Beddoes undertook to supply, by a careful revision of the work, and a comparison of it with two different German translations; and he added to its value by the insertion of a few papers of more recent date, written by the original Author, and by other contemporary German chemists. His annotations upon this volume are scanty; to supply any deficiency in this respect, he refers to those contained in the volume on Elective Attractions. The whole system of chemical science has, since the date of these publications, undergone so great a revolution, a revolution which the brilliant discoveries of Davy must convince us is far from being yet completed, that it would I apprehend consume the reader's time unprofitably, to attempt any minute analysis of the notes in question.

The connexion between the subjects of this and the two preceding works, has induced me to notice them together; but some particulars of a prior date, remain yet to be mentioned. In Act term 1783, Mr. Beddoes took the degree of Master of Arts. In the winter of the same year, during an accidental residence in his native county, he met with an interesting opportunity of exercising his skill and humanity. A fever, attended with great and general mortality was raging in the neighbourhood, and proved particularly destructive in the humble habitations of the poor. It is to this disease that he alludes in the history of Isaac Jenkins. His success in the treatment of it shewed how well he had improved his opportunities; and it so far

exceeded that of the neighbouring practitioners, that the poor creatures whom he relieved, bestowed upon him the most extravagant expressions of admiration, and appeared almost to contemplate him as a superior being.

In the autumn of 1784 he removed to Edinburgh, and during three successive winters and one summer, continued to prosecute his studies in that celebrated school of medicine. Shortly after his arrival he became a member of the Royal Medical and Natural History Societies. In these he soon distinguished himself. He took an active part in the extensive series of physiological experiments in which some members of the former were at that period engaged. To the latter he contributed two curious and original papers; one on the Sexual System of Linnæus, the other on the Scale of Being. He maintains the negative of both these questions, with considerable ingenuity. To these his earliest specimens of original composition, I have given a place in the Appendix. In the following session he was elected President of both these Societies; a flattering distinction which has scarcely ever been bestowed but as the reward of superior talent, and which exhibits an honorable proof of the estimation in which he was held by his fellow-students. In fact his reputation was established with the members of both societies, for extensive and accurate information upon almost every subject.

An additional proof of the influence which he had acquired among his contemporaries, may be collected from his having been chosen chairman at a general meeting of the whole body of students, when a misunderstanding took place between them, and the managers of the Royal Infirmary in the year 1785. In this dispute, which is now almost forgotten, and the minute particulars of which it would be unnecessary to revive, the managers appear to have erred rather in form than in principle. A hasty resolution regulating the hours of admission for the students attending the Infirmary, and implying a

general censure upon the whole body for some individual instances of misconduct, produced a strong spirit of resistance on the part of the latter, who conceived their privileges invaded. As chairman, Mr. Beddoes was, of course, the organ of the demands of the students, and those who are acquainted with his character, will easily believe that they were enforced with sufficient spirit. The intervention of the medical faculty, happily terminated the misunderstanding, and harmony was restored.

To the account here given of his Edinburgh residence, I shall add what he has himself stated upon the subject in vindication of his right to express an opinion on the merits or deficiencies of the system of medical education pursued there. "Let me," says he, "briefly state that I went to Edinburgh as an Oxford Bachelor of Arts, passed there three winters and one summer, was perpetually at the lectures of the professors and in the societies of the students. You may think it probable that I have no humiliating associations connected with Edinburgh, if I add that I can never hope to be of so much consequence among my equals any where else; since the students heaped upon me all those distinctions which you know it is in their power to confer."[c]

The regularity of his attendance on the winter courses was suspended for a short time in 1786, by his returning to Oxford for the purpose of taking his medical degrees. He was admitted Doctor of Medicine on the 13th of December. From this period therefore, he may with propriety be spoken of under the more familiar, and more generally recognised appellation of Dr. Beddoes. In the spring, he returned once more to Edinburgh, and continued there for some months. In the following summer, before bidding a final adieu to Scotland, he made, in company with a friend, an excursion to the

[c] Letter to Sir Joseph Banks. 1808.

Highlands. On this journey, he amused himself in collecting mineralogical specimens and in botanizing. He also met, not unfrequently, with opportunities of exercising his professional skill. He has recorded in one of his publications[d] an extraordinary circumstance, which occurred in the case of a young woman for whom he had prescribed, before ascending the mountain Schehallien. He had left her under the influence of a low fever, then prevalent in the country, which had, in her case, manifested symptoms of peculiar violence. On his return he was surprized to find her fever subdued; and no traces of indisposition remaining except weakness. It appeared that in her delirium she had uttered a wish for cold water, which being refused her, "she had crawled, during the absence of her attendant, to the brink of an adjoining river; from which she immediately perceived a herd of cattle, with the drovers at some distance, on their way to cross the bridge. The sight induced her to make for the water, in hopes of concealing her nakedness. She waded up to her middle, and leaned against a fragment of rock; nor was it 'till one of the drovers turned his horse towards the Inn, that she was discovered in this position; and it was believed that she had occupied it not less than five minutes. Her delirium was gone and the symptoms of fever had quitted her." This valuable practical hint was not likely to be lost upon one so capable of observation as Dr. Beddoes.[e]

[d] Hygëia, Vol. II.

[e] He was sometimes accustomed to relate an adventure of a more humourous cast which befel him upon this ramble. His companion and himself had, by some accident, lost their way in one of the most desolate parts of their journey; and after seeking, in vain for a considerable time, for some habitation, they at last reached a small cottage where they were fortunate enough to find shelter and a bed. Fatigued by their day's labor, they soon dropped asleep; but were shortly after roused from their slumbers, by a violent struggle in the next room. Before going to rest, they had only seen one or two female inhabitants, but they now heard the voice of a man evidently in a furious rage, uttering vehement execrations and vowing that "he would murder them, tho' they were both Dukes of Athol." Alarmed at this threat, they both sprang from their bed, and grasping their cudgels stood one on each side of the door, which had no fastening, awaiting the attack of the enemy. The noise however, by degrees, subsided; the man went out, and the cottage was again quiet. Upon inquiry the next morning, they found that the threats which had occasioned so much terror, were uttered by the good man of the house; whose only bed they had unconsciously occupied; and who having returned home after their arrival, could not, for some time, be induced to forgive the intrusion.

His excursion was not protracted to any very great length, for we find him in the autumn of the same year on the Continent. He passed some time at Dijon, and from thence went to Paris. The particular object which attracted him to Dijon I have not been able to trace. He there became acquainted with Guyton de Morveau, with whom he afterwards corresponded. He spoke, after his return, of the festivities of the vintage with much delight; and seemed fully to participate in the gratification, which most travellers have expressed, upon witnessing the harmless merriment of the peasantry at that joyous season. At Paris he became acquainted with the celebrated Lavoisier; whose talents and modesty inspired him with a respect, which he did not appear to have imbibed for some of his philosophical countrymen. Of Madame Lavoisier also, he was always accustomed to speak in terms of the highest admiration; both on account of the extent of her intellectual powers, and the fascinating elegance of her manners. After passing a few weeks in the enjoyment of literary intercourse, with this interesting family and their learned and accomplished friends; he returned, towards the close of the year, to his native country.

He sometimes reproached himself for having devoted during this excursion, too great a portion of time to amusement, and too little to science. He proposed upon a subsequent visit to the Continent,

to repair this defect. Germany was then to be his object, and he resolved to make a mineralogical tour through the northern part of that country; and particularly to examine the discipline and plans of its various universities. He had actually engaged a person to accompany him on this expedition, but a succession of circumstances delayed his departure 'till it was finally prevented by the disturbed state of the Continent.

It is worthy of remark, that, at this period, he entertained, with some few exceptions, a sufficiently contemptuous opinion both of French men and of French philosophy. His admiration of foreign scientific characters was confined to the Germans; whom he considered as, both in talents and industry, greatly superior to the French.

Shortly after his return, the Chemical Lectureship at Oxford became vacant, in consequence of the resignation of the late Dr. Austin. Dr. Beddoes was urged by his friends to offer himself as a candidate for that situation. He complied with their wishes, and the favorable opinion entertained by the University of his abilities in general, and more especially of his chemical knowledge, secured him the appointment without difficulty.

It was in the year 1787, or 1788, that he was introduced to a man, for whom he, at the first interview, felt a strong partiality. A little time matured this prepossession into a warm regard and an unreserved confidence, which continued unimpaired to the last moment of his friend's existence. This friend was the late Mr. William Reynolds, of the Bank, near Ketley, in Shropshire; a man distinguished for integrity of character, simplicity of manners, and benevolence of heart. In a letter giving an account of their intimacy, with which I have been favoured by the common friend of both, Mr. Yonge, he observes, "I am too well aware how large an allowance is conceded to the partiality of friendship to venture upon

indulging myself in suspicious panegyric, by an attempt to delineate the character of this excellent man.[f] The improvements which he was perpetually making in the iron manufactory by the introduction of new processes, his knowledge of chemistry, the conveniences of his laboratory, the hospitality of his house, and above all the liberality of his mind and the extent of his views, could not fail to attract and to attach to him any kindred heart."

From the first commencement of their intimacy, Dr. Beddoes was accustomed to pass a great part of his vacations at the Bank. During his necessary residence in Oxford he regularly corresponded with his new friend; and every letter evinces the high opinion that he entertained both of his head and his heart.

His acquaintance with Dr. Darwin appears also to have commenced about this period. A congenial spirit of philosophical inquiry, and a corresponding ardour for the improvement of medicine, procured for him the distinguishing notice and regard of this truly illustrious medical philosopher. A frequent and friendly epistolary intercourse was kept up between them, confined chiefly to medical and philosophical subjects. In the course of it, it appears that the proof sheets of Zoonomia were regularly sent to Dr. Beddoes, and his opinions and criticisms were freely invited by the author. They seem to have been communicated with the same candour with which they had been solicited. He was not afraid to use the language of commendation, for the intrinsic merit

[f] To vindicate the partiality of friendship, it would, in the neighbourhood of Bristol at least, be sufficient to state, that Mr. Reynolds was the son of a gentleman of that city, who employs an ample fortune in acts of the most extensive benevolence; one who can only be justly characterized by applying to him the eloquent language of Burke when speaking of Howard; that "he will receive, not in detail, but in the gross" the reward of those "who feed the hungry, who cloath the naked, and who visit the fatherless and widows in their affliction;" and that he was the worthy son of such a father.

of the work repelled the suspicion of flattery; and he offered his objections with as little reserve, because truth was the object of both.

On the other hand, the cordial, and, occasionally, even flattering style in which Dr. Darwin addresses him, proves that his mind was far superior to the littleness of envy; and that he felt a generous pleasure in doing honour to the rising merits of his younger brother in medicine. Indeed, it is well observed by Dr. Beddoes in a letter to another friend, and upon a very different occasion, that "those who have the sense of merit in their own breasts, can afford most cordially to praise, and they certainly best understand the merits of others."

To the names of Mr. Reynolds and Dr. Darwin that of a third correspondent remains to be added, Mr. Davies Giddy, now member for Bodmin, who, when the Doctor returned to the University to take the chemical chair, was an under-graduate of Pembroke College. Dr. Beddoes had a prompt discernment of mental ability, and soon discovered in this young man, evidences of a very superior understanding. In the pleasure of discovering and encouraging rising talent, the distinction between the professor and the undergraduate was soon passed over; and a frequent intercourse took place between them, which gradually ripened into a cordial friendship.

An access to the whole series of his correspondence with these three gentlemen, has enabled me to trace many of the movements of his mind, with a degree of accuracy, which his reserved habits would have effectually debarred me from attaining from other sources. Although, as has been already observed, his letters to Dr. Darwin were chiefly confined to professional and philosophical subjects, he occasionally introduces topics of a more personal nature. With

Mr. Giddy and Mr. Reynolds his communications were of a still more unreserved description, and he seems to have unveiled to them the inmost recesses of his heart.

In 1789 he appears to have made some exertions, in order to place the situation of the chemical reader in Oxford, on a more eligible footing. In a letter to his friend Reynolds, dated in March of that year, he expresses a wish that a statement could be made to some member of administration, of the situation of the Professorships held in Oxford by medical men. To all of these, although some were perfect sinecures, a fixed salary was annexed; while the chemical reader, whose services were necessarily active and regular, derived no other emolument from his situation, than the fees of such students as voluntarily attended his lectures; and these he had found by experience, although his class was considered as numerous, barely sufficient to defray the expences attendant upon the course. He states the delicacy that he felt in requesting any person to undertake this office; remarking, that as he "certainly thinks that he should himself be extremely unwilling to solicit favors from the great, he should be very slow in imposing such a task upon another." He afterwards expresses his desire that any person who should undertake that office should confine himself to a simple statement of facts, "So much only," says he, "I would wish to have said, when the occasion comes: as for any further solicitation, I abjure and despise it, both from principle and pride."

From a subsequent letter, it appears that the late Sir Richard Hill had laid such a statement before some member of administration, and had expressed the fullest confidence of effecting his object. "In general" says Dr. Beddoes, "the strong expressions of great men, as they are called, carry very little meaning; but from what I know of Sir Richard Hill, and I have had opportunities of knowing

a good deal, I verily believe that he would not say more than he knew or thought to be the strict truth."

A few years since, the dignity and emoluments of the chair which the Doctor then occupied, were increased by the establishment of a chemical professorship; but his connexion with the University had been for some time dissolved when that event took place.

In other parts of his correspondence with Mr. Reynolds, chemical hints, speculations, and experiments constitute a frequent topic. Many of these it would be now useless to record, for their value has been destroyed by the changes which have taken place in the whole system of chemical science. These changes he does not appear to have hastily adopted; for, in a letter dated in March 1789, he observes that Dr. Priestley had, in a paper then recently published, "entirely overthrown the new system of Lavoisier." This concession is the more striking, as it seems that he was strongly disposed to admire the philosophical simplicity of the new doctrine, upon its first promulgation; but these difficulties induced him to suspend his assent. In the following year however, his doubts were finally dispelled by the experiments of the Dutch chemists.

In the autumn of 1789, after passing the long vacation in Shropshire, he meditated an excursion with his friend down the Wye. He was, however, prevented from executing his intention; and in a short note addressed to him in October, laments that he shall "be debarred from feeling any of those soothing sensations, which the retired scenes of nature inspire, particularly in the melancholy season of her slow decay." A disappointment of this nature was, to Dr. Beddoes, a real privation. Few men have ever had a keener relish for the beauties of nature; and the simplicity and purity of his tastes preserved that relish unabated to the close of life. His fondness for botany and mineralogy, gave an interest to scenes which would pass unnoticed by a less observant eye; while those of a more generally

interesting character, were contemplated by him with the enthusiasm of a poet. This is abundantly proved by several little sketches of scenery that he had casually visited, which are scattered through his correspondence. One such now lies before me, in a letter evidently written with the most careless haste, describing to Mrs. Beddoes an excursion of a few days into the Principality, with two friends, one of whom was a sufferer from a nervous complaint. "While at Rhayader," says he, "the spirit of adventure decided us for the Devil's bridge; this was leaving home far behind; we took a chaise, traversed long tracts of mountain, and called at most houses in these unfrequented solitudes. We passed no turnpike in fifty miles. There was often no track. At the Devil's bridge we found wildernesses worthy of a gang of Salvator's banditti. Conceive declivities impenetrably covered with wood; deep ravines cut by rapid rivers; this mass of deep green; the sound of numerous waterfalls; and inclosing all, as if to shut out the world, bare mountains with their crested and corniced summits. The stillness of the woods contrasted strangely with the rapid motion and incessant roaring of the cataracts, of which one is above 100 feet in length. The sensations excited by this combination are terribly sublime; in nervous people they would be painful. One of our party, as he was crossing the bridge after a moonlight view of these woods and waters, felt as if a murderer was at his heels, with intent to throw his body into the depths below."

In like manner, the incidental mention of Kynance Cove near the Lizard, in a work to be hereafter noticed, betrays him into a description, which shews how deeply he felt the enchantment of its scenery.

Upon his return to the University in Michaelmas Term, he expresses to his friend the gratification which he felt at the success of his lectures. He observes "that they were attended by a full and overflowing audience," and that "the interest for scientific researches

was not confined to the younger members of the University only." Indeed, one of his pupils and friends, who was long connected with Oxford, speaks of the effect of his lectures in the following terms— "The time of Dr. Beddoes's residence in Oxford was a brilliant one in the annals of the University. Science was cultivated more than it has been since, and I believe that I may say the same of the period which preceded. Dr. Thomson's lectures on anatomy and mineralogy, and Dr. Sibthorp's on botany, were delivering at the same period; and produced a taste for scientific researches which bordered on enthusiasm."

In the month of February, 1790, Dr. Beddoes published at the Clarendon press, an analytical account of the writings of Mayow; under the title of Chemical Experiments and Opinions extracted from a work published in the last century. In a copious introduction prefixed to this analysis he vindicates the author's claim to the admiration of posterity.[5] His mind teems with a prophetic anticipation of the future triumphs of medicine from its union with chemical science; and in the importance which he assigns to the function of respiration, and in the still higher uses of it of which he anticipates the future discovery, we may trace that bias of mind, which afterwards led him to attempt the introduction of remedies of a totally new character, into the system by that medium.

Till the appearance of this treatise, those brilliant discoveries which had outstripped by upwards of a century, the more tardy advances of other chemical philosophers, had either remained totally unknown, or had received only a scanty or derogatory notice. The

[5] The style of this introduction is much inferior to Dr. Beddoes's preceding, as well as subsequent writings. He himself finds fault with it, in a letter addressed in the following year, to a former pupil who was attending the classes at Edinburgh: "What does Dr. Black," he asks, "think of Mayow? I have put too much ornament and verbosity in what I have written of him, but I have not changed my opinion of his merits."

idea of rescuing departed merit from oblivion, and of paying the homage due to original genius, seems to have awakened all the enthusiasm of Dr. Beddoes's character. He thus alludes to the subject in a letter to Dr. Darwin, a short time before the date of this publication. "You may by this time have heard, for, in consequence of my own communications, and those of many persons to whom I had mentioned the circumstance, it has spread pretty wide; that an Author, an Englishman, and a Physician, clearly and distinctly discovered, a little after the middle of the last century, several capital branches of the pneumatic theory of chemistry; and he employs, not vague terms, but clear experiments, and an apparatus such as will astonish every intelligent person who sees it for the first time. I have employed a few intervals of leisure, to brush the dust off the memory of this, perhaps, next to him who awes all men to a respectful distance, the greatest of our natural philosophers."

By the exertions of Dr. Beddoes and the labours of subsequent writers, the history of Mayow's opinions may now be considered as amply elucidated; and when we examine these opinions, and contemplate the pneumatic apparatus, which he had contrived in order to bring them to the test of experiment, we cannot help feeling that surprize, a portion of which was communicated upon the same occasion, even to the philosophical spirit of Dr. Black, and induced him to lift up his hands in silent astonishment.

But these are not the only wonderful circumstances connected with the writings of Mayow. The early period of life at which his discoveries appear to have been made, must excite equal astonishment. He had not completed his twenty-third year. "Intellectual eminence," says Dr. Beddoes, "if I am not much mistaken, is far more early attainable in those things which depend upon books and the internal workings of the mind, than in the observation of nature. Is there any other instance of one who had so soon

discovered a system of natural operations so extensive, and so remote from the common apprehension of his times?"

There appear to be periods in the history of human knowledge, when the most brilliant discoveries remain unnoticed and sink into premature oblivion. Perhaps there is scarcely found in contemporary minds sufficient congeniality to receive, far less to reflect the light which is imparted. The precious seed is wasted on a desert, or lies barren, because the season favorable for its developement is yet afar off. The silent lapse of time however, gradually brings round a more genial period, and the harvest is the more abundant because it has been so long delayed.

The mingled reflections however of surprize and regret which are suggested by a perusal of the writings of Mayow, will be still more strongly awakened, when we find that even prior to their publication, some observations had appeared from the pen of another of our countrymen, Dr. Hooke, which seem to have anticipated some of his most brilliant discoveries. Yet the writings of that philosopher had equally escaped the notice of him, who in the treatise under consideration, appears so desirous of paying to departed genius the homage which it merited; and of a successor in the same walk, the title of whose work, rendered such knowledge indispensible to its due execution.[h] In truth, we know not how far the intense industry of the chemical and alchemical students of a former age, may have anticipated many other discoveries which cast lustre upon our own. A feeling of this kind seems to have prompted the wish expressed by Dr. Beddoes in this publication, that "in the present superfluity of literary men, one at least might be spared from other services, to explore the dark volumes of ancient chemistry." It is possible, perhaps indeed, probable, that if this wish were realized, the laborious

[h] Dr. Yeats's examination of the Claims of the Moderns, &c.

examiner might not meet with a single discovery to recompense the weariness of his search; but we should at least have the satisfaction of knowing that the mine had been fully explored, and that no unknown treasures remained concealed in its bosom.

An experiment with which he amused the University in the following June, shall be related in his own words, as contained in a letter dated on the 10th of that month—"Last night I astonished this part of England with sending up an air balloon; filled, partly with light, partly with heavy inflammable air. I was desirous to try whether such a mass of inflammable air, burning at a considerable height in the armosphere, would produce any imitation of fiery meteors. It was fired at about three miles distance from the place of starting, and probably somewhat less than a mile high. This was done by touch-paper, and it was contrived that the case should be torn and thrown off, as soon as the blaze was communicated to it. We saw this distinctly. On the demolition of the case the colour of the flame changed, and the ball of inflammable air, being freed from the load, rose sensibly and suddenly. It continued compact and burnt away with a lambent flame, 'till it was diminished to a very small size. It was one of the most perfect and beautiful experiments I have ever seen. I have never beheld an igneous meteor, and as descriptions of such objects are very ill calculated to convey accurate ideas, I cannot pretend to ascertain the resemblance or difference. The manner of burning, as I conceive, is not unlike."

It has been observed in a former part of this volume that Dr. Beddoes had acquired, at an early age, a great fondness for mineralogy. He continued to cultivate this science with equal assiduity and success. In his shooting excursions he had met with several rare and curious specimens, and his speculations upon these subjects, as connected with the natural history of the earth, constituted an interesting part of his course; especially after Dr. Thompson, who

lectured on that science in conjunction with anatomy, had quitted the University. His theory of the earth was conformable to that of Hutton, and in his correspondence with Mr. Reynolds he frequently alludes to the subject, and shews himself to be a zealous Vulcanist. He probably, indeed, adverted the more frequently to any facts which appeared to him to favor that doctrine, as his friend seems to have been inclined to the opposite hypothesis.

In a letter to one of his pupils, dated in 1790, he observes that he had made many discoveries relating to physical geography, and all tending to corroborate his faith in Dr. Hutton's theory. "I have a good deal of matter, " he adds" that I might publish, but it is so much more irksome to make books than observations, that I know not when I shall prevail on myself to arrange my ideas." Part of the result of these discoveries, however, he communicated in a paper read before the Royal Society in 1791, and published among their transactions for that year; entitled, observations on the affinity between basaltes and granite. This is a curious and well written dissertation, in which, to use his own expression in a subsequent letter, he has aspired to elucidate some of the most intricate questions relative to geology. He begins by observing that "all our opinions on the formation of rocks and mountains, except volcanic mountains, must of necessity rest upon analogical reasoning; since we have no direct testimony concerning their origin. Hence, whatever portion of the mineral kingdom is but little connected with our experience of the action of fire and water, must be slightly passed over, or set aside for future investigation, while the partizans of the two opposite hypotheses which at present divide the philosophical observers of fossils, fix their whole attention and lay all the stress of their arguments on such particulars as they are able to connect by some analogy, with chemical operations in which either fire or water is principally concerned. Hence basaltes has been

much more the subject of disputation than granite; the former species of rock offering appearances that coincide in some degree with both kinds of chemical processes, while the latter seems to stand aloof from the experiments that have given birth to our sciences." His object in this paper is to take up the subject in a light somewhat new. He first assumes the origin of basaltes from subterraneous fusion, as established by various authors. He comprehends under this term "that vast family of rocks which is frequently cracked into regular colonnades, and may be followed in an unbroken series from this perfect form, through endless modifications, to the most shapeless mass of trap or whinstone." He proceeds to trace its connection with granite through a variety of gradations more or less insensible. He affirms that these rocks may be observed gradually approaching and changing into one another; and as the evidence of a single mineralogist on such a point, might be liable to suspicion, he fortifies his opinion by a numerous collection of authorities. It is remarked as another striking circumstance in their natural history, that "they lie so contiguous, and are so involved in one another, that we cannot but suppose both to have undergone the same operations of nature, at the same time. In support of this position also, multiplied authorities are cited. Another analogy between them arises from their situation with respect to other rocks; in which particular, both appear to observe the same laws. "Thus, there are numerous instances in our own island where basaltes is substituted instead of granite, and others where it seems so alternate with it, as the substratum of other rocks; nay, the analogy extends even to the exceptions to the general rule of super-position; for as lime-stone is said sometimes to rest immediately upon granite, so at the foot of the Wrekin and at Lilleshall-hill, no slate is interposed between the limestone and basaltes." From these premises he draws this important conclusion; that "the common division of mountains into

primary and secondary is to be rejected;" and the paper concludes with some strong arguments in favour of the volcanic origin of both.

On the whole, the author appears to have cited many cogent and ingenious arguments in support of his doctrine of the affinity of these bodies, and to have thrown light upon a difficult subject. But admitting that he has established this point, the question whether their present form and arrangement are to be attributed to the agency of fire or water, is a subject which will not soon cease to divide the opinions of philosophers. *Adhuc sub judice lis est.*

In the same year he contributed another paper which appeared in the second part of the same volume, containing an account of some appearances attending the conversion of cast into malleable iron. His intimacy with Mr. Reynolds, whose manufactory was conducted upon the most extensive and improved plan, gave him every facility of frequently inspecting this process; and his account is the result of repeated observation. In the process of conversion, it appears, that the melted mass is constantly stirred; that after it has been for some time in a state of fusion, it begins to heave and swell, emitting a blue lambent flame; that this flame continues to burn for some time, till its colour becomes pale and at length ceases; and that the metal becomes gradually comminuted to the size of gravel, and at last to that of sand. The most interesting of these phenomena, he thus explains upon the principles of the French and Swedish schools. "Cast iron," he observes, "is iron imperfectly reduced, or in other words it contains a portion of oxygene: it contains also a portion of plumbago, or iron united with charcoal." The heaving or swelling motion he attributes to the developement of an elastic fluid; and this elastic fluid, from the lambent deep blue flame breaking out over the surface, he concludes to be heavy inflammable gas. For the production of this gas he accounts, by supposing that "the oxygene of the imperfectly reduced

metal, combines with the charcoal to form fixed air, at the same time that another portion of charcoal is thrown into an elastic state, that is into inflammable air, and burns on the surface with a very deep blue flame on account of the admixture of fixed air." The paler colour of the flame, in a more advanced period of the operation, he attributes to the more sparing production or entire absence, of this gas.

In the succeeding volume he furnished an appendix to this paper, containing an account of a variety of experiments which he had performed in order to ascertain how far his theory was conformable to fact. They abundantly confirmed the inferences which he had drawn, and demonstrated beyond doubt that air was really extricated, and that this air, during different periods of the process, underwent those variations which his conjectures had anticipated.

He also deduces an observation which subsequent experience has fully established, that the fusibility of iron is in proportion to the charcoal that it contains; and pursuing this principle, he explains how lumps of cast iron of an inconsiderable size, from one to three drachms for instance, will resist for a long time the effects of very intense degrees of heat. The external surface has its charcoal dissipated, and is converted into a coat of malleable iron; and within this shell or crust, the cast-iron remains, to a considerable extent, unchanged: hence results the necessity of the constant stirring to which the mass is subjected in the furnace. These papers are drawn up with much neatness, and shew the ingenuity and minute observation of the author.

It was about this time that he addressed a memorial to the Curators of the Bodleian library, concerning the state of that noble institution, and the conduct of the principal Librarian. This is not the place to notice the abuses or irregularities of which this publication complained. If they existed, it is to be presumed that every

necessary remedy was resorted to, by the guardians of a repository, which claims the proud appellation of the second library in the world.

In the succeeding long vacation (1791) Dr. Beddoes accompanied Mr. Giddy into Cornwall, and paid him a visit of several weeks. He appears to have passed his time under his friend's roof very happily, and his correspondence shews that he quitted it with regret. The mineralogical history of Cornwall particularly interested him; and the scientific character and pursuits of his friend stimulated his mind by collision. His speculations upon the volcanic origin of the earth, received additional confirmation during this excursion. He surveyed, with much attention, the external face and the internal strata of that county and Devonshire; and imagined, as appears from one of his letters, that he had detected the leading idea of the physical geography of the West of England, viz. that Dartmoor should be regarded as the "centre of lifting" or subterraneous explosion. Other objects however divided his attention with his mineralogical pursuits. A scheme was in agitation during his residence in Cornwall for the establishment of a county hospital. Upon this, as upon many other subjects, Dr. Beddoes's opinions deviated considerably from the beaten track. He thought that there were numerous disadvantages connected with all institutions of this kind; and circulated a paper, in which he recommended as a substitute, at once cheaper and more efficient, the general establishment of dispensaries and convenient houses of reception for the sick. As this paper excited much attention, I have given it a place in the Appendix.[1] A few extracts from his correspondence with Mr. Giddy upon quitting Cornwall, will present to the reader some of the less grave features of his mind, and relieve the present narrative.

[1] See Appendix, No. 3.

Exeter, 2d Nov. 1791.

"Now since I am got under weigh after quitting the station where I lay so long, just like the

Non missura cutem nisi plena cruoris hirudo,

I shall advance rapidly onwards, and indeed, I already consider myself as almost arrived at the place of my destination. Meanwhile, as it will be no expence of money to you, nor of very precious time to me, I sit down to tell you how I came hither, and what I have met with at Exeter. I am afraid my materials, unless I should distort their shape or size, which I shall not condescend to do, will not furnish a very engaging narrative; but let fortune bear half the blame at least. Neither our truckle bed in the corner at Saint Agnes, nor my unquiet bedfellow, nor the searching east wind that buffetted us so severely as we wandered among the moors, felt so comfortless, as the stay at Bodmin after your departure. I was amused however on Monday morning with the fair of St. Lawrence. The movements of the sheep, their sellers and buyers, with the spectators, in a fine spacious field, from which there was an open prospect on all sides, exhibited a very lively shifting scene, and very unlike ordinary fairs, where the cattle are crammed into a narrow dirty street. I should have enjoyed a pleasant ride much better if I had not been under just apprehensions that the coach would not afford me any inside place. Of late, it had been generally full; and another person had been three days beforehand with me in bespeaking the first vacant seat; and the wind piped so chilling a tune in our faces, that I should not have ventured to put in practice the resolution I had formed of encountering it on the top rather than wait any longer. To stay at Bodmin 'till Wednesday, notwithstanding the temptation of being present at a christening at Mrs. ———'s, was an idea against which my heart heaved. At last I reconciled myself by this scheme: F—— very kindly offered to lend me horses to Launceston; and

from thence to Exeter I promised myself an agreeable walk; and I really felt somewhat disappointed on being informed that there was one place at my service in the coach. Being seated with my back towards the horses (which in cold windy weather is the best side of the coach, especially when you are windward bound) and the moors offering but few objects for observation, I had abundance of time and opportunities to cast as many westward looks as I might find convenient. My companions of the journey were not over engaging. A servant of Sir —— ——, in livery, was as disagreeable as forwardness, foolishness, and a breath fully impregnated with brandy, can well make a man from whom you cannot budge four feet. A poor invalid of a King's Messenger was a harmless character of insipid civility. He had posted through the world without having seen, or desiring to see, any one object distinctly. From what he said, I gathered that he had been dispatched on an errand relating to the packet in which the intrepid Dutchess of ———, is going to Lisbon, with the amiable intention of nursing her dying husband. Unfortunately, our gallant messenger was fully possessed with the importance he derived from being engaged in the service of so great a lady, and our ears were tired long before his tongue with "My Lady Dutchess," and "Her Grace." Unfortunately too, we were driven to the Inn at Launceston, where her Grace and her Grace's train had occupied all the beds and all the attention of the people. At length, after shivering full two hours, in a large room freely traversed by the eastern breezes, 'till beds could be procured for us in the town, we were marched out; and it fell to my lot to be separated only by a partition of boards, from a noisy party that sate up a good part of the night. We had a most tedious journey to Launceston, from three to near ten, in consequence of waiting two hours at the Jamaica Inn in the midst of the moors, for another coach: On this side Launceston, however, the rising sun spread out the beautifully varied

scenes of Devonshire; and her woods, her green meadows, her cultivated swells, and her clear streams, could not fail to amuse an eye that had been so long accustomed to the dreary desolation of Cornwall."

"Bath, 4th Nov. 1791.

"You did not reckon upon my writing to you again before I had compleated my journey; nor did I myself; and if, as is very possible, you are now (ten o'clock) reading my last dispatches, you will not, I dare say, feel any presentiment of the new ones preparing for you.

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"My confidence that I was as good as safely arrived at home, when I was once got into the track of hurry and bustle, was very near receiving a severe check this morning. In coming down the very steep hill just on this side of Exeter, a stout young horse that had never been harnessed before, *took head*, and, in spite of the coachman, whirled the coach from one side of the road to the other with the utmost violence. He was making to a place where the fence between the road and a precipice is very weak, and had drawn the south wheels fairly off the road, when the other shaft horse fell down, and stopped the coach with his body and legs. I had no apprehension of the danger 'till now, when the coachman handed us all out. He said that he had never been so terrified before. The poor animal who saved our bones, and perhaps our lives, fell a sacrifice; at least I imagine he must have received a mortal injury, though he did not expire on the spot. We waited two hours for fresh horses.

* * * * * * * * * * *

At breakfast I had the gratification of hearing an account of myself, incognito. A young man, a templar I think, said I was gone to Town with Sir —— ——; that I had discovered three volcanoes in Cornwall, and was to explore Devonshire next summer. A lady asked if this was Dr. Beddoes of Oxford, and if the author of the

intelligence knew him. He replied in the negative. She added, neither did she, "but I have heard, excepting what he may know about fossils, and such out of the way things, that he is perfectly stupid, and incurably heterodox. Besides, he is so fat and short that he might almost do for a shew." At first, I encouraged the conversation, as supposing that my appearance would ill correspond to the grave and dignified idea of a professor. But now, I was afraid of being detected; especially as I had Strange on Basaltes in my hand, the plates of which they had been admiring. However, it passed off, and I heard a good deal more news of myself, which would not be worth repeating, if there was room for it. They mentioned something about a gentleman who had taken me into Cornwall, (meaning you, though they were not acquainted with your name) which I shall reserve for your ear, if I should remember it so long."

"Shiffnall, Nov. 21.

"I do not believe that in all my life I have ever written so much about myself as I have lately done to you; except perhaps to my mother and sister. However, pray do not be afraid lest I should always continue in the same strain. Hereafter I will take up a more interesting subject; but as you have already had so much of my journal, I will even send you the conclusion; were it but for the sake of filling up the measure of the depredations I have committed upon your time. Except the volatile S——, whose goodnature kindles at your approach and dies away at your departure, I did not meet with a single person who cared for me, after parting with you, 'till I arrived in Warwickshire. There are multitudes of old unemployed bachelors and autumnal maidens in this, and the reciprocal, (which is a good deal the worse) condition. How comes it that when they find their whole life to be made up of such comfortless portions, they should take the trouble of eating and drinking to prolong it?

At Birmingham I met with several people whose countenances cheered up at my entrance. Being abundantly satisfied with travelling in stage coaches, I determined to walk home. I had formed, on the road, a design of passing a day with K——. I had indeed long wished to be better acquainted with him. His house lies by the way, seven miles from Birmingham. Fortunately he was at home. As our opinions in chemistry were *different*, and as he is the intimate friend of Darwin and Day, we should have been unlucky indeed if we had wanted conversation during the two days I passed with him, and passed very pleasantly. I was sorry when he told me that Mrs. Day had quitted his house not long before. I know not the origin of the association, but from my earliest remembrance, the sound of her husband's name was always accompanied in me with an agreeable emotion: and upon the maturest reflection, I cannot but regret his premature death, as an event that deprived his country of one of its most distinguished ornaments. It was hard that he did not live to see any fruit of his own efforts at home; it was still harder to be cut off before the National Assembly had eventually atchieved the temporal salvation of mankind. Had he been a member of that assembly, he would have been next to Mirabeau in talents; and the eminent superiority of his character would perhaps have given him the precedence upon the whole. Nor do I believe that the eloquence of the French Statesman was more calculated, either in his writings or speeches, to gratify the ear and to convince the reason. His large fortune did not make a coward of him, as is so commonly the effect of wealth; nor did it impair his equity towards others. His refusal to represent a county when solicited; his long demur whether he sho ld marry a lady whom he perfectly approved, merely because she had a large fortune, and a few other of his actions, give him a romantic cast; and he may be regarded as a Lord Herbert of Cher-

bury, perfectly humanized and instructed.[k] When your sister procures a book I recommended to her, she will see him under another, but not a less advantageous point of view. Mrs. —— told me that when he was last at her house, there came continual troops of children to look at the author of Sandford and Merton. She spoke of Mrs. Day in very high terms, and promised that when she returns, which will probably be soon, she will let me know. I am curious to see her, both on her husband's account and her own; and rather more so, as she is young and handsome: though she has suffered much from the loss of her husband, and the aggravating circumstances that accompanied it.[l]

"When I was near taking my leave, K— urged me, as far as civility would permit, to assist him in his great chemical work, offering me any articles I might choose. I could not but be sensible of the compliment, nor could I doubt its sincerity. I observed to him that at first sight I would much sooner be under-rated than

[k] It may gratify the wise and good to oppose this philosophical estimate of the character of such a man, to the unfeeling flippancy of a lady who has published memoirs of the earlier part of the life of Dr. Darwin.

[l] This promise was, shortly afterwards, fulfilled; but the acquaintance which sprang from it was soon interrupted by death. Of this circumstance he thus speaks in a subsequent letter. "The newspapers have announced the death of Mrs. Day. I congratulate myself on having had a slight acquaintance with a lady, who was most certainly destroyed by sorrow for the death of her husband. Before I saw her, K—— had told me that she was *still* much more affected by her loss than any person in her circumstances ever ought to be. This information, coming from so respectable a quarter, very much increased my curiosity to see her; and he promised to send me word when she came next to his house. I never met with a person of superior sense, though she was evidently broken-hearted. Considering, on the one hand, that only persons of powerful understandings are capable of very strong affections, and on the other, that Day was one of those strongly-marked characters that are doomed to be detested or adored by all who approach them nearly, I am the less surprized at a phenomenon which I do not desire to see repeated."

over-rated, and so little liable was I to the last misfortune, that perhaps it had now happened to me for the first time. I had not such extensive reading as qualified me to bear much s are in so comprehensive a work, nor did I greatly relish the idea of searching a vast number of books for the necessary facts. There were, however, a few articles, as iron and some others belonging to metallurgy or chemical mineralogy, in which I would assist him; but I would by no means engage to write an equal share of four or five vols. 4to. Besides, he was the most able and conspicuous defender of the old system. To me, truth seemed to lie on the opposite side: The different articles would therefore be at variance with one another; and though he probably had raised his mind by reflexion above such a weakness, few men could bear to be contradicted, and fewer to be confuted by those who were much younger than themselves. He still continued his solicitations, and requested at least that I would consider his proposal seriously before we should meet next.

"The morning I came away I played an hour and a half at battledore and shuttle-cock with Miss K—; and she promised the next time I came, to go with me to Dudley Hill and shew me some fossil curiosities, which her father and I had failed to find. We had seen some curious dispositions of strata from lifting, and upon comparing the globules from Chinoweth (how do you spell the word) with the Rowley rag-stone we could not perceive any difference. Miss K— is a botanist and somewhat of a chemist. Her father strongly objected to music, and went so far as to say, that girls who were good players were good for nothing else. You may be sure I was faithful enough to the truth to protest against the narrowness of this opinion: I told him if he could bring me as decisive experiments, as I could bring him instances of ladies who excelled in music without being deficient in any thing he might require in the sex, I would relinquish oxygene and return to phlogiston.

" I may be thankful to my residence in Cornwall for being able to walk home (twenty miles) without stopping on the way, and without inconvenience. Yet I was loaded with one quarto and two octavo books, and a few articles besides.

" Without laying a bait for a compliment, I am alarmed at the weary length of my letters. I will curtail them in future. Can you read this galloping hand? I hope you will be able, for it is a great convenience to me to write thus, without attention to the words I use or the way I write them."

" Shiffnal, Dec. 1.

" My dear Friend,

" I have lately fallen in with a number of persons of intelligence in various departments, and as I imagine the sun of information sometimes peeps but late over your western hemisphere, I will try to recollect the heads of what I have heard. The siege of Syracuse by the Romans, not to take you back all at once to too remote a period, happened, I think, a little more than two hundred years before our æra. None of those revolutions took place in Sicily, that overwhelm a nation and all its monuments in total destruction. The people remained, and the language. The chain of history continued unbroken. Nevertheless, Cicero, so soon afterwards, is not a little vain of having pointed out to his countrymen the forgotten tomb of Archimedes. With what congratulations then shall we receive the man who has been fortunate enough to draw aside the veil which oblivion has held for three thousand years over the remains of Troy? Yes, they are brought to light; the ruins of the Scæan gate, the foundations of the walls and of the turrets, and the *Tristes Danaûm reliquiæ*, the tombs of Ajax and Achilles. Tell me, if you possessed the cap of Fortunatus, would you transport yourself to the banks of the Seine or Scamander? for my own part I would go to both; but my first flight should not be to either. However, by taking Montmartre in your way to Mount Ida, you might appease in a small degree the hunger of curiosity, by examining *bouche béante*, the ashes of the Telamonian Ajax, and the urn which contains them. Though I am indeed sorely grieved to add, that according to our last advices, the said urn has been melted down with as little compunction, as if it had been modern European brass, instead of antient Asiatic orichalch. Nothing should have tempted me to commit so enormous a sacrilege. 'But are you jesting, or seized with a fit of credulity?' I am serious I assure you. My information comes, not immediately, but through a very pure and short channel, from a judicious and well informed person who spent the last spring and winter at Edinburgh in the capacity of a tutor; and who, unluckily for me, had, on my arrival, just quitted this country to go back thither. I cannot, therefore, give you the proofs of this extraordinary discovery so fully and so distinctly as I otherwise might have been able to do, but they will be published in the 3d vol. of the Edinburgh Transactions. The discoverer is a Frenchman: his paper was read before the Royal Society of Edinburgh, and, I understand, has had great weight with all who have considered it. Whether, besides mere situation, there are any inscriptions, I have not learned."

In the last letter was inclosed a short paper, which endeavoured to account for the curl, as it is called, in potatoes. The epistolary style is still preserved in it, but the speculation appears so ingenious, and affords at the same time such striking evidence of a mind which suffered nothing to escape observation, that I have thought it worth preserving.[m] He appears to have thrown out some hints upon this subject during his visit in Cornwall, and it was at the request of his

[m] See Appendix, No. 4.

friend that he now committed them to paper. I know not whether this was the circumstance which awakened afresh his ardour for botany; a science to which, as has been formerly remarked, he was partial, and in which he had made extensive acquisitions; but we find him early in January of the succeeding year (1792) engaged in writing Botanical Dialogues, which he thus announces in one of his letters.

"Will you laugh or will you frown if I tell you that I have begun to write a set of Botanical Dialogues? I wish the thought had struck me three months ago. I would give any thing I have to give, to shew them to a certain person, and to hear the opinion of that person.[n] Even now, deprived, as I am, of so great an advantage, if I can present to others, the ideas that float in my own imagination, in their proper shapes and colours, I shall do more good to women and children, than you will perhaps think of at first. In a day or two I shall hear the opinion of —— and ——, and, for want of a better criterion, I shall lay a good deal of stress upon their judgment. Two or three tolerable judges have pronounced too favorable a sentence upon the beginning already. You must understand I write them as fast as I write this letter."

Early in the year he returned to resume the duties of his lectureship at Oxford.[o] His class was still crowded, and the enthusiasm for

[n] An allusion is here made to a lady of superior talents, whom Dr. Beddoes had met in Cornwall, and who appears to have powerfully impressed his imagination.

[o] One of his letters, written soon after his return, contains an amusing anecdote: Mr. S—, a member of his college, had introduced to him a Mr. Millar of Edinburgh; a gentleman whom the Doctor characterizes as an intelligent and respectable man, and a friend of Adam Smith. They soon entered into a very pleasant conversation, during which a variety of literary topics were discussed. Amongst others, a metaphysical work which had not been long published, and the doctrines of which appeared to both, pre-eminently absurd, was alluded to. "I told him," says the Doctor, "that since the loss of Hume and Adam Smith, his country was in danger of losing its credit for philosophy; and speculatists, such as the author of the work alluded to, could not maintain it: But there is one person upon whom the spirit of Adam Smith has rested, and he is a namesake of your's, Professor Millar, of Glasgow. By the gloom of displeasure which instantly overspread S—'s countenance, I suspected that I had said something that I ought not to have said before the parties who were present; and I afterwards found that our stranger was Professor Millar himself. S— has worked up the adventure into one of his best stories, and if he has any correspondent in Cornwall, who happens to know me, you may have it in a much more agreeable attitude and dress, than as it stands here in the simplicity of truth."

science appeared to spread rapidly among his youthful auditory. In the course of the spring he was particularly gratified by a discovery made by one of his mineralogical pupils, which appeared to confirm his speculations relative to the volcanic origin of Granite. The seat of this discovery seems to have been on the borders of Devonshire and Cornwall, whither he invites his friend Reynolds, with some degree of triumph to contemplate the phenomenon. He begins a second letter on the same subject with an abruptness which, had it been intercepted in a season of political agitation, might have excited some alarm. "The plot thickens," he observes, "and we shall certainly have a volcanic eruption in full form in the West. My pupil has found the aperture whence the glassy lava issued. This he has clearly ascertained, and he has made a great number of acute and curious observations besides. He has found granite including masses of other substances, and injected into fissures, with a variety of appearances clearly indicating the posterior and igneous origin of this supposed primitive material; posterior only in this and similar cases. I doubt not of your being willing and even desirous to inspect such a scene. The only question is can you leave Shropshire for three or four days? If you can, say so; *et ero tibi magnus Apollo.* I will shew you what you never could expect to see. You might bring a third person to Bristol; he should not be too corpulent, and we will drive over the hills and far away. But alas,

we shall only snuff the gales of Cornwall, and not even that, but upon certain contingencies. There will be still between us, not, as Achilles says, many shadowy mountains and resounding seas, but many a clift without grandeur, and many a plain without grace."

Dr. Beddoes's situation in the University, at this period, must have been highly gratifying to his feelings. He enjoyed the reputation of distinguished talents, and the genius which he manifested in his lectures confirmed that reputation. He beheld a scientific spirit extensively diffusing itself in consequence of his exertions. His company was sought by the learned and the wise; and the Dean of Christ Church procured for him the distinguished honor, an honor scarcely ever conferred upon individuals not belonging to that society, of being elected a member of their Common Room. Few scientific men resident in that seat of the Muses have had to boast of a fairer prospect. But events were now taking place in the political world of a magnitude before unknown, and of which the final issue is still shrouded in an awful obscurity. The downfall of an ancient government in a neighbouring country, produced consequences which not only affected the situation of every individual in that community, but an agitation was propagated to the social systems of other countries, though separated by the widest differences of institutions and language, producing effects which were sensibly felt in every circle of society.

In the earlier stages of the French revolution a new day appeared to dawn on the world. The grand social principles which were at first proclaimed, found such an universal echo in every human bosom, not debased by corruption nor contracted by selfishness; that many, even of the most supple hirelings of despotism shrunk from the contradiction of the general sentiment, and affected a glow of sympathy which their palsied hearts were incapable of feeling. Those who deplored the evils of war, hailed the prospect

of the extinction of hereditary animosity between two neighbouring nations. Religion blended itself with such a hope in many bosoms, and the various prophetic visions of better times, which have, perhaps, in some instances, been too boldly pressed upon, and too fancifully explained, appeared to many an enthusiastic mind to be on the eve of completion. The mystic travail of the creation of a beneficent God seemed to be advancing to its close. The hope, alas! has been since most cruelly blasted. "The Genius of French Freedom (to adopt the eloquent language of the Biographer of Burns) appeared on our southern horizon with the countenance of an angel, but speedily assumed the features of a dæmon, and vanished in a shower of blood." Crimes and horrors were multiplied, 'till the pillars of the fabric of human society rocked to their foundation, and seemed to threaten to give way; and a despotism so abject and so profligate has succeeded, that the national antipathy which might at first appear to have been founded in prejudice, has appeared almost sanctioned by every virtuous principle. But, to triumph in such a termination of a cause of the fairest promise that was ever offered to mankind, is unworthy of any being who bears the form and aspect of rational and immortal man.

At such a period, it was not an easy task for any person possessed of an independent mind and ardent feelings, to avoid taking a part, and expressing an opinion, upon the important questions which were daily agitating. Dr. Beddoes, at least, was not that man. He hailed the dawn of French freedom with enthusiasm, and cherished, "through many a dark and stormy year" hopes of an issue in favor of mankind. In a long series of his correspondence, almost every letter bears testimony to that intensity of interest, with which he contemplated the events that were taking place in the political world. His anticipations are sometimes full of hope and confidence, at others they are clouded by dejection and dismay. With the progress

of the revolution, the sombre tints predominate; 'till, at length, he appears to have abandoned all hope, and to have determined to suffer his mind to be no longer agitated by any Continental occurrences. Nor was this an inefficient resolution. At the close of the year 1792 he bids adieu to political speculations, as far as France was concerned, and his subsequent letters scarcely ever allude to that country.

Although ample justice was done by his contemporaries in the University to his scientific acquisitions, his political speculations were of a nature that could not fail to be offensive to many; and they were not always, prudently (for such prudence constituted no part of his character) confined to his own breast. As yet, however, these offensive opinions had not been recorded in print; they were only expressed in conversation; and although the keenness of his opposition to the prevailing political sentiments, might sometimes excite a momentary warmth, it soon subsided, and he still continued his residence and labours at the University.

But it was rather to be wished than expected that with a mind so constituted as his, and a pen not unused to composition, he should long refrain from giving to his opinions a more permanent form and a more general circulation. In fact they form a prominent feature of the works which I am next to notice. In the beginning of the year 1792 he addressed a letter to a lady on the subject of early instruction, particularly that of the poor. An idea of the general distribution of his subject may be collected from the following table of contents:—"On the best method of teaching reading and writing—idea of a book proper for this purpose—of the care that should be taken to improve our early benevolent sensations into fixed principles of action—of the urgent necessity of humanizing the minds of the poorer class of citizens—inevitable consequences of a ferocious spirit in them—cautions respecting religious instruction—and lastly, the excessive

danger of strongly attaching to the dogmas of any sect, the minds of those who cannot examine the grounds on which they rest."—"In all education," he observes, "our earliest care must be to bestow that quickness of sight and apprehension in which ready reading consists. Is it indifferent what books are used for this purpose? If we confine our views to the immediate effects only, we shall assuredly save much time and a great deal of irksome labour. A very simple consideration will, I imagine, impress you strongly with the justness of this observation. Suppose, for instance, we should attempt to teach reading by means of a Latin book. The letters will be the same, the method of spelling similar. Only the learner would not meet with a single word to excite an idea in his mind; his progress would therefore be excessively tiresome."

From these considerations, he deduces the propriety of giving children such elementary books as they might easily comprehend. In the little volumes commonly used for that purpose, (he particularly cites Reading made Easy, as an example,) many passages occur, even in the earliest lessons, which, to a child, can convey no ideas. There are, for instance, many sentences relating to the nature and attributes of the Deity; which, as they are learned by rote by the child, and without producing any movement in the mind, may be afterwards heard by the man, with the same vacancy of thought: and this consideration, the Author presumes will have weight with his correspondent, whose benevolent piety appears to have been actively engaged, at the period when this letter was written, in the superintendence of a seminary for the education of the children of the poor.

In teaching the alphabet, he proposes, that an improvement suggested by a French author should be adopted, and that the written and printed character should be taught together. The efficacy of this plan has since been sufficiently established, by the successful

improvements in education, for which we are indebted to that benevolent friend of poor and uninstructed children, Joseph Lancaster. The labours of Mrs. Barbauld, Miss Edgworth, and some others, have furnished a sufficient variety of books adapted for their further progress; and selections might be made from these, adapted to the habits and observations of the more humble classes. "The pupil would be delighted with the image of his mind thus reflected, and his perceptions would become clearer, as he contemplated them in the faithful mirror of expressive language."

But, above all, he inculcates the necessity of awakening the benevolent feelings of our nature. Stories adapted for this purpose should be carefully selected; and when once those feelings were excited, "the attention should be led on to beneficent exertions, excited by these humane impulses." For want of sufficient care in inculcating habits of compassion and kindness, he expresses a fear, that the humbler ranks in England are greatly deficient in general humanity of disposition.

Thus far, (with the exception at least of the last proposition, which seems too generally expressed,) most of his readers would accompany him with pleasure; but his manner of treating some of his remaining topics, is by no means calculated to secure so general an assent. In deprecating bigotry, for instance, and in deploring the unsocial effects of a sectarian spirit, his censure has been too indiscriminate, and he has not been sufficiently careful to separate the chaff from the grain; to distinguish between those religious sentiments which spring from, or are allied to, all the noblest feelings of our nature, and those which arise from presumptuous enthusiasm, or abject superstition. The concluding section is devoted to political speculations; in which he animadverts with much severity upon some existing institutions. In these, although he may be sometimes betrayed into an imprudent vehemence of expression, it is impossible

not to recognise the ardent and sincere advocate of peace and philanthropy.

About this time also, it appears, that a portion of his leisure was successfully devoted to the cultivation of a poetical talent; for almost immediately after the date of this letter, he printed a poem called Alexander's Expedition to the Indian Ocean. The history of this production is rather curious. Some time previously to the appearance of Dr. Darwin's splendid poem on the Œconomy of Vegetation, a conversation took place in a circle of literary friends, upon the subject of the Loves of the Plants; which, as is well known, had preceded, by several months, the appearance of the former work. The magnificent imagery and harmonious versification of the Poet were unanimously applauded; and some of the company carried their praise so far, as to affirm that the style of this work was a style *sui generis*, and that it defied imitation. Dr. Beddoes maintained an opposite opinion. Much as he admired the poem in question, he thought that the Darwinian structure of verse might be imitated by a writer possessed of inferior poetical powers; and in a few days he produced, in the same circle, part of the manuscript of Alexander's Expedition, as an unpublished work of the author of the Botanic Garden. The deception completely succeeded; and some enthusiastic admirers of the latter work, pointed out with triumph certain passages, as proofs of their position, that the Author in his happier efforts defied imitation. After amusing himself for some time with this scene, he avowed the secret. To this circumstance he alludes in an advertisement prefixed to his work. "It originated," says he, "in a stratagem, which, if not entirely innocent, can be charged only with the guilt of presumption. In order to impose upon a few of their common acquaintance, the writer, in a few passages at least, attempted to assume the style of the most elegant of modern poets;[p] and though

[p] The praise here bestowed will not, in the present day, be permitted to pass without

he was encouraged by some degree of success to extend his design, he cannot build much hope upon so slender a foundation. He is too sensible of the difference between a hasty recital and a cool perusal; and between the effect of the same composition, in manuscript, and in print; nor can he forget the power of an illustrious name to disarm censure."

Although it is evident from this passage, that he designed, at that time, to submit his poem to the ordeal of public criticism, he afterwards changed his intention. He was, indeed, prevailed upon, in 1796, to contribute a considerable extract from it to the Annual Anthology; and he appears to have employed some of his leisure moments in correcting it; as two copies which are now lying before

objection. Time and fashion have much modified the opinions originally entertained of the merits of this exquisite poem. If, in the full gloss of novelty, it was perhaps extravagantly applauded, it has since, if I mistake not, been far more extravagantly censured. In truth, it is too evident, that party prejudice has arrayed itself in the garb of criticism; and the poet has been assailed with unsparing severity, because his writings have been thought to glow with too ardent a love for freedom, and too keen an indignation against the oppressor. For my own part, I do not see why all poetry should be conformed to one precise standard; or why those kinds of it, which are naturally susceptible of more luxuriant decoration, should be found fault with, because that decoration is bestowed upon them. In the other imitative arts we admit this variety; and at the same time that a pure taste will prefer, upon the whole, the simple and sublime forms of the Roman school, it will not be less sensible to the magical, though occasionally redundant, colouring of the Flemish or Venetian artist. A stronger objection than that of luxuriant decoration has been brought against the poems of Dr. Darwin. They have been characterized as a succession of splendid enigmas; in the perusal of which, unless the reader were relieved by casting his eye to the bottom of the page, and finding the solution in the notes, his progress would be continually interrupted, by the painful mental exertion necessary to comprehend the meaning so mysteriously conveyed. That this fault exists in some degree will scarcely be denied; but its extent has been much magnified by the severity of Pseudo-criticism. Horace Walpole, after bestowing upon both parts of the Botanic Garden much emphatic praise, states this objection; but goodnaturedly adds, "all this however, is my fault, not Dr. Darwin's. Is he to blame that I am no Natural Philosopher, no Chemist, no Metaphysician?"

me, have many various readings marked with pencil in the margin. But his opinion of its poetical merit seemed to become daily more and more unfavorable; 'till, at length, he entirely abandoned all idea of its publication, and was seldom inclined to indulge even a friend with the perusal of it. I should myself have been strongly disposed to have given this poem entire in the appendix to this volume; but the respect due to the opinion of the Author himself, and to the wishes of one, who cherishes every expression of that opinion with the sacredness of widowed affection, have restrained me. That the curiosity of the reader, however, may not be wholly disappointed, I shall here give a short analysis of the poem; with some extracts, which will shew that he has imitated his Prototype with much felicity and exactness. The harmony of versification which he had attained, will appear the more surprizing, when the reader is informed, (as indeed he himself states in the introduction,) that he had never before, written twice as many lines as the composition under notice consisted of.

The celebrated expedition of Alexander which he had chosen for his subject, is certainly highly susceptible of poetic decoration. The magnitude of the armament, and the grandeur of the object in view, equally solicit the admiration of the reader. The former consisted of one hundred and twenty thousand men, of which a considerable portion was cavalry, two hundred elephants, and of a fleet of near two thousand vessels. On board of these one third of the troops was embarked; while the remaining two thirds marching one on the right and the other on the left of the river, accompanied them in their progress. The ships all preserved an equal distance, and each stroke of the oar was marked by a shout from the boatswains; (keleustai) which was repeated by the rowers. The sounds thus uttered by multitudes, were still further increased by the echoes, that resounded through the solitudes of the forests, which, in some places, skirted the river; and by the wild songs of admiration and

applause uttered by those Indian nations which had submitted to the conqueror. Their astonishment was particularly excited by the horses which were on board; for such a sight had never been before witnessed in that country.[q]

The poem opens with a description of the vessels, and disposition of the land forces. Alexander is represented as standing upon the prow of the foremost vessel, gazing intently upon the unknown country through which he was penetrating, and feeling all his enthusiasm awakened by the magnificence and novelty of the scenes presented to his view.

" Now the new Lord of Persia's wide domain
" Down fierce Hydaspes seeks the Indian main;
" High on the leading prow the conqueror stands,
" Eyes purer skies and marks diverging strands.
" A thousand sails attendant catch the wind,
" And yet a thousand press the wave behind;
" Two veteran hosts, outstretched on either hand
" Wide wave their wings and sweep the trembling land.
" Each serried phalanx Terror stalks beside,
" And shakes o'er crested helms his blazing pride.
" While Victory, still companion of his way,
" Sounds her loud trump and flaunts her banners gay.

The description of the descending army is highly picturesque.

" By moss-grown clifts where infant fountains weep;
" By cataracts thundering down the shattered steep;
" Where from the rocky pier and stream-worn cave,
" Umbrageous forests span the lucid wave,
" Sail after sail they trace the mazy way,
" Their clamours mingle, and their state display.
" Forth from their secret glooms and rugged soil,

q The above account is partly extracted from Dr. Robertson's Historical Disquisition concerning India.

" The voice of uproar calls the Sons of Spoil;
" Far o'er acclaiming shores, the bounding throngs
" Attend the triumph with barbaric songs,
" Or, spent with haste, on wreaths of prostrate grass
" Recumbent, watch the long procession pass;
" Admiring much, as varied barks succeed,
" But most, the wonder of the wafted steed.
" The line flows on, by many a palmy isle,
" Round jutting capes, down many a deep defile,
" Where rifted mountains o'er the lost array
" Fling their vast shadows and exclude the day;
" While Echo, listening from her dripping cave,
" Mocks the shrill cry, dashed oar, and rippling wave,
" Now, quick emerging, o'er the wondering vale,
" Peeps the proud beak, and gleams the illumined sail,
" Now, sudden horror chills the jocund course,
" Impetuous rivers clash with headlong force,[r]
" Dire seeths the foam, and loud the surges roar;
" The deafened bands suspend the uplifted oar,
" Back reels the flood, devouring eddies curl,
" And foundering keels revolve with dizzy whirl.
" With deep-felt tread the sounding march disturbs
" The dark recesses of the matted herbs;
" Uncoiling serpents rear the towery crest,
" Point the dire hiss, and swell the speckled breast:
" Swift, Terror's arm lays low the hideous heads,
" The venomed monsters dart to distant beds:
" Aghast, the tyger and the lion quake,
" Shrink from their bulk and crouch within the brake.
" Through quivering foliage steely lustres glance;
" With kindling eye-ball, from his holy trance,

r " The Hydaspes and Acesines rush together with prodigious impetuosity, and with such danger to navigators, that some of Alexander's large ships were lost, many vessels damaged, and the whole fleet thrown into consternation."

" Behold ! the soul-abstracted Faquir start,
" And human feelings touch a palsied heart.
" And you, mild tenants of the peaceful shore,
" Which ne'er Invader's step profaned before,
" Who bask secure amid your sunny glades,
" Or ply the loom beneath your scented shades,
" How throbbed each gentle breast with wild alarms,
" As o'er you burst the startling blaze of arms !
" Roused 'mid the silence of their lone retreats,
" Your Rajahs haste from forest-cinctured seats ;
" Spice, gold, and gems, and fine-wrought fabrics bring,
" And soothe with gifts out-spread the stranger-King.
" The glowing Hero—while responsive shores
" Ring to the labour of unnumbered oars,
" While with slow pace his long protracted train,
" Toils up the steep or spreads along the plain ;
" While tribes of tawnier hue and lighter dress,
" Submissive awe, by suppliant signs express ;
" And patriarchs hoar, and chiefs of manly prime,
" Bend to the warrior of the western clime ;
" From the scared groves as plumes unknown arise,
" Strange notes resound, and glance more vivid dyes ;
" As stems of prouder growth and gaudier flowers
" Entwine wild fragrance round unfading bowers,
" And giant trunks out-stretch their mightier shoots,
" Spread ampler leaves and tempt with fairer fruits ;
" In swift succession as before his eyes
" A new creation's wonders crowded rise—
" —Long mute, long fixed by extacy's controul,
" Pours forth at last the fervour of his soul.

An animated address now follows to the Genius of the River. The mingled awe and astonishment, with which the sight of this formidable expedition had affected the natives of the East, were felt in turn, by the brave companions of Alexander, (accustomed only to the inconsiderable fluctuations of the Mediterranean) when they witnessed the impetuosity of the currents of the Indian rivers, and beheld, for the first time, the phenomena of the tides. These circumstances are thus alluded to in the invocation.

" Thee I invoke ! thy name, thy nature say,
" Oh ! grant thy presence to the eye of day !
" So shall thy censers blaze, thy temples rise,
" And nations offer rightful sacrifice.
" Our western main thou scornest—benumbing sleep,
" With leaden sceptre, quells that sluggish deep.
" Here paused the monarch, and with arms out-spread
" Bowed to the power unknown his radiant head.

From the contemplation of the flux and reflux of the tide, the Hero's attention is next attracted to the surrounding landscape, which he thus apostrophizes.

" Ye fields for ever fair ! Thou mighty stream !
" Bright regions ! blessed beyond the muse's dream !
" Thou fruitful womb of ever-teeming earth !
" Ye fostering skies that rear each beauteous birth !
" Trees, that aloft uprear your stately height !
" Whose sombrous branches shed a noontide night.
" Groves, that for ever wear the smile of spring !
" Gay birds, that wave the many tinted wing !
" Of reptiles, fishes, brutes, stupendous forms !
" And ye, of nameless insects glittering swarms !
" Sons of soft toil, whose shuttle beauty throws,
" Whose tints the Graces' earnest hands dispose,
" Whose guileless bosom Care avoids and Crime,
" Gay as your groves and cloudless as your clime !
" Primæval piles, that rose in massive pride,
" Ere Western Art her first faint efforts tried !
" Ye Brachmans old, whom purer æras bore,
" Ere Western Science lisped her infant lore !

" How will your wonders flush the Athenian sage,
" How ray with glory my historic page?

He proceeds to compare the landscape before him with the fairest scenes of Greece; and after giving the preference to his new conquest, thus expresses his determination of closing his days in India.

" When every clime shall see my flag unfurled,
" And boundless commerce mix a cultured world,
" From mad misrule reclaimed, and brutal strife,
" Trained to the soft civilities of life,
" When Home's dear ties shall fix each roaming horde,
" And earth shall kneel before her Grecian lord,
" Here shall my arms be hung,—in this retreat,
" My age repose,—here fix its silent seat.

Upon the arrival of the army on the borders of the Indian ocean, the Poet suspends his narration to apostrophize the Chief. He attributes to him plans of the most comprehensive and benevolent description, and laments their frustration by his premature death.

" To HER scared eye, as Fate's dark leaves disclose,
" The ghastly characters of India's woes,
" Thy parting sail, O King, the pensive muse
" With many a sigh, down India's stream pursues.
" Large was thy thought, and liberal was thy soul,
" Nor stooped thy glance beneath bright honor's goal;
" Beyond the Sage's amplest grasp, thy mind
" Embraced the mighty mass of human kind,
" And spurned with firm disdain, the barbarous rule,
" Framed by the founder of the subtle school.
" For this, where HISTORY, 'mid the dome of FAME,
" Awards the tyrant's, and the conqueror's shame,
" And all the nations mingling round the throne,
" Wait on her lips, and catch each awful tone.

" Humanity's mild voice, still raised for THEE,
" Abates the rigour of her stern decree.
" For sympathy could melt that feeling breast,
" And vanquished realms thy healing mercy blest;
" On agonizing woe and captive fear,
" Thy pity shed the warm consoling tear,
" And each soft deed, through many a distant age,
" Shall swell the canvass, and bedew the stage.
" Lo! in redundant current, Commerce pours,
" Obedient to thy call her eastern stores;
" And still, though Plague and Rapine range the land,
" Her spicy bale perfumes thy chosen strand.
" And oh! had years matured the fair design,
" Of which thy genius traced the wondrous line;
" Had GENERAL CONCORD from her finished fane,
" Shed her pure light, and breathed her strains humane,
" Man's varied race, from far dissevered lands,
" Her courts had thronged, and pledged discoloured hands;
" Her shrines had witnessed varying voices blend
" The vow, and in the stranger hail the friend;
" Stern Scythia's clans had cast their rage aside,
" Unsocial Greece renounced her selfish pride;
" And long, beneath thy star's protecting ray,
" Had bloomed the regions of the rising day;
" With keen awakened sense, the list'ning child
" Still on his mother's fearless bosom smiled,
" As, deep concealed o'er-arching shades among,
" Content had caroled blithe his chearing song;
" And still, from far, the swarm of plunderers loured,
" Eyed the fair fruits, and but in thought devoured.
" But earth's fond hopes, how blasted in their bloom!
" How feels a world convulsed thy early doom!
" What mingling sounds of woe and outrage rise!
" How wild the eddying dust of ruin flies!

" As frantic Chiefs the Master's pile deface,
" Rend his strong walls, and shake his deep laid base.

The train of thought which had been suggested by these events, now leads him to mourn over the lengthened miseries of India under her various Conquerors. Under this head, he sketches with appropriate colouring, the horrible effects of the famine produced by the rice-monopoly: a scene from the contemplation of which, the mind recoils; and would fain soothe itself with the persuasion that it never could have occurred.

" Mourn, India mourn !—the womb of future time,
" Teems with the fruit of each portentous crime.
" The crescent onward leads consuming hosts,
" And carnage dogs the cross along thy coasts ;
" From christian strands, the rage accursed of gain,
" Wafts all the furies in her baleful train.
" In vain steep Gwalior rears his towers on high,
" In vain thy walls, dread Nature, touch the sky.
" O'er towers and mountains slaughter's torrent rolls,
" No mound resists it and no power controuls.
" Alike on prostrate foes and plighted friends,
" The ceaseless fury of the blade descends.
" —One heap unites the subject and the king.—
" On female helplessness the ruffians spring ;
" The still Zenana's sacred glooms profane ;
" The shrieking inmates clasp their seats in vain ;
" No rescuer hears the shrill, distressful cry,
" And Death's cold hand has closed each pitying eye.
" On the meek race each plague of guilt is poured ;
" And Famine gleans the relics of the sword :
" For food their fruitless cries thy infants raise,
" Thy gasping parents choak thy spacious ways :
" Wan shrivelled shapes, in lifeless languor laid,
" Nor morning's ray they bless nor evening's shade.

" Where the gaunt heaps abide their lingering fate,
" And pride disgusted spurns them from her gate,
" 'Oh! Father, grant, the unmurmuring victims cry,
" 'Tis all we ask—this little space to die.'—
" Meanwhile the Buryer, with unheeding tread,
" Crushes the dying, as he drags the dead.
" E'en now, inflamed with ravenous thirst of spoil,
" Wide wasting legions scour thy hapless soil.
" I hear, I hear the ravaged nations groan ;
" Their sigh unpitied, and despairing moan.
" I see the sufferers ope their failing eyes,
" To seek avenging Brama in the skies.
" In quivering gore his beak the vulture dips,
" The glutted panther licks his blood-stained lips.
" Wide o'er thy realms funereal horror reigns,
" And bones unburied whiten o'er thy plains.

He now abruptly addresses the Muse; he complains that although, at first,

" Her magic tones of bursting song,
" Rude nature hush'd and charmed the savage throng ;

her enchanting influence was so soon perverted to neglect the softer arts and gentler virtues, and to reserve the meed of her approbation for the warrior only. He reminds her that she has been too long employed in swelling the trump of death, and in soothing the vanity or inflaming the pride of the tyrant and oppressor. Now therefore,

" While, on high, a purer morning breaks,
" Gleams with mild light, and rays its ruddy streaks,
" Through torpid minds while kindling ardours dart,
" And terror vibrates to the tyrant's heart,

He calls upon her to

" Adorn a worthier theme,
" And bid the tear for harrassed myriads stream ;
" Redeem the mischiefs of thy thoughtless youth,
" And tune to thy sweet notes the lore of truth.

" With Freedom's crayon on the patriot scroll,
" Pourtray the passions of the Despot's soul :
" O'er War's wild fury, Empire's fatal thirst,
" Of grief indignant pour the warming burst—
" So shall the Nation's long delusions end,
" So Peace o'er earth her fostering wing extend.
" Thus clear the gathered films of mortal sight,
" Thus shed, benignant Muse, thy kindly light.
" And see! Philanthropy expands her charms,
" And woos thy footsteps to her tender arms !
" Oh fly, embrace the Heaven-descended Guest,
" And in the union let mankind be blest.

After indulging in this long digression the Poet reverts to Alexander, and describes his return to Persia. In order to beguile the fatigues of the march, the army is represented as rehearsing on their way, in lyric measures, " the heartfelt tale of Grecia's wrongs." His strain here glows with an animation worthy of the subject. The injuries inflicted upon that country by " Asia's hordes" in various periods of her history, are rapidly enumerated. The catalogue commences with the Trojan war. The successive invasions of Darius and Xerxes are next alluded to—

" Twice, with a whirlwind's rage, the eastern world
" Against the shores of shrinking Greece is hurled :
" Swoln with the Despot's scorn of human kind,
" From power obdurate, and from flattery blind ;
" 'While boundless empires bend the adoring knee,
" Shall yon insulting corner dare be free?'
" Darius cries, convokes his gorgeous bands,
" Equips his navies and exhausts his lands.
" His courtier Bards preluding praises breathe,
" And for his brows prepare the victor's wreath.
" Those reeking brows, thou baffled tyrant hide ;
" Rise, silken satraps, soothe his wounded pride ;

" For Freedom's spear has gored his vaunting hosts,
" And Havock scares them to his slave-trod coasts.
" —With grim delight the Power of Carnage mounts
" His scythed car ; his gaudy victims counts ;
" O'er rugged steeps, green plains and plashy meads,
" His countless swarms as furious Xerxes leads,
" And bids his banners, to the skies displayed,
" O'er earth and ocean, wave terrific shade.
" Then shares the haughtier Son the Sire's disgrace,
" And decks with richer palms the hated race.
" The rock immoved of SPARTA'S SAVIOUR-BAND,
" Checks the rude storm on Malea's narrow strand ;
" Thy Genius, Greece, wide o'er Platæa's plain
" Spreads his bright plumes, and numbers o'er the slain ;
" Then lifts his wreathed front, and smites his shield,
" And calls his Heroes to the foreign field :

This spirited war-song of the returning army, concludes with a picture of the evils brought upon Greece by intestine divisions ; and Alexander is hailed as the auspicious composer of these unhappy differences.

" What bright effulgence from the unclosing sky
" Descends serene, and clears the clouded eye ?
" He comes ! the youth ! deputed from above,
" Rejoins the wide-rent bonds of Grecian love ;
" The new Pelides Persia's pride o'erwhelms,
" And Asia trembles through her thousand realms.
" Bards of my country ! wake the slumbering lyre,
" And wing the song with his own Homer's fire ;
" Behold whose bright-eyed dawn of martial days
" Obscures, of old renown, the noon-tide blaze.

The Hero now enters Susa in triumph amidst the acclamations and admiration of his subjects ; and the Poem concludes with the following lines.

"The feast resounds in Susa's stately halls,
"And gorgeous trophies deck her echoing walls;
"From horns reversed as Plenty pours her hoard,
"And Vintage piles his blessings on the board;
"With mellow lustre on each festive mien,
"The light of Pleasure's sparkling glance is seen:
"To kindled breasts applauding hymns restore,
"Each high design that swelled the soul before,
"And Beauty's smile, the Warrior's dearest meed,
"Repays the past, and prompts the future deed."

In perusing these extracts, the reader who is acquainted with the Botanic Garden, cannot fail to be struck with the close resemblance of many passages, to some of the most striking parts of that poem. In some instances, indeed, the imitation might perhaps, be considered as too close; since, as the author has himself observed, "when it is carried too far, it becomes contemptibly puerile." The fact however is, that some of these passages are the effect, not of imitation, but of coincidence. The author affirms, in his preface, that his poem was not only written, but nearly printed, before the appearance of the Œconomy of Vegetation, and the third edition of the Loves of the Plants. From a letter to his friend Reynolds, dated in June, 1792, it appears that his work was then in the press; as he requests him to use his influence with the printer to hasten the publication. "I have," he continues, "an urgent reason for wishing it to appear as soon as possible; and this is, that in the new part of Darwin, there occur many phrases and epithets so analogous to mine, that a much longer delay will make it appear as if I borrowed or stole, where I most certainly invented."

Although, at the time when this work was printed, it was not so general a practice as it has since become, to make the text of a volume a vehicle for the notes; little more than half of the book is occupied by the poem itself. Besides a long preface, and notes

of occasional illustration, there are appended to it several dissertations. The preface relates to the character of Alexander. It may be collected from the extracts already given, that our Author is not one of those who would think it a philosophical appreciation of his character, to call him a madman, with Pope, or a highwayman, with Boileau. He attributes to him the grandest and most comprehensive designs; and contends that his virtues and great qualities were the individual features of his mind, his crimes and follies those of the age in which he lived. "His character," he observes "may be delineated in a very narrow compass; and of him as of other great men, he should think it sufficient to say, that his mind was discriminated by exquisite sensibility. By whatever object they were touched, the springs of his nature bent deeply inwards; but they immediately rebounded with equal energy into action. Hence one may explain his passionate excesses: that independence of mind that would not blindly submit even to an Aristotle; and those extraordinary projects, by which he sometimes aspired to praise, according to the false standard of excellence then established; as well as those equally magnificent designs which exceeded the comprehension of his age. Thus his genius was doubtless great; but his birth and times determined its mode of exertion."

The notes and dissertations treat of the principal institutions and customs of the Hindoos; and were, as the Author informs us, chiefly written to diffuse more widely a knowledge of old and new Hindoo literature: "which, although sufficiently familiar to the learned, is but just reaching the circle of ordinary readers." The first essay treats of their devotional austerities, and of the indolence of the Hindoo character. Under the former head he delivers many acute observations upon superstition, upon the priesthood, and other similar topics; under the latter, he gives an interesting description of that torpid state which is peculiar to Asia, and to which, any

degree of European indolence can only present a very faint analogy. "From a concise view of the Hindoo cyclopædia, for which we are indebted to Mr. Halhed or Mr. Hastings, in the elegant and philosophical preface to the code of Gentoo laws; it appears," says our Author, "that their psychology enumerates three modes of existence. 1st, to be awake, 2d, to be asleep, 3d, to be absorbed in a state of unconsciousness, in a kind of trance, as if the mind were as liable to this mixed and middle condition, as to either of the others." He combats the idea of Montesquieu, who attributes this excessive indolence to the debilitating influence of a hot climate, by shewing that human industry is as successfully, and as perseveringly exercised in some of the hottest, as in the most temperate climates of the globe; and refers it to the paralysing effect of their Braminical institutions, and their extreme suffering under temporal and ecclesiastical despotism. In his second dissertation, on the manufactures of the Hindoos, he controverts the opinion of Dr. Robertson, that their perfection depends upon that remarkable feature in these institutions, which compels the son to follow the occupation of the father. It certainly appears extraordinary, that this celebrated historian should have commended a custom, the obvious effect of which, must be to extinguish all energy of mind, and to sink the faculties to one common level. Indeed this law appears to be one of the most tremendous engines of Braminical superstition, and to have proved one of the most effectual means of perpetuating the degradation of the Hindoos. The Doctor pleads the cause of mankind, in this section, with a generous enthusiasm. "It is grateful," he observes, "to oppose writers who are led, by whatever motives, to palliate the crimes of the most cruel enemies of mankind; and difficult altogether to repress the warmth, which so great an interest inspires."

The third essay, entitled Conjectures on Explosive Compositions,

comprises an interesting and entertaining disquisition upon the ancient Greek fire; and as it has not been published, the reader will perhaps be gratified by its being inserted in the appendix to the present volume.[a]

The subject of the fourth, is the antiquity of the Hindoos. In this, the records of almost unfathomable ages of which this nation boasts, are opposed to the more limited origin assigned to the human race by the Mosaic chronology. In the opinion of the Author, "the system of subterranean nature, which is only now beginning to be understood, and which exhibits, as well as the heavens, an arrangement highly worthy of admiration, proves the earth to have existed for millions of years, perhaps, of ages." The progress made by the Hindoos in astronomical science nearly five thousand years ago, seems also, in his opinion, to establish their claim "to a very remote, though indefinite, antiquity." The phenomena of a system, however, "only now beginning to be understood," can scarcely be expected to furnish data sufficiently precise for the proof of the former position. No analogous processes are subjected to our examination, by which we can estimate the period necessary for any given change. Even where it might be apprehended that such an analogy could be traced, the speculator might find himself misled by it, as seems to have been the case with the Sicilian ecclesiastic mentioned by Brydone. With respect to those early advances in science which have been contended for, the Chinese, as is well known, claim, for their institutions, a period equally remote: but their pretensions have, of late, been successfully refuted by Mr. Guignés: and perhaps the industry of future inquirers, may confirm the doubts thrown upon the antiquity of the Hindoos by the sagacity of Sir Wm. Jones; and prove their claims to be equally destitute of foundation.

[a] See appendix. No. 5.

At the close of this section, the Author has inserted several quotations from the Baghvat-Geeta, which breathe a very pure spirit of morality, and inculcate a sublime and rational theology. The industry of subsequent writers on the literature and institutions of India, has enabled us to extend the number of such quotations; but, it has also shewn us, that precepts equally pure and excellent, are debased by a mixture of others of a description so totally opposite, that a perusal of them must enhance, instead of depreciating, the value of that pure system for which we are indebted to revelation.

The fifth dissertation treats of the complexion of the natives of hot countries, and the varieties of the human race. The Author is disposed to consider the African negro as a distinct species from the native of Europe. At the same time he deprecates any justification of that iniquitous commerce of which these oppressed beings were so long the object, that might be drawn from the admission of such a principle. His speculations upon the cause of the black colour in this part of our species, are ingenious. He supposes that "their *rete mucosum* may possess too small a quantity of oxygene; and that it might be whitened by combining with it an additional quantity of this principle. It remains to be decided, first, how far this is true, and secondly whether, if the skin can be bleached, it will retain the oxygene, or continue in the habit of discharging it." He proposes as a query, "whether the oxygene extricated from the negro's skin may not contribute to the fœtor of his perspiration? as phosphorus, sulphur and other acidifiable bases, acquire a strong smell from a certain proportion of this principle."

In pursuance of these speculations he made some experiments. He immersed a lock of hair recently cut from the head of a negro in a bottle filled with oxygenated muriatic gas. The bleaching powers of this substance are sufficiently known. In a short time, the hair became white, with scarcely any tinge of yellow. Upon another

occasion, he "prevailed upon a negro to introduce his arm into a large jar filled with the same elastic fluid; at the bottom of which, there lay a small quantity of water, also impregnated with it. The back of the forefinger, and part of the second, lay in this water. At the end of twelve minutes the man withdrew his arm. The whole had assumed a greyish cast, something similar to ointment of quicksilver. The parts that had been immersed, had acquired very much the colour of white lead paint; but it only continued for a few days."[t]

The last essay contains a purely political disquisition on the possessions of the British in Hindostan. It is drawn up with much ability, and manifests a spirit of enlightened benevolence. He first examines the political expediency of these distant possessions. Of this he expresses the strongest doubts, and in vindication of his scepticism, he appeals to the authority and cites the arguments of Adam Smith. On the moral expediency of the system upon which the government of these possessions is administered, he is still more impressive. From the writings of persons conversant with the affairs of India, he quotes examples of the most iniquitous oppression, and of the most wanton and unjustifiable wars. If these documents be correct, a review of them cannot but excite both grief and apprehension.

In treating the several subjects of these essays, the Author seems to have anticipated that the freedom of his sentiments

[t] Many years afterwards, the Doctor attempted a repetition of this experiment, at the Preventive Medical Institution. A mendicant negro was prevailed upon to introduce his hand and arm into a jar prepared in a manner similar to that described in the text. The man had one or two small scratches on his arm, and the application of the acid to the denuded surface, gave him pain; in consequence of which, he hastily withdrew it. He was, afterwards, sufficiently artful to station himself in the neighbourhood of the Institution, and to appeal to the compassion of all he met, by telling them that he had been decoyed thither, and made, without his knowledge, the subject of a cruel and unheard of experiment.

might give some offence. His friend Reynolds appears to have prevailed upon him to suppress, or to modify, certain passages in the first of the series. He afterwards expresses to him his satisfaction in having done so. "My first principle," says he, "is to say the truth without reserve; the second, not to scandalize any body. They are often incompatible I own; but in a publication the first should be sacredly adhered to." One circumstance more, relating to this work should be recorded, because it suggests a benevolent hint too valuable to be lost. It was printed in a remote village, and the *compositor* was a young woman. "I know not," says the Doctor, "if women be commonly engaged in printing, but their nimble and delicate fingers seem extremely well adapted to the office of compositor, and it will be readily granted that employment for females, is among the greatest *desiderata* of society."

It has already been observed that neither this Poem, nor the Letter to a Lady on the subject of Education were published, though both were printed. Probably the persuasion of his friends, or possibly his own reflexions, might induce him to suspend their more general circulation; for the freedom of some of the sentiments contained in them, might, perhaps, in a moment of political effervescence, have scarcely been tolerated. But if either of these motives influenced the suppression of these works, he was not equally fortunate, when, in the course of the Autumn of this year, he circulated a political hand-bill in the neighbourhood of his Shropshire residence. Its object was to reply to some alledged misrepresentations in an advertisement soliciting relief for the French Emigrant Clergy, which had appeared, a few days before, in a Shropshire paper. He assails, with much severity, the general character of that body; he vindicates the cause and extenuates the excesses of their countrymen; and deprecates the appeal which was made to the English nation by the promoters of the subscription, as being founded upon mistaken prin-

ciples; as arraying, upon false grounds, conscience and religion in the cause, and, in his apprehension, "tending to inflame the people of England to a thirst of blood against the French." It is remarkable, that in this paper, he speaks of the conduct of that nation with far more indulgence, than he ever manifests in his private correspondence. In the latter, he frequently gives loose to his indignation when alluding to their crimes. In the preceding May, he had expressed himself in the following terms upon the transactions of the army at Tournay. "At present, the conduct of that part of the French people, on which the eyes of mankind are intent, forms so unpleasant a contrast with the principles the whole nation has professed, that I am somewhat disposed to question, whether your solitary speculations at Tredrea, have not as much influence on the happiness of Cornwall, as the decrees of the national assembly on that of France. I could easily, at this moment, resign myself to despondency; to that sullen sort of depression when one has no heart to complain, and not energy enough to be fretful. There has been too much already to regret; but the incidental evil was so soon and so largely to have been redeemed, that it would, I thought, have been cowardly and criminal to have abated of hope or ardour on this account. But this last complication of guilt, cowardice and misfortune, is not calculated to stagger merely the unthinking, and shock the prejudiced. It has no character in common with those excesses which originate in the intemperate spirit of newly acquired freedom. The French revolution is every day losing that amiable aspect which it wore in the beginning. It is no longer a revolution cemented by water instead of blood. As to these murderers of their officer, of an unoffending priest, and (what I am utterly at a loss to conceive,) of their prisoners, they are wild beasts broke loose; and must either be hunted to death, or taken and chained more securely than ever." It is curious to contrast this animated declamation with

the apology for their excesses in the paper under notice. But, upon the present occasion, his whole attention was absorbed by the dread of war between the two countries; and the portentous magnitude of this evil, veiled from his mental eye every other consideration. In addition to this, some passages in this paper particularly reflected upon some features of our ecclesiastical institutions; a topic which required to be treated with peculiar delicacy by any one connected as he was, with one of the universities.

Although the circulation of this paper appears to have accelerated the resignation of his lectureship, it was not, as has been generally apprehended, the original cause of it. He had, for some time, thought of relinquishing his situation, and had actually waited on the Vice-Chancellor on that account, some months previously to its publication. At this interview, he announced his intention of resigning, after reading one more course of lectures. From this, he added, he should willingly excuse himself; but he conceived, that he ought not to occupy the laboratory without lecturing, and his mineralogical collection was too extensive to allow him to remove it immediately, without inconvenience. In the mean time, by giving this early notice of his intention, the university would be less hurried in the choice of a successor, and the gentleman nominated might not be displeased at having some time for preparation for the duties of his office. The Vice-Chancellor received this notice with a compliment upon the liberality of his conduct; at the same time, he observed, that as it was extremely desirable that some salary should be annexed to the chemical chair, (a subject which had occupied Dr. Beddoes's attention some time before) and as "the University could not ask this in the name of any person so eminent as himself," he wished him to draw up a memorial to the Secretary of State, and to keep the Lectureship 'till an answer should be returned. With this request the Doctor complied; and the memorial was transmitted to the

Earl of Guildford as Chancellor. The Earl presented it to Mr. Dundas, by whom it was very favourably received. But before any steps were taken in consequence of this application, the circulation of the obnoxious hand-bill had made his political sentiments a matter of public notoriety; and this circumstance effectually destroyed any influence which his name might otherwise have given it. The clamour which it excited soon extended itself to the University; and it is scarcely to be wondered at, that upon his return thither, he found that some prejudice was excited against him, and that he had occasionally to encounter some hostile glances. Of this hostility however, he met with far less than he might, under all circumstances, have reasonably anticipated. On the contrary, he speaks, with pleasure, of the liberality and civility of the greater part of his clerical acquaintance. Conscious in the mean while that he had advanced nothing which was not, in his apprehension, important truth, he made no attempt to conciliate those who might be offended with him; he preserved an unbending attitude, and during the Christmas recess, resigned his chair as chemical reader, and prepared to quit Oxford. The regret which this event is calculated to inspire, is not however unmingled with satisfaction. Probably, by his change of situation his mind was stimulated to greater activity, and his sphere of utility was enlarged. Still we can scarcely forbear lamenting that any circumstance should have induced him to relinquish a situation, from which he at once received, and upon which he reflected, real dignity.

When he first anticipated the dissolution of his connexion with the University, he appears to have had some thoughts of paying a second visit to France. He had even written to a scientific friend in Paris, to procure him lodgings; but the tumultuous scenes of the 10th of August, and the massacres of September, induced him to relinquish that arrangement. In one of his letters he alludes to

these transactions in the following indignant and eloquent terms. "By the favorable accounts from the Frontiers, relative to the desertion of the Austrian Soldiers, I flattered myself that the tree of despotism was decaying at its roots. But this infernal club of jacobins, with its mad mob, will water it with innocent blood; it will take fresh root, and put forth new branches, and cover the whole earth with its blasting shade."

The darkness which, at this period, overspread the political atmosphere, appears, for a time, to have cast a corresponding gloom over his mind; but this was soon afterwards happily dissipated by the brilliant discoveries which had been just made in Italy, and which laid the foundation of the science of galvanism. He entered into the investigation of this subject with his characteristic ardour. In an animated letter to one of his correspondents, he announces the discovery; and gives a rapid, but interesting, view of the phenomena which had been observed. He anticipates from the new science the most important results, and after contemplating its possible application in a variety of instances, he adds that he thinks it not impossible, that he himself, or some more fortunate medical inquirer, might be enabled to construct, from the fresh light thrown upon the subject of muscular motion, a new system of medicine. His anticipations in this instance have hitherto, proved too sanguine. The science of medicine has derived, comparatively, but little assistance from this powerful agent: but, the illumination which it has already poured, and may yet continue to pour on chemical science, equally transcends past hope and defies future calculation.

With regard to his future destination he was, at this period, entirely unsettled. In the close of the same letter which announces these new physical discoveries, he expresses his intention of speedily returning, for a short time, to his native town. The uncertainty however of his prospects did not repress his spirit of literary enterprize. Two of his most ingenious works received their final touches under these circumstances, and were sent to London for publication about the period of his quitting the University. The first of these was his "Observations on the Nature of Demonstrative Evidence &c. with reflections upon Language." This book is dedicated to his friend Davies Giddy. Its object is to smooth the difficulties, which render the commencement of the study of geometry, so repulsive to the majority of young minds. In opposition to the doctrines assiduously maintained by the ontologists, particularly by the author of Hermes, he contends that "geometry is founded in experiment; and that it would not only be possible, but highly useful, to render the elements of that science palpable. They would be thus rendered more interesting and more obvious to the perception of the senses, the only real inlets of knowledge." He affirms that "if a train of mathematical reasoning be examined, we shall find, that at every step, we proceed upon the evidence of the senses; in other words, that this science is a science of experiment and observation, founded solely upon the induction of particular facts; as much so as mechanics, astronomy, optics, or chemistry." It is because mathematical reasoning rests upon this secure foundation, "that the mind is enabled to grasp its conclusions with full assurance of their reality; that we are satisfied that our advances in this science are actual acquisitions, and that we find them, as we go on, continually capable of application." He proceeds to shew that "Euclid sets out from experiment, and appeals constantly to what we have already learned from the exercise of our senses, or may immediately learn." This principle is illustrated by a long and minute application of it to the first theorem in his first book of elements. In applying it to the demonstration of a general proposition, it should be remembered that such a proposition can be demonstrated, by one diagram, in a particular case only; and that

the generalization of it depends upon our mentally shifting the several conditions into all their varieties. Thus, if we wish to convince a person previously acquainted with the 47th proposition of the first book of Euclid, that, in any circle, the square of the sine added to the square of the co-sine, is equal to the square of the radius, he has only to delineate on paper, or to conceive in his mind, a circle with a radius drawn to some particular point of the periphery, and the sine and co-sine applied. He will then immediately discover that the three lines form a right-angled-triangle. This proves the fact in the particular instance. In order to render the general deduction equally convincing, the next process would be to place the radius in different positions; or, which would be still more conclusive, to fancy it sweeping round with the sine and co-sine attached to it; he will then, and not before, have ascertained, by experiment, that this property belongs equally to any part of the circle.[u] After having shewn, at large, the justice of his principle by the application of it to the first theorem, he proceeds to some remarks upon the definitions, which he complains are, by an unnecessary pursuit of extreme exactness, rendered almost incomprehensible. It is certainly discouraging to the mind to impose upon it the task of comprehending impossibilities. Yet little less is required by the common definition of a point, a line, and a superficies. From the definitions, he proceeds to apply his principle to the elucidation of some of the axioms. To the twelfth in particular, he has added a long series of experimental illustrations of the nature of parallel lines. The fifth definition of the fifth book, is also accompanied by an explanation equally ample.

[u] I am indebted for this elegant illustration of Dr. Beddoes's doctrine, to the gentleman to whom the work is dedicated. In a casual communication before the book had come into my possession, he made use of it, by way of stating the principle upon which its reasoning was founded.

For the principal opinion stated and exemplified in this treatise, the Author observes in the dedication, that he has "the full evidence of intuition." And "what additional confirmation it was possible, under such circumstances, to receive, was afforded by the assent of his friend; whose uncommon proficiency in mathematical science, and no less uncommon discernment, perfectly qualified him to decide on such a question."

The deduction from the principle which it is his object to establish is briefly this: that the sciences which have obtained the name of the abstract sciences, are, in fact, originally founded entirely in experiment; that they absolutely depend upon sense. "What the senses are so perfectly adequate to convey," he observes, "they have been supposed not to convey at all: just as we many times hardly perceive ourselves doing what we do with perfect ease. When the senses serve us imperfectly, and make us continually feel our dependence, we are ever ready to express the obligation; But, where they instantly deliver such full and clear perceptions to the memory, that we have no more occasion to recur to them, we forget or deny the service they have rendered us."

Having thus denied the claim of mathematics to the title of an abstract science, he is led, by an easy transition, to consider the origin of abstract terms, and the philosophy of language. Remarks upon these subjects are frequently introduced in the body of the work, and they are still further elucidated in the appendix, in which, the labors of the Dutch etymologists, of Mr. Harris and of Lord Monboddo, pass under his review. Wherever these topics are alluded to, he confesses his obligations to the Επεα Πτεροεντα of Mr. Horne Tooke; a work upon which he bestows the highest eulogium.[v] He vindicates the Author's claim to originality, with

[v] So much was he gratified by this work, that it appears he had, at one time, meditated

that generous warmth which an ingenuous mind is apt to feel, when a theory unassailable on the score of reasoning is attacked on the ground of its having been previously discovered. But such, he remarks, was the lot of the illustrious Hervey; and future discoverers can scarcely hope to escape a similar fate.

The other work which appears to have divided his attention with that just noticed, during the closing period of his residence in the University, was his first original publication on medical subjects. It was entitled "Observations on the nature and cure of Calculus, Sea-scurvy, Consumption, Catarrh, and Fever; together with conjectures upon several other objects of Physiology and Pathology." It is easy to trace throughout this work, his prevailing bias for chemistry, and the outlines of most of those sentiments and opinions, which he afterwards more fully developed, and inculcated with still greater earnestness. In his dedication, he complains of "the infinitely small portion of genius that has hitherto been exerted in attempts to diminish the sum of our painful sensations," and anticipates, from the movements then taking place in the moral world, a great and important improvement. In the first division of the work itself, he speaks of the great efficacy of alkaline remedies in calculus; and after bestowing its due praise upon the *aqua super-carbonatis potassæ*, he proceeds to mention a remedy, which he had devised in order to obviate the only objection which could be made to the impregnated water, the expence of preparing it. He candidly observes of his medicine, that "though he knows not whether it be inferior to the water, he cannot suppose that it is superior; and were both equally easy to pro-

applying the principles contained in it, to the construction of a philosophical dictionary; which should endeavour to ascertain the primary signification of our abstract terms. A brief specimen of his etymological inquiries is contained in a letter published in August, 1796, in the Monthly Magazine; and in a subsequent number, he has given some farther examples.

cure for all patients, he should not think it worthy of public notice."

The remedy in question is the carbonate of soda, of which the water of chrystallization has been dissipated by exposure to a warm dry air, or by being spread before a fire. This is combined with rather more than an equal weight of soap, and made into pills. One or two scruples of the powder are taken in the course of the day. A number of interesting cases are added which establish the efficacy of this simple remedy; especially in that form of calculous complaints to which the nosologists have given the name of *nephritis calculosa*.[w] The section concludes with some speculations and queries as to its mode of operation.

His considerations upon the sea scurvy, which is the subject of the next section, are prefaced by a slight sketch of those reflections upon the effects of oxygene air upon the animal œconomy, which had, for some time, occupied his mind. "It appeared likely," he observes, "that its abundance or deficiency would sensibly affect the health, and that the chemical composition of the fluids and solids of the living body would influence their properties, not less than the properties of dead matter; though not perhaps exactly in the same way.... I had long supposed," he continues, "the scurvy to be owing to a gradual abstraction of oxygene from the whole system; just as death is produced in drowning, by withholding, all at once, the same substance, from that blood which is to pass to the posterior cavities of the heart." In these speculations he was further confirmed

w From my own experience of the efficacy of this remedy, I cannot forbear adding that the ardour of discovery had not led Dr. Beddoes in any degree to overrate its powers. Calculous complaints are, as is observed in this treatise, not less frequent among the poor than among the rich: and the sufferings which they inflict, are often more intensely felt by those whose labours or occupations oblige them constantly to exert the muscles of the back. It appears also, that slight degrees of calculous affection are more frequently complicated in patients of this class, with dyspeptic and nervous complaints, than is commonly imagined, or, as far as I know, stated in practical books.

by the livid colour of the blood, and the large livid spots which are so often spread over the surface of the body of the scorbutic patient; as well as by the remedial effects produced by acids and a vegetable diet. There still remained, however, certain difficulties which withheld absolute conviction from his mind, and prevented him from publishing his opinions to the world. While he was pausing over these difficulties, and waiting for some further lights which should dissipate or confirm them, Dr. Trotter, in the second edition of his work on the sea scurvy, advanced a similar theory to account for its origin. But although their opinions coincided in this important particular, there were some material differences in the views which they entertained upon other parts of the subject. One of the most important was, with respect to the occasional cause of the disease, which in Dr. Trotter's apprehension was "a deficiency of *recent* vegetable matter *alone*." To this Dr. Beddoes objects, that although it is possible that the system may imbibe oxygene by the medium of the stomach, yet it is evident, that "the blood in the first instance, and afterwards the solids, are oxygenated by means of the lungs." He considers, therefore, the want of pure air, to be a more powerfully exciting cause of scurvy, than the want of recent vegetable aliment; although he does not deny, to the last, a considerable share in its occasional production. Facts, however, have occurred, which, in his idea, decide the question of their relative importance. Under this head he refers to the uniform health enjoyed by the crews of Captain Cook's ships while engaged in his voyages of discovery, although they were frequently confined, for a long period, to salt provisions alone; and contrasts it with the great devastation produced by the disease under consideration in slave-ships, where, though the unhappy victims were plentifully supplied with vegetable aliment, they were confined below the decks in a contaminated atmosphere. Neither does the freshness of the vegetables made use of, appear to him so important as it does to Dr. Trotter. "The Laplanders never taste bread, and seldom vegetables; they feed all the winter on the fresh flesh of the rein-deer: yet they are free from scurvy." Indeed he considers fresh meat as highly efficacious in curing this disease; and there are not wanting facts which render this opinion probable.[x] As an analogous illustration of the effects produced by a deficient supply of oxygene to the blood, he gives an abstract of the striking and deplorable case recorded by Sandifort, of a boy in whom an irregular conformation of the heart deprived his blood of a due supply of this important principle.[y] In conformity to his views of the origin of the

x Dr. Rush, however, has recorded a striking exception to this rule. During the war of 1756, a party of British Americans were suddenly surprized by a considerable body of French and Indians, and were obliged to shut themselves up in a fort, with no other food than some cattle which they had hastily collected. In a short time they were affected with scurvy to a violent degree. In this case, however, it is probable that the depressing passions exerted a considerable influence in the production of the disease.

y As cases of this kind are at once rare and interesting, the author will perhaps be excused for stating in a note, the particulars of one which came under his care, at the Preventive Medical Institution. William Blackham, aged five months, was entered on the 18th November, 1805. The account of his symptoms was as follows: Ever since he was born he has screamed violently and repeatedly, at short intervals; after a fit of crying, he appears to faint from exhaustion; he is often convulsed. His complexion is habitually livid; and on his first waking is sometimes quite black. To be danced or moved about, gives him very evident distress; and if either be attempted hastily, he seems to have a rising in his throat which threatens instant suffocation. There is much palpitation of the heart; the pulsation is particularly evident in the scrobiculus cordis; sucks moderately; appearance of dejections tolerably good; heat natural.

Some palliative medicines were occasionally administered, merely with a view to secure the attendance of the mother 'till the issue of the case should be known. On the 5th of January, 1806, the child was seized with such violent convulsions, that he was supposed to be dying. They continued all night, and 'till nine of the evening of the day following, when, though he had previously refused all kind of nourishment, he suddenly took the breast. For about a fortnight, he appeared much better; he had no fit; he sucked more freely, and bore motion more easily than he had ever done. Towards the end of the month, however, the

disease, he suggests the cautious adoption of an hyper-oxygenated atmosphere[z] as a probable means of cure; and pursuing the analogy, warmly recommends the use of acids also, mineral as well as vegetable; of certain vegetable preparations in an accescent state, and of nitre.

By way of appendix to his observations on scurvy, he has added some ingenious remarks upon obesity; to which he thinks the theory of scurvy here laid down, capable, with some modifications, of being applied. The conversion of muscular fibre, after death, into a substance resembling spermaceti, is a fact well known to physiologists. This effect appears to be produced by a gradual abstraction of oxygene. But such changes are not confined to dead animal matter only. He thinks that the attentive physiologist will discover, that the living system also presents some appearances indicating a tendency to form

symptoms returned with increased severity, but still with short intervals of ease. On the 14th of March, after continuing for the forty-eight hours preceding in almost incessant convulsions, he expired. The following morning the body was examined.

The heart being laid open approached much more to a square figure than usual; right ventricle much dilated, foramen ovale very open, but still the membrane appeared to form a perfect valve; between the ventricles a communication large enough to admit the finger. No vessel whatever arose from the right ventricle, and for a long time, nothing corresponding to a pulmonary artery could be traced. At last, a venous looking vessel that would barely admit a small probe much less than a crow quill, and of so slight a texture as to tear upon its being introduced, was discovered to take its rise from the left ventricle; and by this, all the circulation that was carried on at all through the lungs, must have passed; no pulmonary branch from the aorta; the diameter of the aorta was very considerable, and all the valves were perfect. Mr. B. Travers, surgeon to the London Infirmary for the Diseases of the Eye, was one of the medical gentlemen present, and assisted in the dissection.

[z] In a subsequent correspondence, however, with Dr. Trotter, he received such unequivocal assurances, that a sudden exposure even to fresh air of a common degree of purity often proves fatal to patients affected with scurvy, that, notwithstanding an additional supply of oxygene seems so strongly indicated by the symptoms, he candidly states his opinion that "the Doctor's facts amount to a prohibition of the practice."

fat, wherever there exists a deficiency of oxygene to a certain degree."

The first example which he adduces in support of this opinion is furnished by the unhappy Africans already alluded to. Dr. Trotter remarked that "when any one of them was becoming rapidly fat, it was no difficult matter to determine how soon he would be seized with the scurvy." Other instances occur in the emaciation produced by an excessive use of acids; in the inactivity which stands to obesity in the relation both of cause and effect; in the corpulence of many short winded and asthmatic persons, who, it is probable, take in at each respiration, a smaller quantity of oxygene than persons in ordinary health; in the mechanical effect of exercise, which is a medium of introducing into the system additional quantities of oxygene, and in the aptitude to grow fat, observed in persons who indulge much in sleep. From the well-known infrequency of respiration during sleep, he supposes that "a smaller quantity of air must be taken into the lungs than while we are awake."[2a] The necessary consequence and its application are obvious. He proceeds to mention various particulars in the physiology of hybernating animals to the same purpose, and concludes with a curious speculative application of the doctrine laid down, to the economy of the vegetable kingdom. After adverting to the chemical decomposition of water which is effected by vegetables, he remarks that "these elements are sometimes so combined, in various proportions, with the azote derived from the atmosphere, as to produce in them an excess of oil and a

[2a] Is this observation perfectly accurate? Respiration may perhaps be less frequently, but is it not at the same time, in many instances, more fully performed? "I am disposed to believe" says Dr. Rush, "that more air is phlogisticated in sleep, than at any other time: for the smell of a close room in which a person has slept one night, we know is much more disagreeable than that of a room under equal circumstances, in which half a dozen people have sate for the same number of hours in the day time." *Rush's Works*, Vol. II. p. 400.

species of obesity. And some are capable of forming oils exactly or very nearly resembling animal oils." He concludes, therefore, "that a more intimate acquaintance with the laws of organic bodies, may, possibly, hereafter, enable us, by regulating the vegetable functions, to teach our woods and hedges to supply us with butter and tallow; and thus to save a considerable portion of that profusion of vegetable food, which is at present wasted in fattening a single animal. Nor will this speculation be derided as purely visionary, when we call to mind certain vegetable products; and especially when we recollect our imperfect acquaintance with their physiology; and the various modifications of their functions which have already been effected by chance or design. Of these the Phytologia of Darwin will furnish some interesting examples.[2b]

The subject of the next section, is a disease, to the investigation and treatment of which, the future labours of his life were particularly devoted. It needs scarcely be added, that this disease is consumption. In his speculations upon this subject, we trace the first outline of those ideas with respect to the medical administration of permanently elastic fluids, which afterwards led to the establishment of the Pneumatic Institution; and a perusal of this essay will convince us that his theory of this disease, was not a random excursion of the imagination, but was a sober and rational deduction from certain phenomena which had arrested his attention while investigating its nature. It had, for instance, been long observed that pregnancy had, occasionally at least, the power of suspending the symptoms of phthisis. It occurred to him therefore, that if the manner in which this was effected could be discovered, it was pro-

2b A wax in America is obtained from the *myrica cerifera*, (candle-berry myrtle) the berries of which are boiled in water, and the wax separates. Sparmann, however, suspects this wax-like substance to be deposited by insects. *Phytologia*, p. 83.

bable that a similar state might be induced by other means, and prolonged at pleasure.

After some time had been occupied in fruitless researches, the following supposition occurred. The fœtus has its blood oxygenated by the blood of the mother, through the placenta. "During pregnancy there seems to be no provision for the reception of an unusual quantity of oxygene. On the contrary, in consequence of the impeded action of the diaphragm, less and less should be continually taken in by the lungs. If therefore, a somewhat diminished proportion of oxygene be the effect of pregnancy, may not this be the way in which it arrests the progress of phthisis? and if so, is there not an excess of oxygene in the system of consumptive persons; and may we not, by pursuing this idea, discover a cure for this fatal disorder?" He proceeds next to enquire how far this theory is countenanced by facts. The state of defective oxygenation in pregnancy he considers as scarcely ascertained; but the crimson cheek and vermilion lip which in phthisical patients are subjects of common observation, appear to him to present strong proofs of his hypothesis.[2c] The injurious effects also produced by the administra-

2c In his considerations upon factitious airs, he has been one of the first to point out that this reasoning was not fully supported by subsequent experiments. From these it appeared that "a florid complexion might, as far as it was connected with the mere substance of the blood, depend equally upon arterial blood highly oxygenated, or venous blood brightened by any agent, as, for instance, by the application of hydro-carbonate. The blood is frequently florid when flowing from a vein. But in many of these instances, arterial blood only escapes the change it commonly undergoes in its progress through the small blood-vessels. Thus when Mr. Hunter says, "I bled a lady whose blood at first was of a dark colour; but she fainted, and while she continued in the fit the colour of the blood that came from the vein was of a fine scarlet," we may suppose the action of the small arteries to have been suspended, and the oxygene not to have been communicated to the solids; the same phenomenon occurs when an animal is bleeding to death. Meanwhile as it is certain that the blood and the solids may acquire a bright red colour, from causes totally distinct from the presence of oxygene, my conjectures concerning the condition of the system in some cases of consumption lose their support." See *Considerations, &c.* second edit. p. 17, 18. 156.

tion of an increased portion of oxygene to such patients, which were noted by Fourcroy, give it additional confirmation. "The skin was dry and hot, the face took fire and became of a more florid red." Such are the expressions of this philosophical physician, while describing the symptoms which immediately followed its exhibition. Consequences still more fatal succeeded, and the deleterious influence of an agent, from which some benefit had been anticipated, soon became strikingly manifest.

The temporary mitigation of hectic symptoms which is sometimes produced by the use of the mineral acids; and the beneficial effects attributed to nitre in phthisical complaints, (if these effects be real,) seem to contradict his theory. He admits this difficulty with philosophical candour, and observes, in a style very remote from that of a presumptuous theorist, that it would be rash to place much confidence in so incomplete a theory, however strongly it might seem to be favoured by some of the principal phenomena. If I might even take it for granted, he continues, "that excess of oxygene is a well ascertained circumstance in phthisis; it would still remain to be determined before the investigation could lead to any thing useful, what rank it holds among the other deviations from a state of health observable in this disease."

In conformity to the theory which he has advanced, he proposes that air should be administered to hectic patients, diluted either with hydrogene or azotic gas; so as to be less stimulating to the lungs, than the air commonly respired. The air of a crowded room approaches to this state in one respect; but its increased temperature would probably counteract the effect of its diminished purity. "The influence of the air which we breathe," he observes, "is as wide as the diffusion of the blood. The minutest portions of the organs of motion, sense, and thought, must be affected by any particular change in this fluid; and nothing would so much contribute to rescue the art of medicine from its present helpless condition, as the discovery of the means of regulating the constitution of the atmosphere."[2d]

With regard to the speculations contained in this part of his work, he had previously observed in his preface that "it would be but a poor project to lay one's self out for the praise of ingenuity, by proposing plans which are in no danger of being tried;" and expresses a confidence that easy methods of submitting them to the test of experiment would in no long time be produced. He adverts to the assistance which medicine may expect from the rapid advances making in chemical science, and indulges in a confident anticipation, that means which bid fair to afford relief in some of the most hopeless diseases with which humanity is afflicted, are on the eve of discovery.

He concludes his essay with observations on the great prevalence of the fatal disease which is the subject of it, in our native island. He exposes the fallacy of the common doctrine with respect to catarrh; explains its phenomena and treatment upon the principles of the Brunonian theory; and earnestly inculcates a more careful adaptation of our dress to the variations of our climate. He laments that the influence of fashion, in this particular, should be almost perpetually exerted in opposition to the dictates of prudence; and that the fairer part of the creation should especially be sufferers from this

2d In a letter from Dr. Darwin referring to this work, after commending its ingenuity, and expressing the pleasure that he had derived from the perusal of it, he proposes, with his usual cuteness, a difficulty in the theory of consumption here laid down. "It seems strange, says he, "that the metallic oxyds, as of mercury and lead, should so much contribute to heal ulcers when externally applied, if oxygene could occasion them in the lungs of consumptive people." In a subsequent letter, however, he retracts his objection, and observes, that although these oxyds may produce a good effect in the torpid state of such affections, because they stimulate the torpid vessels, yet in an inflammatory state of them, they would probably do mischief.

source; "for alas," he concludes, "they are still compelled, whenever the Enchantress waves her wand, to expose themselves half undressed to the fogs and frosts of our island."[2e]

Two papers by Dr. Girtanner, on the principle of irritability, are added to this work by way of appendix. The object of these is an investigation of the laws of organic bodies, by combining the medical opinions of Dr. Brown, with the theory of chemistry proposed by Lavoisier. As these papers are not even translated by Dr. Beddoes, any analysis of them, in this place, becomes unnecessary. They are followed, however, by some additional observations from his own pen, which are well worthy of attention from their ingenuity and importance. He glances at the prevailing treatment of typhus fever; and suggests the employment of oxygene in certain forms of it. He has elsewhere in this volume expressed his doubts

[2e] A work lately published in Paris, called *L'Ami des Femmes*, exhibits nearly a similar view of this subject, and sufficiently proves that the same causes exert an equally murderous influence on the Continent, as in our Island. The Author quotes the following expressive inscription from a monumental tablet in the cemetery of the Four Sections, Rue Vaugirard, Paris :—

Ier Nivose, 6 heures du Matin, 22 Xbre. 1802,
LOUISE LE FEBVRE,
Agée de 23 Ans,
Victime de la mode meurtrière.

Vertu, grâces, beauté, modestie, ame bonne et sensible,
La firent estimer et cherir.
* * *
Repose en paix ô ma Louise,
Six ans de bonheur, comme un eclair
Se sont écoulés!
Morte à tous les yeux,
Tu vivras dans mon cœur.
S——,
Rose, elle a vécu ce que vivent les roses.

"whether the stimulating plan of treatment in fevers, has not been pursued to far too great a length; so that patients are often drenched with wine and opiates and stimulated to death;" and directs the views of the medical inquirer rather to attempt the restoration of the principle of excitability, than to degrade the practice of medicine to the art of administering drams. He deprecates a too hasty discouragement of inquiries into the phenomena of life, on account of the difficulties in which the subject is enveloped. "Physiology," he observes, "will not fail to gain something, and perhaps, something considerable, even by the proof of the falsehood of a new hypothesis capable of being put to the test of experiment. This reflection should also teach us to set a due value on our present knowledge, although it be imperfect; and it should restrain those rude hands, that are ever ready to pluck up the tender plants of science, because they do not bear ripe fruit, at a season when they can be only putting forth blossoms."

From the advances making in physical science, he anticipates the most fortunate results, because "they are fast conducting us to a more intimate knowledge of ourselves." He anticipates the rapid approach of a period, when this species of knowledge will constitute a part of education, and produce the most happy effects upon the morals of mankind. By the earnestness with which he pursues this train of thought, he shews how early his mind had been impressed with the immense importance of more widely diffusing physiological information. But, as his opinions upon this subject are still more amply explained and inculcated in some subsequent writings, their fuller developement will more properly find a place, when an analysis of those writings is attempted.

Although the dedication of this volume, as well as of that on the nature of Demonstrative Evidence, is dated from Oxford, neither of them, as has been already intimated, was published 'till after his

connection with the University had terminated. In a very short period after he had committed them to the press, he bade a final adieu to this venerable seat of the muses. He returned to Shiffnall, and after continuing there for a short time, he went to the house of his valuable friend at Ketley, where he remained for some weeks. It was during his residence here, that he published his celebrated history of Isaac Jenkins. It is almost superfluous to mention, that this admirable moral fiction gives an account of the reformation of a drunken labourer, and his return to habits of sobriety and i dustry. Its design and its execution are alike excellent. Little touches of nature are occasionally introduced which possess the most genuine pathos; and the descriptions have a minuteness and locality which produce the same kind of intimate acquaintance with the characters of the story, as is effected by similar means in the novels of Richardson. The language too is equally worthy of remark. It is so simple as to be fully intelligible to the humblest capacity, yet it is perfectly free from vulgarity: and although the dialogues in which the inferior characters of the tale appear as speakers, are perfectly natural and characteristic, the author has not deemed it necessary (to adopt the phrase of a celebrated writer) to invent a jargon."[2f]

The success of this work has been correspondent to its singular

[2f] The following extract is taken from a letter written by the Doctor a few weeks after the first appearance of this publication. "I know not how to send you any copies of Isaac Jenkins, who is a prodigious favorite in this part of England. I was not sure that he would find equal favor in distant parts, because he speaks as provincial a dialect as the standard language would in any way permit; and because there are so many other local peculiarities about him. Among the colliers, it is a common saying, when they see a man staggering along, 'Ah! he has been at big Martha's:' and I am assured that some people in this neighbourhood have written to their acquaintance at Ludlow, to go and pay Sarah a visit; many gentle, and all simple folks, most seriously believing in her existence."

merit. Repeated editions of thousands have been rapidly sold.[2g] It has been considered as a standard of imitation; and was certainly the prototype of those cheap stories of a moral and religious tendency, which have supplanted the ridiculous and often immoral fictions of a former age. In a word, it appears so admirably calculated to effect the purpose for which it was written, that by those who have attentively examined its tendency and execution, it will scarcely be deemed extravagant praise, to say, that had the Author left no other monument of his ingenuity and benevolence behind him, he would not have lived in vain.

It was during this visit also, that he first developed those ideas on the medical use of the permanently elastic fluids, which afterwards attracted such general attention. He was fortunate enough to meet with a few opportunities of trying the new remedies in the country; and although the apparatus was exceedingly imperfect, and the plan was not pursued with sufficient regularity, the results were such as to furnish a rational hope of more decided benefit from future trials. This rendered him the more eager to submit his opinions to the test of more extensive experiment; but the probable expence of such an undertaking, deterred him from venturing upon it; especially, while his present situation and his future prospects were so clouded with uncertainty. His difficulties and apprehensions, however, upon this subject, were soon dissipated by the liberality of those to whom he had communicated his views. In his friend Mr. Reynolds, he met with a mind ready to sympathize with, and to co-operate in any plan which promised to be beneficial to

[2g] Two editions of 5,000 copies were sold or distributed in a few weeks. Upwards of 40,000 had been disposed of before the end of the year 1796, and a large impression was issued by the Author, a few years since, at the particular request of a religious society instituted for the promotion of knowledge and virtue by the distribution of books, who were desirous of including it in their catalogue.

mankind. Mr. Joseph Reynolds participated in the benevolent feelings of his brother; and the theory upon which his speculations were founded, appeared plausible and well deserving attention to Mr. Yonge, whose medical sagacity particularly qualified him to estimate its probable advantages. Animated by a kindred spirit of philosophical benevolence, these three gentlemen resolved that the scheme should not be abandoned without submitting its merits to a fair trial. They therefore agreed with Dr. Beddoes, to contribute in equal portions towards the expences of a Pneumatic Establishment to the extent of £200 each. On his part, he was to contribute a similar sum, and to engage, with proper assistants, to superintend the undertaking. To these propositions he, of course, cheerfully consented; and in addition to his contribution of an equal share of the expences, he voluntarily proposed that the whole of the fees that he might receive pending the issue of the experiment, should be devoted to the same purpose. Nor was this a nugatory proposition; for I am enabled to state upon the authority of one of his coadjutors, that the professional receipts thus appropriated, amounted to a considerable sum, before either of the parties concerned had advanced half the amount for which they had respectively engaged.

The attention of Dr. Beddoes was now directed to the choice of an eligible spot for the formation of the projected establishment. In the first instance, the metropolis, or its immediate vicinity, was fixed upon. It was resolved that a house should be immediately engaged, for the purpose of erecting a suitable apparatus, and that apartments in it should be properly fitted up for the occasional accommodation of patients, and for the purpose of respiring the gasses. In pursuance of this resolution, Dr. Beddoes set off for London early in the month of March, 1793. He was accompanied by Mr. Yonge and Mr. Sadler the aeronaut, who had occasionally

assisted him in his laboratory, while he filled the chemical chair at Oxford, and whose services were sought for, upon the present occasion, as machinist. Upon their arrival in London some time was fruitlessly consumed in looking out for a proper situation. At length, the Hotwells, or its vicinity presented itself to Dr. Beddoes's mind, as a spot equally, if not more eligible for the trial of such a scheme, than the Metropolis. After revolving its advantages for some time, he mentioned the idea to Mr. Yonge, who readily entered into it. He also addressed a letter to his friend Reynolds upon the subject; in which he observes that "an establishment at the Wells, would secure the precious advantage of patients in all stages of phthisis." In consequence of this alteration of his views he quitted London in a few days.

In the last letter dated from that city previously to his departure for Bristol, he expressed his satisfaction at the rapid sale of his "Observations." This was the more gratifying to him, as, he remarks, that it had scarcely been advertized. In fact, it appears to have excited a considerable degree of attention in the medical world. Men with ardent and enterprizing minds, turned with eagerness to the contemplation of a plan, which offered the probability of relief in diseases that had hitherto appeared hopeless; and even those of a less sanguine character, could not, if unprejudiced, refuse to acknowledge that it contained none of that overweening fondness for his own speculations, which so frequently characterizes the proposer of a new theory. It established his reputation as a man of ingenuity and research, and the conviction which it inspired of his medical information, was well calculated to operate as a favorable introduction, upon the commencement of his professional course, and to counteract, in a considerable degree, the asperity of political prejudice.

Such were the circumstances under which he commenced his

career at Bristol. He had scarcely any acquaintances either in that city or its neighbourhood; but his reputation had preceded him. He had previously sent forward Mr. Sadler to take a house, and to make some arrangements with reference to his intended pneumatic trials. The rumour of a new medical establishment, of which the precise import was unknown, excited some hostility among the inhabitants of Hope-Square. Some dreaded the idea of the vicinity of a hospital; and others were afraid that the experiments going on might poison the surrounding atmosphere. These prejudices were soon communicated to the landlord of the house which had been secured for him; and it appeared, for a time, very doubtful whether the peaceable occupation of the premises would be permitted. In consequence of these obstacles some delay took place, and they would probably have never been surmounted, had it not been for the good offices of the author of Practical Education, who happened, at that time, to be at Clifton. Mr. Edgeworth had been previously acquainted with Dr. Beddoes, and from the respectability of his character, possessed sufficient influence with the landlord, and with some of those who had originally stimulated his opposition, to enable him to subdue their prejudices; and the Doctor's assistant was at length allowed to commence his preparations without disturbance.

The society of this gentleman and his family was a most valuable acquisition to Dr. Beddoes, upon his arrival in a place where he was personally known to so few. There existed between them a similarity of opinion upon a variety of subjects, which rendered their intercourse more pleasant and unrestrained. The science of education, in particular, had already occupied the attention of both,[2h] and

[2h] In the chapter on toys, in Practical Education, it is observed in a note, that for many hints on that subject, the Authors are indebted to Dr. Beddoes. About this time he circulated among his friends, proposals for rational toys, to be constructed according to the principles contained in that chapter; but they were not made public till a future opportunity.

the practical and enlightened views of the one were still further extended by the philosophical theories of the other.

In a letter addressed to Mr. Reynolds, containing an account of the system of education pursued by Mr. Edgeworth, Dr. Beddoes observes that, he intends to add to it the great art of cultivating the senses; an art so much beyond vulgar apprehension, that even his correspondent laughed when he first mentioned it. "But," he continues, "is it likely that a child left to himself, would fall upon the best method of storing his mind with lively and various ideas of the best sort?' I contend that, as a child has the most pleasure when his ideas are the most distinct, the best method of cultivating the senses, would also procure to him the greatest quantity of present as well as future happiness. But I have not space to develope these opinions. I know them by experiment to be just. Mr. Edgeworth's children, to whom I have shewn a few experiments of a kind adapted to their age, jump about me, intreat me to go to Ireland, and consider my occasional absence from dinner as a serious calamity. Their minds were well prepared for the reception of distinct impressions. I will add also that this cultivation of the senses is no less favourable to virtue, than to happiness and ability. Persons so educated, would have no more time than inclination for vice."

In the mean time his apparatus for the medical exhibition of the airs was slowly advancing, and he was waiting, with anxiety, for a favourable case upon which he might try their influence. He was, at one time, apprehensive that a patient whose situation he considered as already desperate, would be confided to his care with that view; and he shrunk from the risque of exposing the "tender credit of his infant project" to such a test. The deliberate caution, however, with which his preparations were made, occupied more time than he had anticipated, and his friendship was not put to the trial. In a letter written towards the end of May, he observes, "Although we have made airs, and made some experiments upon them, I am

not yet in a fit condition to receive patients. The adjustment requires time; and it is important to ascertain the dose of non-respirable air, that may safely be mixed with atmospheric. The appearance of the room itself requires to be studied; for if it produce an unfavourable impression, all is over; and one rash experiment would demolish a plan, on which the hope of relieving mankind from much of their misery is founded; and which, I am certain, from trials even upon myself in the case of oxygene, will not be disappointed. I have been intensely meditating an advertisement of our scheme, or at least some way of making it known. I am pleased with none that I have yet fallen upon. I am persuaded that the summer had better be employed in curing one or two cases, than in making a number of rash and inconsiderate attempts."

The tediousness, however, of delay, and the solicitude which he must naturally have felt for the success of his scheme, were soothed by his constant intercourse with Mr. Edgeworth's family. And the pleasure of this intercourse was soon enhanced by the additional interest inspired by one of that gentleman's daughters. A letter in which he informs his friend of his attachment, admirably describes the emotions of an honest and feeling heart. "I know not," says he, "whether I am taken for one insensible to women: I should think that such persons must have viewed me at a distance, and have been prevented, by the exterior roughness, from perceiving the internal susceptibility of impression." After this introduction he proceeds, with an ardour which would surprize a superficial observer of Dr. Beddoes's character, to avow to his friend a passion, which any woman might feel proud to have inspired. The approaching return of the family to Ireland, appears to have accelerated the declaration of his affection. The avowal was made shortly before their departure, and the suit of a man of worth and intelligence was not rejected.

In the summer of this year, the Dr. published a letter to Dr. Darwin containing a farther explanation of his theory of the treatment of consumption. He had been much gratified at finding that it had been thought plausible by this enlightened and philosophical physician, and therefore addressed to him this illustration of his ideas upon the subject. He here points out two principal varieties of phthisis, to the former of which he considers the reasoning in his observations as exclusively applicable. This he calls the florid consumption. It is marked by the vivid redness of the cheeks at the accession of a paroxysm, and the extraordinary permanent redness of the lips, tongue, and fauces. "The eyes too, in such cases, are remarkable for their vivacity. The blood discharged by epistaxis, or haemoptysis, has a colour evidently more florid than usual." From these symptoms of the hyper-oxygenated state of the system in consumption he draws some curious inferences. "It is an evident consequence," he observes, "of my leading opinion, that a phthisical patient would take a longer time than another in being drowned, or in being suffocated in most of those airs that are unfit for respiration. Being already provided, as I suppose them to be, with a larger proportion of that principle which respiration introduces into the body, they must be able to continue, for a longer time, without the necessity of a new supply; and as the left cavities of the heart seem to be more irritable in such patients, it is probable they would be more easily recoverable from accidents of this kind, than persons in an ordinary state of health." On the other hand, he supposes that in constitutions injured by excess of spirituous liquors, and more particularly while they are under the primary operation of such liquors, there exists a deficiency of oxygene; "at least of oxygene in a combination so loose, as it is found in the circulating blood and moving fibres." He concludes, therefore, that more of this pabulum of life must be required by the system under such circumstances. The former of these opinions, he had an op-

portunity of confirming by experiment, in a few weeks after the publication of this pamphlet. As soon as his apparatus was completed, he subjected a variety of animals to the influence of gasses differently modified. In a letter dated the 20th August, he informs one of his friends, of his "having been very active in preparing for a noble course of pneumatic experiments on animals. He had already made four upon kittens, with uniformly the same result. Two were selected, of the same age, and the one that appeared the weaker of the two, was placed in air with an over proportion of oxygene. The proportion which he found fittest for his purpose, was one half oxygene, and the other half atmospheric air. Undiluted oxygene was too strong. The other kitten was left to respire the common air of the atmosphere. After some time, he drowned both. The animal which had breathed a modified atmosphere drowned last and recovered first. In a fourth repetition of this experiment performed before several friends, by one of whom the subjects for it had been selected, and the weakest placed in the oxygenated medium, "the latter was perfectly recovered fifteen minutes before the other got upon its legs." The proof of the converse of his proposition was still more satisfactory, as it was the result of observations made by a careful and accurate observer upon himself, without any bias from pre-conceived theory. Mr. Spalding, who did so much in using and improving the diving bell, and whose nice observation, had he not fallen a sacrifice to the negligence of drunken attendants, would have thrown much additional light upon more than one branch of science, informed Dr. Withering, of Birmingham, that when he had eaten animal food, or taken fermented liquors, he consumed the air in the bell much faster, than when he lived upon vegetables, and drank only water. Repeated trials had so convinced him of this, that he constantly abstained from the former diet whilst engaged in diving. This interesting fact was communicated to Dr. Beddoes by Dr. Withering himself; and appeared amongst the "Letters" from him and from some other physicians, which were published in the beginning of the following year, as a supplement to the observations on Calculus and to the letter under review. Nothing could more satisfactorily establish his inference, that the use of spirituous stimulants impaired the faculty of living in air of a reduced standard. He proceeds to mention some phenomena which had particularly struck him during his attention to phthisical affections; and gives the history of one of his earliest pneumatic trials, in which, although from various circumstances it was conducted in a very imperfect manner, the effects produced were strikingly beneficial. After mentioning the result of some other less important experiments, he relates, minutely, the effects produced upon himself by breathing an hyper-oxygenated atmosphere. It appears to have gradually induced the symptoms of incipient phthisis. Among its more striking effects were a manifest improvement of his natural complexion, and a considerable degree of insensibility to cold. The former was so striking, that he expresses a doubt whether a minute portion of it may not be safely inhaled as a cosmetic. Both these effects continued for a long time after he had relinquished the use of the artificial atmosphere. He concludes his letter with enumerating certain diseases in which he apprehends that the use of an increased proportion of oxygene would be found advantageous. The experiments which he had an opportunity of making when his pneumatic apparatus was completed, soon brought these speculations to the test; and it will be unnecessary to notice them at present.

Early in the year 1794, he published the supplement to these observations which has been already alluded to. It consisted amongst others, of letters from Dr. Withering of Birmingham, Dr. Ewart of Bath, and Dr. Thornton of London. They afforded him

a gratifying proof of the attention which his opinions had excited, and of the readiness with which some of the most enlightened of his brethren were disposed to assist his inquiries. Dr. Withering's letter contains several practical hints and reflections which present a valuable commentary upon a variety of passages in the observations. Dr. Ewart relates the history of two cases, from which it appears that he had anticipated the idea of administering a modified atmosphere in consumptive diseases. The accidental recollection of a hint contained in the appendix to one of Dr. Priestley's volumes on air, suggested the first trial of this plan. In this, although the case was advanced to the hopeless stage, the sufferings of the patient were much mitigated. In the second, the beneficial effects of this treatment were more decidedly apparent; though the history of the case is incomplete. The air made use of in both instances, was carbonic acid gas obtained in the usual way by pouring diluted sulphuric acid on marble in a Nooth's apparatus.

Dr. Thornton contributes two letters containing an account of several cases treated according to the pneumatic theory. Dr. Parry of Bath also furnishes a case, which there is reason to suspect was connected with defective oxygenation of the blood; but, as the minutes of it were preserved principally with reference to the investigation of another disease, the evidence afforded by it is not decisive.

In addition to these letters several ingenious remarks are interspersed in the course of the work; and an analysis of two very interesting papers is added; one by Lavoisier on the state of the air in crowded assemblies, the other by Vauquelin on the liver of the skate. This organ is, in that fish, remarkably large in proportion to the size of the heart and organs of respiration. It was found, by actual experiment, to contain more than half its weight of perfectly formed oil. This phenomenon is attributed to the inconsiderable respiration of the animal; and the opinion is supported by a very

ingenious and satisfactory train of reasoning, which throws further light upon, and appears to confirm the Doctor's speculations on the subject of obesity. The effects of acids and of exercise in diminishing corpulence are thus seen to rest upon a very simple principle; the introduction of an unusual quantity of oxygene into the system: while, on the other hand, the effects of sloth and inactivity combined with such articles of diet as abound in hydrogene, are rendered equally visible in the rapid accumulation of fat.

The Observations on Calculus, the Letter to Dr. Darwin, and the Pamphlet just spoken of are so connected, that it appeared unnecessary to interrupt the analysis of them, in order to preserve the exact order of time. It should, however be noticed, that previously to the latter of these publications, Dr. Beddoes contributed a paper to the fourth volume of Medical Facts and Observations, containing a case of phlegmonic inflammation, with reflections on certain effects of heat and cold on the living system. In this he has illustrated upon the principles of Dr. Brown, many interesting pathological phenomena, connected with inflammation; and has accurately discriminated between the effects of a general and partial alteration of temperature in their production and modification.

His private correspondence with Dr. Darwin during this year contains much interesting discussion, both physiological and metaphysical, upon the subject of the first volume of Zoonomia, which was at this time passing through the press. A few extracts from this correspondence will be found in the Appendix.[21] His letters to his friend Reynolds during the same period are strongly indicative of satisfaction at the gradual increase of his reputation, and his practice. On the subject of his pneumatic establishment he observes, "that some unforeseen difficulties must always attend a

21 See Appendix, No. 6.

scheme where all is novel;" but he still indulges the expectation that those friends whose liberality enabled him to commence his inquiries in this particular branch of medicine, would be reimbursed. At the same time, he expresses his consciousness that they would be fully satisfied without such return, provided the grand object in view, a diminution of the evils which afflict humanity, were effected. He announces his intention of preparing, with their permission, a full account of all his experiments, with drawings of the apparatus; in order to put it in the power of every philosophical member of the medical profession, to make similar experiments, and to verify or confute their results.

In December, 1793, the late Duchess of Devonshire, who had been passing some time in the neighbourhood of Bristol, expressed a curiosity to witness some of the processes of pneumatic medicine; she accordingly paid a visit to Hope-Square, and minutely examined the whole apparatus. Nor was this a visit of vain or frivolous curiosity; for the Doctor observes in a letter to Dr. Darwin, that she manifested upon this occasion a knowledge of modern chemistry superior to what he should have supposed "that any duchess, or any lady in England was possessed of." So much was she gratified and interested by what she saw, that she shortly afterwards repeated her visit and staid almost three hours. It was during this second visit, while remarking the vivid interest excited in this accomplished female, that the idea of a hospital for the administration of the pneumatic remedies first struck his mind. "It appeared to me," says he, in a letter written immediately after her departure, "that it would be more practicable to determine the medical effects of elastic fluids in one year, if we had from six to twelve patients in a house with the apparatus, than in twelve years of private practice. Six or seven hundred pounds would provide so many with air and food, and support all expences. Bad as the times are could not one find

benevolent people enough to assist in the execution of so grand a design?" He mentioned his idea to the Duchess, who entered into it with great eagerness, and requested him to communicate to her by letter a further detail of his plan. From this time, his mind was much occupied by the subject; but it was some time before his ideas were sufficiently matured to enable him to propose his scheme to the public.

In the mean time, however, he found leisure to publish a little tract, addressed principally to the more humble classes of society, entitled a Guide for Self Preservation and Parental Affection. In this work, he points out in the most simple language, a variety of errors generally prevalent upon subjects in which health is concerned. He states it to be his purpose "to give the poor in particular, some instruction in the art of rearing their children, and to teach those who are grown up, how they may escape several serious disorders, as well as some of those lighter ailments which, in this fickle climate, often render the half of life uncomfortable." He first treats of the effects of diet. He particularly describes the evils resulting from a deficiency of proper nourishment; and cites several interesting cases illustrating the effects produced upon the stomach by common stimuli, when its susceptibility has been accumulated by inanition. He next explains the injury produced by the opposite error of over-gorging the stomach; more especially in infancy; and under this head, particularly insists upon the great, and often irreparable mischief inflicted upon children, by inflaming their tender organs with fermented liquors.

He notices, in the third place, the injurious consequences resulting from any sudden abstraction of heat, as for instance, drinking cold liquors, or bathing in cold water when the body is previously heated. In the fourth, which is, by far, the most ample division of his work, he fully explains and elucidates the mischiefs caused

by a sudden transition from cold to heat; and delivers some plain directions for avoiding, or, in some degree, obviating the ill consequences which must be expected to succeed any acts of imprudence of this nature.

He next insists upon the importance of cleanliness and fresh air, and concludes with some hints as to the proper kinds of cloathing. All these topics are treated in the most familiar manner, and are illustrated by a variety of apt illustration and anecdote. They were afterwards incorporated in an enlarged and improved state in a little volume which will be noticed hereafter, explaining the objects of the Medical Preventive Institution.[2k]

Towards the close of the month of March, he embarked for Ireland; and after passing some weeks at Edgeworth's-Town, received the hand of the object of his affection. Immediately after the ceremony he returned with his bride to England.

Soon after his return, his spirits seem to have been, in some degree, depressed by the deserted appearance of Clifton and the Hotwells; where the temporary shock given to enterprize by the war, appeared in many a melancholy row of almost deserted lodging-houses. Still, however, whatever were the result as far as regarded himself, he expresses his determination of expending one hundred pounds more in

2k This useful little tract had a rapid sale. In a few months after its first appearance it is thus alluded to in a letter from the Author to Dr. Darwin. "I published, just before I went to Ireland, a little book of directions for poor people respecting health. It was principally to dissuade them from plunging their chilled children into a warm temperature. Two small editions have been sold, and I am going to print a third. I do not believe that you have seen it. I thought it trifling and did not expect the sale that it has had. Perhaps the plain style recommended it, perhaps the fame of Isaac Jenkins."

From a letter of Dr. Darwin nearly coinciding with the former in date, it appears that it had already fallen in his way. "I have read," says he, "a little work of yours about preserving health with great pleasure. You deserve a civic crown for saving the lives of your fellow citizens."

perfecting his pneumatic scheme. This activity of mind soon dispersed the clouds of doubt and uncertainty, and another object was shortly afterwards presented to his attention. He was solicited by Dr. Parr, Mr. Christie, and some other literary characters, to engage in the superintendance of a new edition of the works of the celebrated John Brown, for the benefit of his widow and children. Dr. Darwin and himself had been both thought of by the friends of this unfortunate and deserving family; but the advanced age and constant avocations of Dr. Darwin seemed to forbid an application to him, and they therefore turned to Dr. Beddoes, who readily assented to their wishes. In a letter which announces his being about to engage in this work, he observes, that his "principal reason for undertaking it, is to administer this consolation to men of genius languishing in penury and neglect; that when they are gone from the scene, some notice will be taken, for their sakes, of those nearest and dearest to them."

Had not such motives been particularly calculated to influence his mind, he might easily have offered an excuse for declining the office of an Editor. He was now much occupied in meditating the further extension of his pneumatic scheme. He had made known his intention by letter to a number of persons respectable for talent and science, from whom in general, he received assurances of co-operation; and was engaged in an almost constant correspondence upon the subject. Indeed he states the multitude of inquiries with respect to the detail of his plans, as among the most cogent reasons for a publication, which by the help of engravings and minute description, might render the processes familiar to the profession in general. In addition to this, his reputation as a physician was daily diffusing itself, and his practice proportionably increasing.

In the month of August, he published under the unassuming

title of a "Proposal for the Improvement of Medicine," his plan for determining the power of factitious airs, by the formation of an institution for that specific purpose. Upon contemplating this paper now that a period of fifteen years has elapsed since its publication, it appears difficult, or rather almost impossible, to conceive how a scheme so modestly and benevolently announced, should have had to encounter so much opposition as it appears to have met with. No extravagant advantage is either stated to have been already attained, or is anticipated in future. On the contrary, he declines giving "the slightest assurances of success." He merely states a position which no one will be sufficiently hardy to deny, that the permanently elastic fluids seem possessed of considerable powers upon the human system; and that it is highly desirable to ascertain, how far these powers can be applied or modified so as to afford relief to suffering humanity. Upon the supposition that the projected institution were deemed worthy of adoption, every precaution is suggested and recommended to ascertain the real effects of the remedies resorted to; and far from obtruding his services as the medical superintendant of such an establishment, he himself suggests that it might be thought, "that it ought to be confided to a physician less prejudiced in favour of the project than he might be presumed to be." This prospectus, after having been generally circulated, was in October, affixed as a preface to the first and second parts of Considerations on the medicinal use and on the production of Factitious Airs.

Some time before the publication of this tract he had the good fortune to secure the assistance of a gentleman in constructing his apparatus, whom it is sufficient on such an occasion to name. The person who had first undertaken this department, had, in executing his ideas, so multiplied machinery, that those parts of it which he had contrived, have been said to resemble, in some degree, the complicated engine which, in one of Hogarth's prints,

is applied to the purpose of drawing a cork. The philosophical mind of Mr. Watt, at once perceived what was wanting; and he produced an apparatus equally simple and efficacious.[21] His services are acknowledged in a handsome dedication which the Doctor without his coadjutor's knowledge, prefixed to the first part of these Considerations. The second is entirely occupied by a description of the apparatus from the pen of Mr. Watt himself, elucidated by drawings. This publication sold rapidly, and in four months a new impression became necessary. It was a circumstance particularly gratifying to the Author, that its circulation was by no means confined to the medical profession. He considered this as a sign "of a rising disposition in mankind to take what belonged to their welfare into their own consideration; and to emancipate themselves still further from the danger and servility of implicit confidence." In a manly preface[2m] he states what had been already effected, and what the friends of humanity might hope would in future be effected, by the new plans proposed: but the same candid and philosophical spirit which appeared in the prospectus, tempers his anticipations here also. He promises nothing; he asks only that pneumatic medicine should have a fair trial.

He proceeds to relate a number of interesting experiments illustrative of the effects of the different gasses. When they had been tried in a variety of combinations upon inferior animals, they were applied to the treatment of disease in the human species. But, except in one or two cases incidentally cited by way of illustration, with a remarkable degree of candour and forbearance, he abstains from

21 From this period, the Doctor and Mr. Watt frequently corresponded, and he appears to have preserved his letters with particular care; a distinction to which they were justly entitled from the sagacity and extent of information which the writer has manifested in almost every department of science.

2m The second edition of this tract being an enlarged and improved one, I make use of it for the following analysis, although a little out of the order of time.

giving the result of his own experience. He leaves the efficacy of factitious airs to be established by the testimony of others; lest doubts should be thrown upon facts coming from a source, which prejudice might consider as of questionable authority. A general view of what appears from the most ample testimony to have been effected by these new remedies, will be deferred till the concluding volume of these Considerations comes under notice.

In the mean time, his attention was not unawakened by the political occurrences which took place at the close of this year. He wrote for a certain society, an address to Thomas Hardy upon his acquittal. It is conceived in a style of forcible and indignant eloquence; and animadverts with the most poignant severity upon the conduct of Mr. Pitt, in persecuting the more consistent adherents of a cause, of which, he himself had once been one of the most distinguished advocates.

To complete the list of his published writings in the course of this year, a contribution should be noticed which appeared in the fifth volume of Medical Facts and Observations, containing a narrative of the good effects of opium, in counteracting an excessive dose of digitalis. The practical information contained in this narrative renders it worthy the perusal of every medical practitioner.

In the year 1795, the edition of Brown's Elements of Medicine which he undertook to superintend and revise, was given to the public. In order to render its doctrines more intelligible, he was at the pains of correcting throughout the language of the author; which was, in many places, uncouth and obscure.[2n] To one whose own

[2n] Among his letters to Dr. Darwin, there appears one, in which he asks his advice as to the best mode of executing the task that he had undertaken. In his reply, the Doctor observes, "to make Dr. Brown's work agreeable reading, it must be totally written over again; and to shew the excellencies and the errors of it, would require a volume or two. All you can do will be to white-wash the old building as it stands, and to put a neat portico to it by way of preface commendatory, and cover the irregularities by shrubberies of myrtle and orange flower; but not to attempt to pull down and rebuild any part of it; because it would be easier to make a new one."

mind furnished a perpetual spring of fresh ideas, and who was not unused to original composition, this though a necessary, must have been a very wearisome task. The introductory matter which he has prefixed to the work is highly valuable; as it contains an able analysis of a system, which in spite of numerous imperfections, is a splendid monument of original genius.

He commences his observations with a brief sketch of the life of its founder; written in an animated style, and apparently developing with much ingenuity, the secret movements of an extraordinary mind. In tracing the history of Brown's private practice, he is led to quote the following sentence from Dr. Johnson. "In a great city, reputation is, for the most part, totally casual. By an acute observer who had looked on the transactions of the medical world for half a century, a very curious book might be written on the fortune of physicians." This idea struck him as a peculiarly happy one, and digressing from the main object of his introduction, under the unassuming guise of suggesting what might be written upon such a subject, he has himself offered some keen observations upon the inadequate basis upon which professional reputation is often founded. He forcibly describes the injurious consequences resulting to society, from the mistaken estimate generally formed of medical ability. When eminence is attained by some fortunate concurrence of events and not by real merit, the individuals thus elevated not only injure those committed to their care from want of information, but diffuse more extensive mischief by a haughty indifference, and not unfrequently even an active opposition, to any thing tending to the advancement of the science of medicine. Such persons, our Author observes, are "jealous of improvements and hostile to improvers." . . . "The internal monitor whispers, that it was not by knowledge that

they rose, but by knowledge they may sink. It is, therefore, the constant expedient of dullness to persuade the world that men of genius are deficient in judgment; though it be certain that the very persons who have been most remarkable for devising new means of relieving distress, and removing uncertainty, have also been the most acute in discerning the real relations of things. Still, however, *the old way* is judged *the safest*, and crafty mediocrity treasures up the spoil of the credulous and the rich."

He next adverts to the very scanty services which have been rendered to medicine, by those who have enjoyed the most ample professional emoluments, and were possessed of the most fashionable reputation. Under this head, he proposes it as an axiom, that "If a physician has attained to great eminence without having made some assignable improvement in physic, if he has neither executed or promoted any designs tending to this end, he may be safely set down as the narrow-minded creature of artifice, or the spoiled child of chance."

As an useful, and at the same time amusing addition to this projected essay, he proposes that an Iatrologia, or a classification of physicians into genera and species, in a mode analogous to the Linnæan system, should occupy an appendix; and by way of shewing its practicability, he has, as he had before done in the essay, himself executed the task. The various members of the Æsculapian family are successively delineated, and according to their salutary, their neutral, or their noxious qualities, are the subjects of animated eulogium, of playful satire, or of indignant reproof. It has been said that this publication had not long appeared, before the friendly zeal of some of its readers, had traced among some of their medical acquaintance, the supposed archetype of every sketch, the features of which were unfavourable. Upon an attentive perusal of it, however, it appears more probable that the satire is general, and that it has only been applied to individuals, by the mistaken apprehensions of too sensitive friends, or perhaps, more frequently, by the malicious suggestions of secret enemies.

This new classification is succeeded by an exposition of the Brunonian doctrine; in which the Author has introduced the ingenious illustration of its principles drawn up by Mr. Christie. To some parts of the doctrine itself Dr. Beddoes has offered powerful objections, especially to the division of the passions into stimulant and sedative. The following observations upon this head seem to be expressed with peculiar felicity.

"In fear, grief, and anxiety, some parts manifestly betray by their paleness and coldness, diminished exertion. Now, as no two parts, according to our Author, can be in opposite conditions at the same time, what could he in consistency do, but assert that the doctrine of heat and cold is exactly applicable to the passions? In high spirits, therefore, we are to suppose ourselves animated by something corresponding to the warmth of summer; in tranquillity, we are lowered by a subtraction of this mental stimulus down to temperate, and in grief we sink to the freezing point; how far the common opinion varies from this of Brown, I cannot exactly say; because I do not understand what particular change the words depressing or sedative passions are designed to indicate. When I try to assist my apprehension by some analogy, I find nothing in nature to help me out, but am obliged to think of certain passages in books of romance, where the enchanter is described as inducing a state of permanent torpor by the motion of his wand. To discover whether any of the passions have a *benumbing* operation does not appear very difficult: let us take a transient look into the mind of a mother sorrowing for the loss of her son. I ask whether her ideas are more or less vivid than usual? whether, she does not exert herself to recollect all he said or did between the cradle and

the grave? whether, after minutely considering what he has been, she does not set herself with equal earnestness, to fancy what he would have been? and whether every picture formerly drawn by hope does not pass again before her imagination, with the figures more strongly illuminated and more distinctly embodied?

" Grief fills the room up of my absent child;
" Lies in his bed; walks up and down with me;
" Puts on his pretty looks; repeats his words;
" Remembers me of all his gracious parts;
" Stuffs out his vacant garments with his form,
" Thus have I reason to be fond of grief.

Constance in the Play of King John.

" If this expression of sorrow be not too strong, while a happy meeting is still believed possible, it may be doubted whether the faculties of Shakespeare or Schiller strained to their utmost pitch, are equal to that intensity of thought which takes place when this hope is finally destroyed. Fear and anxiety excite images of equal vivacity with grief; and on considering the subject, it will appear that, for these states of mind, *perturbation* which occurs in the writings of the ancient philosophers, is a far more apt term than *passion*. Had it not been for inaccurate language, which the Author of the *Enquiry into the State of Medicine*, justly calls the greatest of all plagues in science, the opinions I am inviting the reader to compare with nature, would, probably, never have existed. Neither should we, perhaps, have been taught, that in grief the mind moves slowly; an assertion as distant from the truth, as if it should be said that animals in full chace of their prey, move more slowly than when they are not actuated by any appetite."[2o]

He concludes his introduction with a vindication of Brown's

[2o] The reader will find this subject again taken up in that number of the Essays published under the title of Hygëia, which treats of insanity.

system from the charge preferred against it by his enemies, of a tendency to promote intemperance. To insist much upon this point seems scarcely necessary; as the idea could only have arisen from a gross or wilful ignorance of its genuine principles. On the contrary, as our Author has observed—" No writer has insisted so much upon the dependance of life upon external causes, or so strongly stated the inevitable consequences of excess. And there are no means of promoting morality, upon which we can rely, except the knowledge of the true relation between man and other beings or bodies. For, by this knowledge, we are directly led to shun what is hurtful and pursue what is salutary; and in what else does moral conduct as far as it regards the individual, consist."

The new edition of Brown's elements was almost immediately followed by a translation, from the Spanish, of Gimbernat's New Method of operating in Femoral Hernia. The superiority of the mode suggested in this treatise, and a wish to excite the more general attention of English surgeons to the works of their foreign brethren, are stated, in the preface, to have been his motives for publishing this work. He has added to it an appendix recommending an improvement in variolous inoculation. Dr. George Fordyce had suggested that, one of the most important circumstances to be attended to in this operation, was to make the puncture exceedingly small and superficial, as he presumed that the mildness of the disease was, in a great degree, connected with the sparing quantity of matter applied. Upon this hint Dr. Beddoes improved, by recommending the dilution of the virus with water; and he advises that a very minute vesication should be first raised, and the diluted matter applied with a camel's hair pencil to the spot, after removing the cuticle. He has inserted communications from two surgical friends which seem to establish the advantages of this practice.[2p] If therefore the mistaken

[2p] One of these, written by Mr. Rolph, a gentleman of observation and ingenuity, con-

prejudices of parents, and the ignorance and avarice of some medical practitioners, should still perpetuate the variolous plague, the hints suggested in this little tract may, in some degree, disarm it of its malignity. The appendix concludes with a short paper warmly recommending a freer use of mercury in various febrile diseases, than is familiar to common practice.

The labours of Dr. Beddoes during the year 1795 were however, principally confined to the advancement of pneumatic medicine. So many cases, in which these new remedies had been resorted to, were now communicated to him, that he was enabled in the course of the Autumn to publish a third part of the considerations. In this, as in his preceding publication on the same subject, the facts rest upon the testimony of others, and he himself only furnishes an occasional hint or remark. Prefixed to this volume is a letter drawn up with a considerable portion of humour, in the character of a venerable

tains a singular passage. With a view to secure a family where the natural small pox was apprehended, he had inoculated amongst others, a man who "never received the infection though the operation was repeatedly performed with undiluted matter, and though he was for days exposed to contagion, from living in the same room with a man who died of the disease."

"It is worthy of remark, that this man had some years before, a complaint incident to cows, and commonly called the Cow-pox; a malady more unpleasant than dangerous. It is generally received by contact in milking. In the *human species* the complaint is sometimes local; at other times absorption takes place, and the glands in the course of the absorbents become indurated and painful. When this is the case, I have learned from my own observation, and the testimony of some old practitioners, that susceptibility to the small-pox is destroyed. Some advantage may probably in time be derived from this fact."

It must appear strange to any one who reads this communication in the present day, that the concluding remark should not have led the writer to anticipate the brilliant discovery of Jenner. It is still more surprizing, that the active and inquisitive mind of Dr. Beddoes, accustomed as he was to experimental research, did not pursue the hint. It exhibits a convincing proof how many fortunate coincidences of genius, of observation, of opportunity, and of combination were necessary, before a discovery could be perfected which envy would fain ascribe to chance, or endeavour to trace in hints of preceding writers amounting to much less than that under notice.

octogenarian physician, complaining of the rage for novelty in medicine, and the rejection of some of the most anciently received opinions; and expressing a particular horror at the gaseous remedies. It includes a specimen of the mode, by which, under the greatest apparent candour, an effectual barrier may be raised against the advance of any improvement whatsoever. The artful objections which, in this letter, are assigned to its fictitious author, were literally brought forward, upon a very melancholy occasion, by a physician of considerable eminence. The ludicrous anecdote of an apothecary, who was so enraged with one of his patients for determining to try the aerial remedies, that he sent in his bill and menaced him with an immediate arrest if he were not paid, is equally authentic. It appears that some medical practitioners, of no mean rank, were so profoundly ignorant of pneumatic chemistry, that by one, oxygene gas was mistaken for fixed air, and by another, for the phlogisticated air of Dr. Priestley. Yet men thus unqualified presumed to give an opinion upon the subject. It is difficult to say, whether opposition arising from such sources, calls more for contempt or indignation.

An appendix to this volume contains among other miscellaneous articles, a description of a new pneumatic apparatus invented by Mr. Read; and an ingenious application of the general principle of Mr. Watt's air-holder to the construction of a mercurial apparatus, by Mr. William Clayfield of Bristol. About the time that it was committed to the press, he republished in an enlarged and more elegant form, the prospectus of his projected pneumatic institution; under the title of an "Outline of a plan for determining the Medicinal Powers of Factitious Airs."

He complains, in a letter written in November of this Year, that his literary pursuits were suspended and interrupted "by a concourse of patients." Notwithstanding this complaint, however, it appears that he found leisure for the composition of some of his most celebra-

ted political productions. About the same time also he amused himself with a little literary imposture, which met with as much success as the expedition of Alexander. In imitation of certain poems which were published about this period, he wrote a few lines entitled "Domiciliary Verses," which successfully parodied their style and manner. He then had them printed in a form exactly similar both in type and appearance of the page, to the work in question, and inserted in the volume; where they maintained their rank without any suspicion being entertained of their spurious origin. The verses alluded to afterwards appeared in the Annual Anthology, and in consequence of the exactness of the resemblance, I believe that what was intended merely as a playful imitation of a style which the Author conceived to be incompatible with genuine poetry, was received and perused by many as a serious contribution.[2q]

His principal political writings followed each other in such rapid succession and their subjects are so immediately connected, that I shall deviate a little from chronological exactness, in order to notice them together. Although the analysis which has been given of some of his preceding works, will shew that political topics had not escaped his notice, it should be remembered that, with the exception of the obnoxious handbill, they had been only privately circulated. He had not yet descended into the *arena* as a public champion. He now, however, came forward with a fearless and unequivocal avowal of his political sentiments; although in the ferment that then existed, so marked an opposition to the opinion of the majority, could not but expose him to much obloquy, and might, in all probability, materially affect his interests.

The following are the names and dates of these writings. A Word in Defence of the Bill of Rights against Gagging Bills: Where

[2q] Appendix No. 7.

would be the Harm of a Speedy Peace? both published in the winter of 1795: An Essay on the Public Merits of Mr. Pitt: A Letter to Mr. Pitt on the Scarcity; both in 1796: Alternatives compared, or, What shall the Rich do to be safe? 1797.

Of these pamphlets, perhaps, the first is written with the most energy and eloquence. Were it a less difficult task to separate those grand political principles which are of universal application, from temporary references and allusions, I should be tempted to make copious extracts from it. The eloquence, however, of some passages gives them a claim to insertion that cannot be resisted. He commences his defence in the following terms.

"The individual inhabitants of Great Britain have been distinguished for a century past, by superior generosity, openness, and energy of character; the society at large, by a degree of unexampled prosperity. For so long have we enjoyed, in a superior degree, the use of *reason* and *speech*, the two great faculties by which the Almighty has distinguished *man* from the brute creation. Other countries more favoured by nature, have languished in time of peace; and, though far surpassing us in numbers, have yielded in war to the courage which liberty inspired. To look ministers in the face, to applaud without meanness, and censure without fear, has been our privilege and boast. We have felt no dread of capricious mistresses, of spies ripened by pocket-picking for perjury, or vindictive agents of government. We have it among the most solemnly recorded and recognized of our rights, to deliberate, in common, concerning grievances, without ministerial controul, and to petition with frankness for redress. This inheritance we derived from our ancestors; by whom it was dearly bought, as by us it has been securely enjoyed. Two years ago, was it supposed that there existed a tool of despotism so abject as to dream of dispossessing us? But two weeks ago could we be apprehensive of losing that, which more

than being born in a certain country, constitutes us Englishmen? Ten thousand swords were called by the fancy of Mr. Burke from their scabbards, to avenge a look threatening insult to the beautiful and high-born Queen of France. What conceptions would have crowded in upon him, at the idea of an infringement of British freedom, more audacious than Pitt the elder ever imputed to Lord Bute, or Pitt the younger to Lord North? Millions of indignant voices reprobating the sacrilege, and millions of hands signing petitions for an impeachment of its perpetrators, would have been forms of disapprobation too tame for his exalted imagination.

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"To surrender this right would be deliberate political suicide. And be assured that neither national prosperity nor the noble attributes of the British character will long survive the death of freedom. Our immediate ancestors harboured suspicions of a settled design to stifle that spirit of freedom, which is to the moral order of society, what the vivifying sun himself is to the physical order of the Universe. I have not the time to state, and who needs to be told, the dark designs imputed to Lord North, to his predecessors and his secret directors. But was it ever prophesied that a minister should dare to aim an open stroke at liberty, using for his dagger the misplaced confidence of the people!! That people making no legal effort to ward off the blow; the last of the Britons overwhelmed in speechless amazement!!

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"To abolish the Bill of Rights under the pretext of altering it, is to cut by one cruel stroke the nerve of affection by which each Englishman feels for the welfare or adversity of all; the nerve which connects us all with the sensorium of the state. An unskilful minister engaged in a pernicious war, and trying, like a desperate gamester, to retrieve his original rashness, may go on staking our property and

our lives, till the last guinea and the last man capable of bearing arms, be sacrificed. The more pernicious the measures, the more strenuous will the junto in power be, in maintaining throughout the kingdom the mournful silence of despair. Misery will be obliged to stifle its groan, and virtue her sympathising sigh; till at last, in a nation characterized by every manly and humane attribute, all the kindly feelings of the heart retire inwards and die. Public spirit will be extinct or dumb; and on this influence against which the Commons protested, and every man inveighed in whose bosom one spark of patriotism glowed, will no mortal, henceforward, be able to "look and live."

This strain of indignant eloquence extends through some pages. He is, however, anxious that his principles should not be misunderstood, or misrepresented, as inculcating any thing beyond constitutional resistance. "For myself," says he, "I deprecate all violence. I have no talents for pillage. *Peto placidam sub libertate quietem.* Peace and liberty have my sincerest vows. I shudder at the idea of confusion. In this spirit, descrying anarchy at the end of an avenue of oppression, I protest against that revolution of law which threatens our liberties. A man, accustomed all his secluded life, to seek truth by the instrumentality of reason, cannot well fail to abhor the disorders committed by mobs."

He addresses himself in particular, in rather more humble language, to the labouring part of the community; and in allusion to the extravagant ideas which some persons seemed to entertain of the importance of the Premier, as if he alone were the great sun of the system, the great centre of life and activity to all British enterprize and British industry, he amuses himself for a moment with sketching in a few sarcastic and humourous lines the calamities which must necessarily befal that portion of society, should the heaven-born minister unfortunately be compelled to quit his office. While warn-

ing this class of readers against the ambition of men in power, he is not less careful to protect them from the wiles of the turbulent and the factious. From the peaceful and temperate conduct of this class of citizens, he augurs that these innovations would not be of long duration. "As men," he observes, "become more humanized by knowledge, they cannot, indeed, become less free. Instruction must now daily spread, and the majestic stream of human reason hold on its uninterrupted course. By the desperate schemes of a minister to keep his place, this stream may for a moment be ruffled and ensanguined; but such a minister's memory it will soon sweep with other rubbish into the Gulph of Infamy."

In the second of these pamphlets, he displays in strong and energetic language, the blessings of peace; and examines the justice of those reasons, which, in the apprehension of so large a portion of the community, rendered a continuance of the war necessary. I shall only extract from this work two short sentences as a specimen of the animation with which it is written. They refer to the apprehensions which he had felt, that the acquiescence of his countrymen might have permitted the convention bills to pass unmodified; and that the effectual opposition which had softened some of their harsher features, would not have been made. "While I was under this apprehension," he observes, "there arose before my imagination a picture of society such as it must become, were it subjected to the full rigour of these fatal measures. In the foreground, I beheld steam ascending up to heaven, volume after volume; it arose from the executed martyrs of freedom. In the distance lay a tract strewed over with ruins, as after the passage of a hurricane; this part of the scene represented the effects of popular indignation bursting forth in all its undistinguishing fury."

But by far the most celebrated of his political publications was the Essay on the public merits of Mr. Pitt. The introduction to

this work contains a vindication of the right of a medical man, to devote a certain portion of his time to politics. To this chapter he has affixed the following quaint translation of the ancient adage; *Ne sutor ultra crepidam.*

"Penn'd be each pig within his proper sty,
"Nor into state concerns let Doctors pry."

It appears that he had attended a political committee while the restrictive acts before alluded to were pending; by which means he not only gave a handle for censure to those who were avowedly his enemies, but afforded also a similar opportunity to more insidious foes; who concealed their hostility, under an affected sympathy for any unfortunate patient, that might have accidentally required his services while he was thus engaged. "Yet," as he observes, "to have been found bearing a hand at whist, or partaking of a turtle, would expose a physician to no reproach, although it delayed his attendance upon an unexpected summons." The inconsistency of this conduct, it needed not his sagacity to detect, nor his talents to expose. In the following chapters he proceeds to trace the political career of Mr. Pitt; to appreciate his services, and to develope his character. The light in which he places each, notwithstanding the solemn irony of praise which is occasionally introduced, is sufficiently unfavourable.[2r] He applies, with much felicity, an historical review of the concluding period of Lord North's administration to illustrate the state of national affairs under Mr. Pitt, and puts speeches into the mouths of some rising patriots of that day, at least equally applicable to the state of things when he wrote, as to the period to which he ostensibly refers. One

2r The irony is, in some instances, so masked, that it is only discoverable from the context, that his approbation is not real. Dr. Darwin, in a letter acknowledging the receipt of a copy of the work, adverts to this circumstance, and proposes the introduction of a new stop to designate irony; as, for instance, a note of admiration inverted, or some other mark, which should admonish the cursory reader of what he had to expect.

of these supposed speeches he has versified in a manner which proves that had he applied his powers to satirical composition, they would not have been found deficient in energy.

In tracing the history of the commutation acts, he is naturally led to allude to the injurious effects of the window tax upon the health of the community. For this source of revenue it would perhaps be very difficult to point out an adequate substitute; but no medical man, who ever explores the humble habitations of the poor, can help contemplating it as a wide wasting source of disease and death. In reviewing that part of the minister's conduct, which he characterizes as consisting in "leaving undone those things which he ought to have done," he draws a forcible picture of the distresses of the poor; distresses, the full extent of which is, perhaps, more intimately known to the medical practitioner, than to any other description of the community. He enters into an examination of his financial projects, which he, by turns, condemns and ridicules. He attempts to shew the ruinous tendency of his political measures; pointing out their present inadequacy, and predicting their future failure; and concludes his Essay* with a sketch of the contrast between the actual situation of Great Britain in 1796,

* It had been the intention of the Author that this essay should be illustrated by two etchings, the designs for which he has given in a letter to one of his correspondents. In the first, which was intended as a vignette for the title-page, was to be represented a heart, "as flaccid as possible" with a Genius standing near it, holding a spear surmounted by the cap of liberty. The other end was to be near the heart, and a spark to be seen issuing from it and striking it. Round it was wound a scroll containing two mottos. One in Latin, *Lateat scintillula forsan.*" The other in English:

"Thou British heart that liest so pale and cold
"Shall never spark thy latent fires unfold?
"Warm with rekindling life thy torpid clay,
"And bid once more thy patriot pulses play?"

For the second his design was a column decorated with death's heads, leaning on one side, with a gaping fissure at its base, threatening to crush the by-standers in its fall; and containing a short inscription to Mr. Pitt; which, perhaps, exceeded in severity any of his former attacks upon him.

and what it might have been if Mr. Pitt had aimed at the "character of a benefactor to mankind, and not preferred office to reform." The vision which he calls up, presents images of the most soothing kind. In stating the probable progress of the French Revolution, had the energies of Great Britain been employed in arresting the attack of the coalesced powers, he uses a singularly happy image. "Innovation," says he, "would have flowed in with so gentle a tide, as not to overwhelm an infant in its way."

The subject of the "Letter to Mr. Pitt" was the scarcity that existed in the winter of 1796. In the commencement of this letter, he alludes, with the most caustic severity, to the project for reducing the enemy by famine, and to the inattention which had neglected to provide for the consequences of a failing harvest in our own country. He proceeds to inquire into the practicability of increasing the national stock of provisions by introducing new articles of consumption. As a means of effecting this object, he recommends that animals should be dieted as far as practicable, upon such articles of food as might, in case of scarcity, be easily convertible to the nourishment of man. Thus, he observes, that "an ounce of beef may contain the quintessence of tons of

This design was afterwards altered; an account of the alteration is given in the pamphlet called "Alternatives Compared." "In the centre stands a column, ornamented with death's heads, and surrounded by analogous emblems of disastrous war; as torn streamers and broken gun-carriages: on the right is a naked and hungry rabble; on the left a crowd of stock-brokers and monied-interest men. At some distance, stands a solitary figure, fixed in astonishment at the insensibility of this groupe to their danger from the falling of the broken shaft, which is seen inclined towards their side. The inscription is as follows. I AM UNCOMMONLY HAPPY TO FLATTER MYSELF THAT MY NAME MAY BE INSCRIBED UPON THAT FIRM COLUMN NOW ABOUT TO BE RAISED TO NATIONAL FAITH AND NATIONAL PROSPERITY." These ideas were executed by a friendly artist so much to his satisfaction, that it is rather surprising that they did not accompany the work. Probably he apprehended that they would too much enhance the price of a political pamphlet, and by this means impede its circulation.

grass, hay, and other vegetables." We are not, as yet, acquainted with any culinary process, by which these articles might be rendered fit for the diet of the human species; but if our labouring quadrupeds were uniformly fed upon potatoes, turnips, carrots, and the like, there would be always in the country a large stock of provisions, which though designed originally for their use, might be applicable, without any change of his habits, to man.

He proceeds to give an account of a machine which had been applied, by a friend, to the purpose of extracting a nutritious soup from bones. It is needless to mention that subsequent years of scarcity have shewn the value and importance of this improvement. He recommends the adoption of some regulations for the saving of barley; a grain next in value for food to wheat. As an obvious mode of diminishing its consumption, he points out the propriety of forbidding the brewing any beer, beyond a certain strength, during periods of scarcity.

It had been suggested to him by an ingenious correspondent, that an infusion, or beer of hay might be attempted. The same person had advised, as possible resources, the trial of all roots (whether poisonous or not,) which contain starch: for the deleterious ingredient of such roots, is, we know, daily dissipated by culinary operations in the West Indies.[2t] He had likewise mentioned the bark and tops of vegetables armed with prickles, as the gooseberry, furze, holly, hawthorn, all which, animals eat greedily." The ingenious correspondent here referred to, must have been Dr. Darwin.

He concludes his essay with a physiological inquiry of great importance. "Can any stimulating substance," he asks, "be added

[2t] The cassava exhibits an instance of this. In its recent state it is highly poisonous, but by the operations of boiling and baking its noxious qualities are dissipated, and the pulp is converted into a light friable bread, at once nutritious and wholesome.

to poor aliment, without detriment to health in the long run, so as to give it greater power of nourishment?" The use of salt as a condiment to meagre diet, as to potatoes only, he condemns upon the authority of Dr. Darwin, as injurious. He considers it as having a great share in inducing glandular relaxation, and tending to the production of scrophula. "Could opium," he enquires, "be used as a substitute, in minute quantities?" He hesitates in recommending it, for fear of its leading to the adoption of bad habits.[2u] "It is probable, however," he adds, that some seasoning for poor food, which did not increase the production of sensorial power, and at the same time promote the expenditure of this power, might be found. "Between the oriental spices, and the garlick of the French there is great choice. An obstacle to the introduction of that seasoning which may have the best title to supplant salt may be

[2u] Unhappily, this highly diffusible stimulus, which the Author hesitated to recommend as a condiment, was, at this period, coming into extensive use among the poor, as a cordial. Important as this fact is, and familiarly as it was known to the druggists of the metropolis and of many others of our larger towns, it had escaped the notice of Ruggles, Eden, Davies and others, whose writings proclaim their benevolent interest in determining the situation of the poor. "No approach," as is elsewhere observed by our Author, "can be made towards tolerably exact knowledge on this subject, unless the enquirers be acquainted with the effects of this and that power, this and that privation, on the living system. They will not know what to look for, or how to put questions. Whether opium was first taken to recruit the labourer after excessive toil; or occasionally to cheer the gloom of despondence; or to make up the deficiencies of that abominable water-gruel and potatoe diet, by which the joyless being of so many pale, meagre, shivering women and children is prolonged, I am not informed. I lately received the following account from a medical observer. "The use of opium as a cordial, is very general among the poor of Sunderland, and I believe of the other sea-ports on this coast; and they all agree that it enables them to support a longer abstinence from food than they otherwise could. Its use seems, unfortunately, as bewitching as that of spirituous liquors, and a gradual increase of the dose, as certainly induces a state of debility of the whole frame, as the other baneful habit. Nothing can be more wretched than the appearance of some whom I have seen; their skin of almost a leaden hue, the abdomen tumid, the limbs shrunk, and a countenance expressive of infinite anxiety and wretchedness."

apprehended in the prejudices and habits of the people; but is this a reason why we should not immediately set about to ascertain which that best seasoning is? It cannot be adopted before it is known. The seeds of benefit to the human race have generally been sown for ages, before any fruit became ripe for gathering."

From the short review which has here been given, it will be seen that a great portion of the contents of this letter, was, by no means, so confined to the events of the day, as to give it only a transitory interest; or to confine its circulation to any particular political party. But the minister is often incidentally attacked with open severity, or with an irony perhaps still more galling, and sustained throughout with an admirable air of solemnity.

The pamphlet named "Alternatives Compared, or, What shall the Rich do to be safe," might have been entitled, without a misnomer, a second part of the Essay on the public services of Mr. Pitt; for he still continues the main subject of his hostility, and is assailed with the most cutting sarcasms. He contrasts his lofty promises of conquest in 1793, with his more humble assurances of security in 1796. He attempts to fix upon him the charge of utter incompetency, and reproaches him with the failure of every scheme that he had formed, and the disappointment of every result that he had anticipated. He allows him to possess no accomplishment except oratory, and even that not of the highest species. Upon some other members of administration he is equally severe.

In his estimate of the character of that nation, which was then, as it is now, an exasperated enemy, he shews an acute and philosophical spirit. He expresses, although with diffidence, a conviction that if it was totally mistaken by the minister, it was no less misapprehended by a political opponent, whom he characterizes as "superior to Mr. Pitt in the philosophy of history, by as many degrees as he might be inferior to him in the practice of intrigue." "While,"

he observes, "the repulsive genius of the feudal aristocracy operated in full force upon other regions, the component parts of France were drawn into a degree of union and pervaded by a common feeling. This as yet rude and imperfectly animated whole, the romantic or satirical strains of the Troubadours, and the Courts of Love, seem to have informed with new life and to have impressed with an indelible character. The mind of the people, we are certain, was wrought, centuries ago, to a very lofty pitch; and if it ever suffered depression, it soon mounted up again to its standard elevation. By degrees, was formed that habit of enthusiasm, in which lies the strength and weakness, the good and evil of the French character. Hence the readiness to fly out beyond the limits within which other nations restrain both their feelings and the expression of those feelings. Hence excess of ferocity and excess of frivolity, virulence of rancour and womanishness of sympathy: Hence centaur compounds of the mountebank and the knight-errant, and the ape and tyger traits noticed by Voltaire. To each horrid barbarity, each heroic exploit, each ludicrous spectacle, exhibited during the troubles of our time, a parallel may be quoted from the annals of every one of the last twenty generations." Such have been, and such appear to be still, the constituent elements of the French character. No political change has produced any essential alteration or improvement.

The pamphlet which has just been noticed closed the list of Dr. Beddoes's political publications. It would have been easy to have multiplied quotations from them to a far greater extent, but their topics are too recent to allow of a dispassionate estimate of their literary merits In the letters of Junius, many of the parties alluded to are already so far removed from the scene, and the political questions there agitated have so far subsided, that the eloquent periods of the unknown author may now be canvassed as a pure matter of taste.

But we are as yet too near the time of action, to examine with equal impartiality, the merits of writings so hostile to Mr. Pitt. A great portion, however, of the events anticipated in these essays is already become history. The career of this celebrated statesman is closed. If his measures were good, he can no longer direct, if bad, he can no longer restrain their influence. A long period must elapse, perhaps it must be left even to a distant posterity, to trace their full influence on the destinies of Great Britain. The censure which the Author has thrown upon his plans may be unjust, but his anticipation of their failure was prophetical. Principles were in action, the full operation of which had not yet been familiar to human experience. Common political calculations and common-place statesmen were every where baffled and confounded. But however deplorably his schemes of foreign policy may have failed, whether from deficiency in political sagacity, or from the incapacity or treachery of allies; his advocates will triumphantly maintain that in the point of primary importance he succeeded: He saved the English Constitution. If this be true, no praise can exceed his deserts, and no homage that a grateful nation can pay to his memory can be excessive. To have preserved a constitution which has raised man to the true level of his nature, which has "ripened souls,"[2r] which secures to every individual under its protection a degree of practical liberty of writing, of speaking, and of action, greater than exists in any country on the surface of the globe, must emblazon his name to all posterity. Should all the other pillars that support the temple of his fame give way; so long as this remained unshaken, it would, singly, uphold the fabric. His opponents, however, will remind us of unhallowed attempts to deprive us of these proud distinctions; and they will contend, that great as are the honours that should be paid to his memory, if the measures of his administration should appear to have been really the means of preserving this glorious monument of the wisdom of our ancestors; so great must be the indignation that should pursue it, if they should be proved to have impaired its magnificence, to have undermined its foundations, and to have exposed us to the hazard of a contest in which not common interests only are involved, but on the issue of which is staked every thing that is dear to the heart of a Briton, every thing that can render life itself valuable or desirable.

[2r] "MAN is the nobler growth our realms supply,
And SOULS are ripened in our Northern Sky."
Mrs. Barbauld.

Before, however, I finally dismiss this part of my subject, it is due to Doctor Beddoes's memory to remark, that although the progress of the Revolution had early extinguished all interest in the French cause, he still cherished an unabated love for real liberty, and the genuine principles of the British Constitution. Discriminating between those follies and crimes which had disgraced the venerable cause of freedom, and the cause itself, his hatred of those crimes and follies never alarmed him out of his reason; nor did he ever condescend, to the end of his life, to applaud or to justify any species of political corruption or political profligacy. When the question of the abolition of the slave trade was in agitation, he went from Bristol to Shrewsbury to attend a meeting there; and, almost for the only time in his life, addressed a public assembly in behalf of the wronged children of Africa. He lived long enough to witness the tremendous elevation, and to detest the character of a crafty usurper, who after trampling upon the rights of his own, has shewn an equal contempt for those of all other countries: and still hostile to despotism wherever he saw its savage features displayed, he holds him up to detestation in a little volume which was widely circulated among the humbler classes of the community, "as an enemy who violates all the

rights of peace and war, who makes a jest of his own most solemn protestations, and unites the vices of the savage and corrupt periods of society."

From this digression, into which Dr. Beddoes's political writings have led me, I now return to pursue the regular course of my narrative. In the month of February, 1796, he engaged, with his usual activity, in promoting the sale of an Essay, accompanied by and chiefly explanatory of a set of schemes and models of the principal theorems both in plane and solid geometry; invented by a teacher of the mathematics named Donne; a man well known in Bristol, and respected for unassuming talents and ingenuity. These models were, of course, particularly acceptable to him, as they practically realized the plan of instruction in that science, which he had sketched out in his Essay on Demonstrative Evidence. He obtained for the inventor the patronage of many of his literary and scientific friends. Indeed had it not been for the activity of his kindness upon this occasion, it is stated in the preface, that these models, in all probability, would never have seen the light. To the book of directions which accompanied them, the Inventor has prefixed a letter addressed to him by the Doctor, in which he explains his ideas upon the subject, and throws out some hints upon the best mode of communicating instruction in general.

After some prefatory remarks upon the ingenuity and utility of these models, he thus continues. "It may be thought that the long demonstrations in Euclid are of use, in bestowing a facility in conceiving and recalling long chains of argument. This advantage I shall not call in question, for I am not disposed to depreciate the merits of the ancient Geometricians.

"I shall, however, observe that as all ideas are derived from sense, all argument must consist of a statement of facts or perceptions. The true way, therefore, of making ideas durable, or rather,

easily excitable, is to make them distinct at first. It was on this account, truly observed that *the art of memory is the art of attention*. The same end will be answered by any contrivance calculated to render perceptions vivid. On this principle, your tangible proofs of the properties of figures, will be eminently serviceable to the intellectual faculties of young people."

"For these several years, I have been corresponding and conversing with different friends, about a project much allied to that which you have now executed, and which will come in very well after yours: It is to establish a manufacture of RATIONAL TOYS. I believe parents are become sufficiently attentive to education, to give such a scheme support; and fortunately it cannot alarm any prejudice. The design is to construct models, at first, of the most simple, and afterwards of more complicated machines. The models are not to be very small, and they are to be so constructed, that a child may be able to take them to pieces and put them together again. The particulars of the design are too numerous to be given here. It comprehends engravings and a good deal of letter-press. I have in view not merely information in mechanics, chemistry, and technology, but the improvement of the senses, by presenting in a certain order and upon principle, objects of touch along with objects of sight. In this important business, we have hitherto trusted to chance. But there is every reason to suppose that INTELLIGENT ART will produce a much quicker and greater effect. Should instruction addressed to sense, be made in any country the principle of education; should the best method of cultivating the senses be studied, and should proper exercises be devised for reproducing ideas (originally well defined,) sometimes with rapidity, at others in diversified trains, the consequence is to me obvious. The inhabitants of that country would speedily become as far superior to the rest of mankind in intellect and efficiency—in the SCIRE and POSSE

of Bacon—as the most cultivated people of Europe are now superior to the Portuguese, or to the Moors of Barbary."

The scheme here alluded to by the Doctor was a very favourite one. It has been already noticed that some of his early ideas upon this subject were circulated among his friends in the year 1793. In a letter to his friend Reynolds, the date of which nearly corresponds with that of Mr. Donne's publication, he enters more fully into the detail of it. His intention was to begin with the plough, "which," he observes, "would afford an opportunity of introducing a vast train of ideas belonging to natural history, chemistry, and other branches of science." The first manufacture which he intended to take up, was the iron trade; with the details of which, probably, few speculative men were so well acquainted. The subscription to this projected scheme would have been considerable; as each share would have amounted to one hundred pounds. He had engaged an artist to execute his models, and an engraver to copy the designs when executed; and announces his intention of employing the whole sum subscribed, without any deduction, in the execution of the scheme. "I have made the subscription," he remarks, "a kind of favor, as it in fact will be; for I propose to myself no other recompence than the satisfaction of setting on foot a scheme of boundless utility." This plan, however, did not succeed; probably from its being attempted on too extensive a scale; it was not, however, as will be seen in a subsequent part of this volume, finally abandoned.

The second volume of Zoonomia made its appearance this year, and interested him in no small degree. It has been noticed on a former occasion, that he had been indulged with a sight of the proof sheets of both volumes, as they successively issued from the press. One of his letters addressed to the Author when this great work was upon the eve of completion contains the following passage.

"I have offered to give an analysis of your work to Johnson; but he has not accepted my offer, and I rather believe that he will employ some other hand. I am sorry for this, as I could have set forth the characteristic excellencies of your work, at least as well as they are likely to be set forth by a hack reviewer. Possibly, these gentlemen may not perceive the merit and the value of such an analysis of morbid phenomena as you have given; to which there is certainly, nothing similar in medical literature. As you have done so much, have you not given us a right to expect the only thing that seems to me wanting to the perfection of your system in a practical view? And this is, an account of such conjunctions of symptoms, as require a particularly nice treatment. For instance, I was informed by a medical student, that a typhus accompanied with severe inflammation of the lungs and pleura, proved fatal to every single patient in the Edinburgh Infirmary, two or three winters ago; and they were not a few. Have you not observed unusual concurrences of morbid phenomena, and ought they not to be described like other monsters?"

If in some part of the commendation here bestowed he should seem to have adopted a style approaching to flattery, the following extracts from letters addressed to another correspondent will shew the sincerity of his approbation; and will prove that, where he could not be suspected of a wish to flatter, he was not afraid of bestowing still more animated praise upon the work alluded to. The first passage refers to the first, the others to the second volume. "Dr. Darwin has in the press a work of the most astonishing ingenuity, and I believe I may add, truth. It is a treatise upon the laws of animal nature, which he has been the first to discover fully. It is, as to materials and arrangement, perhaps the most original work ever composed by mortal man."

"You will be glad to hear that Dr. Darwin's book is half printed.

You would not discover, by conjecture, his manner of treating of diseases. His is a *symptomatologie raisonnée.*[2x] Does this give you any idea? He treats of symptoms, as they are called, each by itself; and so has few or none of those groups of symptoms, which, as they often occur together, have hitherto come to be considered as one state or being; in the same manner as any plant or animal is one single being consisting of parts." *May* 1795.

[2x] A note in one of his common-place books, contrasting the nosology of Darwin with that of Cullen, will more fully illustrate his view of the peculiar merits of the former. "The nosology of Darwin, if not the greatest thing ever done for medicine, is the certain promise of the greatest thing. Nothing but such an analysis can give any true idea of the nature of diseases. Each particular part has its various deviations from the healthy state, accompanied or not by deviations of other parts, just as individual susceptibility and associations determine. Such accidental combinations constitute many of the species of modern nosologists; and they are for ever varying from the variation of particular figures in the groupe. This view elucidates and justifies the common complaints against nosology. It is true that a synthetic nosology, pretending to be no more than it can ever be, and by no means to follow the varieties of nature, may be of use as an appendage to the analytical; but, of itself, must almost as often mislead and bewilder, as prove a faithful guide."

"An analytical nosology is the alphabet of medicine. This alone can enable us to read the characters in which nature writes diseases."

"What mischief will ensue if synthetic nosology be regarded as any thing beyond a very clumsy expedient for abbreviating language, is easily shewn. Attacks of epilepsy are infinitely various; that is, epileptic patients are variously affected; for there must be some internal differences answering to the external variation of phænomena. When we shall penetrate further into animal nature we shall know more of these differences. But the authority of a common name and definition, holds us to the consideration of things dissimilar, as similar. Differences not noted in the definition are essential in practice. By attending to the *aura epileptica*, we are occasionally successful in epilepsy. Many of Cullen's species are complicated diseases, and should be so stated. The concurrence of symptoms in his definition of typhus is more frequent but not more essential than the addition of pneumonia to the rest. Cullen, has spoiled more than improved Sauvages, by striking out bilious, &c. &c. fevers; Sauvages's statement is often a truer picture of nature."

"Cullen's nosology will often be productive of one of two bad consequences. Either the student will despair entirely of mustering disorders; or, trusting blindly to his roll, he will confound the omitted with the enumerated forms."

"Darwin's second volume is out, and his analysis of morbid phenomena is one of the greatest exertions of the human understanding. The foundation of the most important and difficult science is fairly laid. There will be an end of medical imposture in due time; and if the profession continue to exist, the number of its members will be wonderfully diminished. *April*, 1796.

"You have seen Darwin's second volume, which I think surpasses the promise of the first; and will place the Author amongst the greatest of mankind, the founders of sciences." *June*, 1796.

About this period, he experienced a second interruption of an excursion which he had meditated down the Wye. He addressed a few lines to that beautiful stream upon this occasion, which were printed in the Monthly Magazine for October. I should scarcely have thought it necessary to notice this trifle, were it not that in delineating some of the more romantic features of its scenery, he has contrived to introduce an expression of his mineralogical faith. To the same work he has also communicated an account, extracted from a foreign journal, of the efficacy of a non-descript insect inhabiting the *Carduus spinosissimus*, when rubbed between the fingers, in removing the tooth-ache; a property which has since been attributed to the common lady-cow *(Coccinella septem-punctata,)* of our own country.

These, however, were merely the relaxations in which his mind indulged in the intervals of more serious speculations and enquiries. He still continued to prosecute pneumatic medicine with great industry; and accounts of its progress, accompanied by solicitations to his friends to circulate the proposal for its permanent establishment, and complaints of the incessant inquiries by which he was assailed from all quarters, constitute the principal subjects of his correspondence. Before the year closed, he published the fourth and fifth parts of the Considerations on Factitious Airs. The fourth part consists

of reports of cases treated by the pneumatic remedies. The fifth contains a variety of miscellaneous articles. The greater part of it is occupied by a description of Mr. Watt's simplified pneumatic apparatus, drawn up by the Inventor; and including many valuable hints and cautions with respect to the preparation or employment of the gasses. It contains also a keen reply from Dr. Beddoes, to some misrepresentations which had appeared in one of the reviews; some of the earliest communications that had been received in Europe, relative to the virtues of nitrous acid; remarks on Dr. Carmichael Smyth's claim to the discovery of acid fumigations, and an account of a successful operation in a case of femoral hernia, performed according to Gimbernat's method, by Mr. now Dr. Kentish.

In the preface to this volume, he announces that it would be the last of the series. But although this annunciation was literally verified, as he here closed his collection of cases and testimonies, the list of his publications on the gaseous remedies did not finally terminate with this volume. In the mean-time, he prosecuted, with increased activity, if that were possible, the establishment of a Pneumatic Institution. Till the year 1796 was far advanced, he entertained but faint hopes that the subscriptions would ever be found sufficient to authorize him to set it on foot. But, after this period, the prospect so far improved, although still very gradually, that he began to consider its realization as less impracticable. In consequence of this, he published in the spring of 1797, "Suggestions towards setting on foot the projected establishment for ascertaining the powers of factitious airs in medicine;" and after announcing that steps were actually taking to carry the scheme into execution, he invites the attention of physicians and philosophers to the plan which he is about to submit to their consideration; and solicits the further lights which their reflection on the subject might enable them to communicate.

Although Dr. Beddoes might naturally be supposed to have felt a

peculiar interest in the progress of pneumatic medicine, that interest was by no means of an exclusive kind. On the contrary, he eagerly welcomed and readily adopted any probable means of alleviating human suffering, that came recommended upon respectable authority. The reports of the efficacy of nitrous acid in syphilitic and hepatic affections, by Mr. Scott, of Bombay, had reached England before the publication of the fourth and fifth parts of his Considerations; and were, as has been already intimated, included in that publication. It had been supposed by Dr. Girtanner, that the cure of syphilis by the oxyds of mercury, depended upon the oxygene combined with that mineral. It was therefore apprehended, that any other remedy possessed of this active principle in sufficient proportion, and at the same time, in a sufficiently loose state of combination, might possess similar virtues. Mr. Scott, was the first who appears to have put this principle to the test; and soon after the result of his experience was known in Europe, several trials were made not only with the nitrous acid, but with different analogous remedies; as the oxymuriate of potash, the citric acid, and some others. The powers of a new medicine reported to be successful in the treatment of a loathsome disease that had hitherto yielded to one agent only, appeared to him particularly worthy of investigation. Its importance was much increased, when its mode of operation was contrasted with that of the remedy hitherto considered as the only specific. The disturbance and irritation excited in the system by the latter, were so considerable that the patient not unfrequently sunk under it; and even in more favorable cases, it was generally apprehended, that the constitution was injured by its operation. The new remedy, on the contrary, was said to act in the mildest manner; and the strength and appetite were rather improved than diminished during its use. Anxious that its virtues should be brought to the test of experiment in his own country, Dr. Beddoes published in the month of August, a small volume of reports

of cases in which it had been administered; and in September, addressed a circular letter to the faculty, giving a succinct account of what it had effected; soliciting their co-operation in subjecting it to further trials, and requesting communications upon its effects. These he proposed to publish, and to give the profits arising from the sale, to those charities which were particularly instituted for the relief of the complaint alluded to. A number of communications were received in consequence of this address; but circumstances delayed, for some time, the appearance of the publication.

In the latter end of the autumn of this year, Dr. Beddoes had the gratification of seeing one of his most favorite objects carried into execution. This was the delivery of a popular course of anatomical lectures. Two surgeons of Bristol, Mr. Smith and Mr. Bowles, the former of whom possessed an anatomical Museum respectable both for the number and the value of the articles which it contained, and the latter had devoted much time to the preparation of anatomical specimens, undertook to deliver the course. Dr. Beddoes actively and zealously patronized the scheme; and his exertions had a considerable effect in procuring a numerous and respectable audience. To invite the attention of the public, he wrote an introductory lecture, which explained the object of the intended course, and drew an outline of the constitution and management of the human body. So well is it executed, that this short pamphlet of little more than seventy pages, deserves to be ranked amongst the most valuable of his publications.

After some general introductory remarks upon the importance of that species of instruction which it was the object of the course to communicate; (for "an Essay on the means of securing health can be indifferent to no man, who has feared for himself, or pitied in another, those evils by which daily life is most cruelly infested";) he proceeds to enumerate in a summary manner, some of those more

palpable advantages and acquisitions which society has derived from improvements already effected in the science of medicine; preparatory to an inquiry into what is yet wanting to secure domestic felicity against the perpetual apprehension or actual invasion of disease. Under the former head, he first adverts to the discovery of inoculation; which had, to so great an extent, disarmed the small pox of its terrors. Yet, he is compelled to lament the existence of a fact, advanced upon authority which he could scarcely question, that in some extensive districts this loathsome distemper "destroyed more lives than of old. For many among the poor, obstinate from ignorance, and supine from despondence, refused their children the benefit of inoculation, and its partial adoption only spread the poison." The discovery which has since immortalized the name of Jenner, and which is one of the proudest trophies of medicine, had not then been perfected; or this part of his subject might have been sketched in far brighter colours.

The next palpable acquisition to which he adverts is the improved treatment of scurvy; and the third, the favourable prospect of the extinction of the power of febrile contagion.

The increased habits of cleanliness, and the attention generally paid at the present period to ventilation, have, no doubt, materially contributed to the extinction of several pestilential and local diseases. From the neglect of the latter circumstance, in particular, among our ancestors, it is probable that "multitudes must have perished in the very dawn of existence." To the full enjoyment of the atmosphere the free use of the limbs has been also added. The infant is no longer bandaged and swathed like a mummy, and "it is impossible not to rejoice at the emancipation of beings so susceptible of injury, and so impatient of confinement."

The Author next does justice to the increased sobriety of the age; though his gratulations are checked by a doubt whether,

although we are grown more sober, we are yet sufficiently temperate. He acknowledges also the palpable improvements which had taken place in female dress, in the abolition of that severe system of constriction which had injured the fine outline of the female form, as much as it had impaired the function of some important internal viscera. "These attainments," he continues, "are valuable. They contribute, hourly, to the comfort and satisfaction of multitudes. It is animating to think that we can move secure from those arrows that flew unseen and so often smote our ancestors."

Having thus dwelt upon some of the advantages which we have reaped from the industry and science which have honorably distinguished the present generation, he turns to contemplate the reverse of the picture, and to trace some of the evils to which it is particularly exposed; evils, which render the diffusion of salutary caution and some general knowledge of the laws of our being peculiarly necessary. Foremost in the list, as, with one exception, pre-eminent in extent and fatality, he places consumption; the ravages of which appear to have extended with the increase of our habits of luxury and inactivity "till we daily see families thinned and not unfrequently exterminated by repeated invasions of this disease. "Think," says he, "(if you have escaped every such trial yourselves,) of the state of parents suspended on the rack of agonizing expectation, from the loss of a first child, till the imminent danger of the last; and then say, if it be absurd to qualify heads of families to act at home *as inspectors of health.*" The interval which often occurs, before the symptoms of phthisis manifest themselves, even in those who are evidently pre-disposed to the complaint, presents an invaluable season for the use of preventive measures; but, in multitudes of instances, this precious period is suffered to pass by, never to return, for want of that knowledge, which it should be the object of an undertaking like that under consideration, to diffuse.

An allusion is next made to a female writer, who excited "admiration in some and abhorrence in others," by the peculiar cast of her ideas upon the subject of that delicacy and feebleness of frame, which are rather encouraged than guarded against, in females of a certain rank in life. Whether her speculations upon the moral effects of these qualities be correct or mistaken, their physical consequences appear at every turn; and the habits and institutions of society are unfortunately calculated, for the most part, to aggravate their unfavourable influence. In the few efforts made to counteract them we seek rather to fence the system against effects, than to remove the cause. We palliate the symptoms instead of striking at the root of the disease. "In aid of delicacy of constitution, art has engaged in many a contest with nature. The carpetted floors, stuccoed walls and double doors of modern apartments, are intended as its screen. But these, reinforced with the double windows of the north, would be an unavailing protection. Nature, brandishing her scourge, pursues with quicker steps, than those who forsake her ordinances can retire. The susceptibility of impression increases faster than ingenuity can bar out external agents; and in the best secured fortress of effeminacy, it is the fate of the occupant to shiver more at the inclemencies of the seasons, than the mountaineer who is exposed to all the blasts of winter."

The alarming mortality of infants is next pointed out, as a circumstance which appears to call, with the most imperious voice, for the diffusion of medical information. "In London more than half perish before the fifth year; and in other places, the proportion of deaths is considerable."

This waste of life is not one of the laws of our nature, for in healthy situations and under favourable circumstances, an infant is a being tenacious of existence. Experience shews us how often they struggle through dangerous and almost hopeless diseases. The

cause, therefore, must be sought in the want of judicious management. Care and affection, however, assiduously bestowed, will not, in these cases, effect all that is wanting. Knowledge must direct their application. To secure or extend the wealth of our offspring, prudence and experience have accumulated a sufficient variety of rules, of which the application is next to certain. Nor, under their sanction, does a parent hesitate to make considerable present sacrifices. But no such correct ideas or rules exist upon the subject of securing the most valuable of all possessions. "The article of health is unfortunately left to shift for itself." Yet, to the eye of reason it would appear among the most imperious duties of the parental relation, to communicate to our offspring an accurate knowledge of those terms and conditions, upon which alone, a healthy existence can be held; and that not by the medium of advice alone, but by actual proof that such are the laws of our being. Vague surmises upon this subject, and some general indistinct apprehension of these laws will sometimes be forced upon the mind by surrounding circumstances. But the conception is indistinct, and the impression cannot be expected to be permanent. Yet he who has "ever witnessed the long agonies that close the career of the debauchee, can hardly fail to have heard him bitterly lament the want of a timely and adequate warning. As these agonies rarely extinguish, and sometimes exalt natural affection; is it not strange that anticipating sympathy and a deep sense of the fatal consequences of hereditary ignorance, should work together in vain; and that some plan for saving his offspring from death-bed groans, such as he has himself been doomed to utter over an unintentional suicide, should never flash upon the mind of the repenting sufferer?"

If daily experience convince us of the comparative, or in general, absolute inefficacy of mere advice, should we not be induced to seek the means of producing more powerful impressions? We may

see that dear-bought experience will often produce this effect; and opinions derived from this source become "parcel of the mind." Conviction almost equally strong may be given in a way which will not cost the pupil so dearly. "His momentary rash propensities may be checked by enlarging his views."

Personal experience seems to be the great source of the moral discipline and improvement of man. It is much to be lamented that it is almost the exclusive one. The comparative rarity with which men, so far avail themselves of the experience of others, as to reap any real benefit from it, has furnished an abundant source of reflection to the speculative mind. In the physical history of our species, this rule has obtained with the fewest exceptions; and the fact has excited, by turns, the pity and the indignation of those medical practitioners, who considered their science as having a higher tendency than the mere accumulation of wealth. "The generality of men," says Dr. Cadogan, "seem to me not to bestow a thought upon the use and value either of health or life, till it be too late to reap the benefit of their conviction; so that health, like time, becomes valuable only when it is lost; and we can no longer think of it but with retrospect and regret." Nor, it might be added, do the mistakes of the father essentially benefit the son. "But," asks our Author, "do we see flocks of sheep move otherwise than as they are driven? on what can the generality of men bestow thought, but on the objects towards which parents and preceptors, the shepherds of their youth, turn the mind's eye?—When landed upon the unknown shores of life how should they escape its dangers, if neither diligently instructed to elude the wiles of the enemies they must encounter, nor furnished with defensive armour against open force?"

The means of imparting this knowledge are next considered. "To comprehend the healthy functions and possible injuries of our

frame, its structure must be in some degree understood." This knowledge can only be derived from one source. There exists perhaps an instinctive repugnance, and this repugnance is certainly cherished by early associations and impressions, to the details of anatomy. To these associations, the author refers the general unwillingness to permit an inspection of bodies after death. But many branches of it might be taught by models, provided sufficient encouragement existed to call forth ingenuity; preparations of various kinds would, in general, surmount every feeling of disgust, by their elegance and their admirable structure; and even the recent subject would only excite it in the outset of the study. An acquaintance with the delicacy of structure of certain organs would easily suggest the probability, and preparations might demonstrate the certainty of the injurious effects of certain agents. Knowledge thus acquired would be a real acquisition. It is obvious that there must exist a "radical difference between a set of notions picked up by snatches and loosely tacked together by hear-says, and a body of information founded in clear perceptions, and proceeding upon authentic testimonies from properly qualified observers, where facts cannot be brought under the senses. Is it not probable that these two sorts of knowledge, (if the former can be so called,) will differ in their consequences, as widely as in their essence?"

A particular application of this principle now follows. There are certain substances so obviously of a poisonous nature that they excite general alarm: "many householders will not admit them within their doors, and scarcely any vender will retail them without enquiry." It is from the rapidity of their effects, that these agents are contemplated in so different a light, from the slow poisons which are daily taken by the majority of persons in a certain situation of life. By a gradual process, the latter induce the most important changes in the internal organs; changes equally striking

as the former, but they are performed out of sight; and from their being gradually effected, even those who may have some faint conception of their injurious consequences, cherish, at the same time, an obscure reliance, that they may, by some intervening chance, escape them. Such perplexity of reasoning would not satisfy them upon other subjects for an instant; and they are not aware that cause and effect are here as essentially connected, as in any other general laws affecting our being. And although there may be found some exceptions even amongst those who have "paid unreserved devotion to Bacchus," as there may also be found such exceptions among persons exposed to the noxious climate of Java, or to the contagion of the plague itself; the pleasurable feeling of existence is first blunted, and at length extinguished; and according to various predisposing circumstances, "madness, dropsy, or palsy, preceded by the tortures of gout" may close the scene.

As a farther advantage from the proposed lectures, he states the acquisition of juster ideas on the relative importance of the effects of acute and chronic diseases upon the human system, and a diminution of that excessive alarm, which sometimes, in case of illness, almost paralyses the faculties of those who are most affectionately interested for the patient, and aggravate the sufferings of the latter by vague and undefined apprehensions that the most tremendous evils may spring from the most inadequate sources. Some previous acquaintance with the laws of our being, would lead to a habit of attention to the first symptoms of disease or disorder; and evanescent appearances might be noted, important both to the patient himself and to the medical attendant; which must of necessity pass unregarded, so long as "the eye of the spectator has not been taught to see."

By the gradual and universal diffusion of preliminary knowledge of this kind, preventive or prophylactic medicine would be at length

established on a permanent basis. This was the favorite object of the labours of the Author, during a considerable portion of his life. Some imperfect sketches, some detached fragments we have in our possession; " but," he observes, " it is a CODE or system of doctrines which we need," to operate as the guardian of infancy, youth, manhood, and old age.

Amongst other topics elucidating his views, and explaining what might be expected from the proposed course, he remarks that, it had been originally his wish that females should be present at some parts of the lectures. " I would not, indeed," says he, " have been concerned in proposing an exhibition of blood and bones for their amusement; but no objection on the ground of indelicacy or disgust, can be brought against some anatomical subjects."

Before the lectures were closed, Dr. Beddoes had the satisfaction of seeing his idea of a more select course, adapted for a female audience, carried into effect. In the first instance, the lecturers felt some difficulty in undertaking the task. " People," says the Doctor, " less easily resist temptations to be witty than to be wicked; and in case of failure, the wits of Bristol would doubtless have vied with one another, in reporting them as *would-be tutors to the ladies in anatomy*." These difficulties, however, were gradually surmounted; a prospectus of lectures was drawn up, from which every topic which might, by possibility, afford room for a perverted imagination to lay hold of, was sedulously excluded. To insure a select audience, tickets were issued for ladies only; but each lady was at liberty to introduce a gentleman. About forty ladies of great respectability entered their names; and they expressed the greatest satisfaction at the course, which consisted of ten lectures. Their subjects were, a view of general physiology; an exhibition of many of the bones; demonstrations of the organs of sense, illustrated by preparations of peculiar elegance and beauty; a minute account of the teeth, in

which the whole process of dentition was exhibited by similar means; the heart, with general ideas of the circulation; the nervous and absorbent systems; the lungs, and some other of the viscera. The latter were shewn only in the form of preparations; which were still further illustrated by drawings.

At the close of the course a few lectures on the general laws of life were delivered to the audiences united. No circumstance occurred that could give alarm to the most timid female delicacy, or excite disgust in the most refined mind. The result of the whole was highly gratifying to Doctor Beddoes; as he had thus the evidence of experience, that there was no insurmountable difficulty in attracting the attention of the public, to a subject, which, though of primary interest to all, had hitherto been considered as the specific province of a chosen few; and had been contemplated by the mass of mankind, with comparative apathy and indifference.

With a view still further to gratify the curiosity for scientific information, which appeared to have been excited by this course, Dr. Beddoes proposed, after its termination, to deliver a series of chemical lectures. His proposals were eagerly received; and the subscription list consisted of many highly respectable names. He expended a considerable sum in making such additions to the apartment where the anatomical lectures had been delivered, as rendered it a convenient laboratory; and opened his course early in the spring of 1798. It was illustrated by an uncommon number of experiments; many of them of his own invention. The ingenuity and simplicity evinced in these, excited the admiration of his audience, in proportion as they were enabled, from a previous acquaintance with the subject, to estimate the difficulties overcome, and to trace their exact application to the points designed to be illustrated. The lectures on iron were uncommonly interesting. This might be expected from his unusually accurate acquaintance

both with the natural and artificial history of that metal. But it was remarkable that his abilities appeared to be called forth, in proportion to the apparently uninteresting nature of any particular branch of his course: and it is still remembered by some of his most intelligent hearers that, upon a subject which promised so little as distillation, he delivered one of his most brilliant and entertaining lectures. The expectations, however, which had been excited in some individuals by the notice of the intended plan of this course, were not altogether realized. It is not difficult to account for this. In the first ardour which this project had inspired, he had hastily conceived, and as hastily promised, that the principles of the science should be so familiarly explained, as to be level even to the comprehension of very young persons. But in reality, it is said, that his lectures were much better suited to the comprehension of those who had been previously accustomed to the exercise of their reasoning powers, or were already somewhat acquainted with the elements of chemistry, than to the young beginner. This must be confessed to be extraordinary, as his writings exhibit multiplied proofs of the facility with which he divested scientific information of its technical garb, and rendered his ideas easy of comprehension even to the more humble and uninstructed classes. Probably, indeed, the multiplied avocations of a daily increasing practice, prevented him from sufficiently arranging his lectures before the time fixed for their delivery. But whatever were the cause, it is certain that, while his ingenious objections to received theories, (to the doctrine of heat for example,) his original speculations and his multiplied analogies excited at once astonishment and delight in those who were able to follow him; some of his younger auditors were disappointed in their desire of elementary instruction, and were dazzled rather than illuminated, by the multiplied information, collected from such various sources, that he poured forth. In the necessary manipulations, he

occasionally wanted that dexterity which only habit can confer. Every deficiency, however, in this department was amply supplied by the assistance of two gentlemen, alike conversant in the details of practical and scientific chemistry.

But whatever objections might have been raised against some parts of this course of lectures, their main object was answered. A taste for scientific information was awakened, and a spirit of liberal curiosity excited. His letters of this date express his satisfaction at the prospect of a scientific institution being about to be opened in Bristol. A subscription for this purpose had been entered into, which he eagerly forwarded himself, and for which he solicited the assistance of his friends from every quarter; and a vacant space was fixed upon for the scite of the intended building. It was found, however, that the height of any erection on the spot which had been selected, was limited to such a degree, as to be unsuitable for the purpose of the promoters of the scheme. This difficulty seems to have damped the ardour originally excited, and the execution of the plan was, to his great mortification, abandoned.

Some particulars in the management of the Bristol Infirmary, having been, about this period, the subject of discussion, Doctor Beddoes published a small pamphlet, called "A Suggestion towards an Essential Improvement" in that charity. The medical officers of this benevolent institution are at present, and have been from its first foundation, chosen for life. Dr. Beddoes considers this system of election as "illiberal and unjust towards the majority of practitioners, both medical and surgical, and comparatively prejudicial to the public." He proposes, therefore, "that the physicians and surgeons to the infirmary, be partly changed every year, or every second year; that if the average number of respectable physicians and surgeons residing in and near Bristol, be sufficient for two changes, those who go out first, be not re-elected till at least two periods shall

have elapsed; and that the exclusion be prolonged according to the probability of a proper succession."

That this scheme is practicable, he brings forward the example of the Glasgow Infirmary to prove. In that charity, two physicians and four surgeons are elected annually; and it does not appear that any evil has resulted from this rapid rotation. A similar custom obtains in the Edinburgh Infirmary also. It should, however, be remarked that this system has been forcibly attacked by Dr. Gregory; whose situation affords him ample opportunities of judging, and whose talents entitle his opinions to respect.

Having proved its practicability, he endeavours to shew that the opposite system is prejudicial to the public. "From the ascertained motives of human action," he observes, "we may calculate that exclusive possession during life or pleasure, will have in part, the baneful effects of monopoly. On the contrary, will not a perpetual quick succession of professional attendants operate as a constant stimulus to exertion? . . . . Is it not then to be expected that a rotation can, on no principle, diminish the quantity of care bestowed upon the sick, and that it will probably, on the whole, much increase it?"

He proceeds to examine the ground upon which votes are generally given upon such occasions, and complains of the little discrimination which is exercised, as to the merits of the respective candidates. He professes his conviction that the system of rotation would operate as a powerful corrective of this inconvenience. For, if it should be objected to this system, that it may place the sick in the hands of practitioners of inferior skill; "the system of perpetuity (for what any unprofessional person can tell) may keep them in such hands." With respect to its injustice towards the great body of practitioners, he sums up his arguments by observing that "if the office of public physician or surgeon be a burden, it

ought to be equally borne; if an honour, it ought to be fairly shared."

It would be difficult to deny, that the main principle proposed in this short tract, is abstractedly founded in justice; but its adoption would, in all probability, be attended with numerous difficulties and inconveniences. What term, for instance, could give greater scope for dispute and dissension, than that of *respectable* physicians and surgeons? Must not the question of respectability, at last, come to be determined by a majority? Every practitioner, however ignorant, would have his little circle of partizans, whose vindication of his claims would not be the less importunate on account of his incompetency. The frequency of elections would, probably, in no long time, wear out the patience of the great body of subscribers, and render them indifferent to the question. And in any situation where the candidates for professional fame and emolument were numerous, it seems unlikely that the rotation would be sufficiently rapid, to render it an object to the more eminent practitioner, to take the trouble of a second canvass.

The year 1798 was, on various accounts, an important one in the life of Doctor Beddoes; and the various objects which occupied his attention, called for the exercise of all that mental activity, by which he was distinguished. In the course of it, a charge of peculiar importance was confided to him. Among those friends for whom he felt a peculiar degree of respect and affection, the late W. H. L——, Esq. M. P. held a distinguished rank. He admired the manly character of his mind, the liberality of his sentiments, and the goodness of a heart which the possession of immense wealth was incapable of corrupting. This gentleman had, at various periods, been under the Doctor's care for a pulmonary complaint, and had removed in 1797, to the more genial climate of Italy. Such, however, was his confidence in the skill of his medical friend, that he

sent to require his attendance even from that distant region, towards the close of the year. "I am pressed," says the Doctor, in one of his letters, "in a manner not to be resisted, to set off for Italy to see L——, whom the Italian doctors have suffered almost to die of an ague. If no fresh letters arrive forbidding me, we shall start for Hamburgh the week after next." He then adverts to his intended chemical lectures, and to his other literary and scientific plans; observing that they would be only suspended, not finally abandoned, in consequence of his intended journey. Before closing the letter, however, he announces that his departure was no longer necessary. He had, that instant, received the melancholy intelligence, of Mr. L——'s death. He pronounces a short but emphatic eulogium upon him; "He is dead," he observes, "the best man that I ever knew, or, that in his sphere of life, I ever shall know." A few months after his decease, an important proposal was made to Dr. Beddoes, under the united sanction of his widow and his acting executor. He was, in the first place, solicited to take a journey to the family seat, in order to lay down a plan for the medical regulation of the five infant children of his deceased friend; with a view particularly to fence them, as far as art could avail, against the future attacks of a disease to which the father had fallen a victim, and which had made other inroads into his family. After this introduction, the subject of education was alluded to; and a further proposition was made to him, to receive the two elder boys, one seven, the other five years of age, into his house; and to undertake not only their physical, but their moral and literary culture. Upon the latter of these propositions he was unable immediately to decide. Few men could be more deeply impressed than Dr. Beddoes with a sense of the importance of such a charge. On the other hand he was, no doubt, secretly gratified by the compliment thus paid him; and he might naturally feel desirous of reducing to practice some of

his speculations upon the subject of education. The father of these children had often expressed a wish that his eldest boy, notwithstanding his large expectations, should be trained to habits of self-dependence; and he perhaps imagined that if he accepted the important trust which was offered to him, he might have favourable opportunities of assisting in the formation of such habits. In his letters both to Mr. Reynolds and Mr. Giddy, he expresses the difficulty that he felt in coming to a decision upon the subject; he, however, finally determined to accept the charge. "I am very far from thinking," he continues, "that we can come up to ideal perfection in educating these boys; but who can? and if, in such times, we may depend upon the stability of property, it would be a matter of some consequence, to give to a young man of immense fortune, some inclination and power to be useful. I wish that you and Josiah Wedgwood lived near me; as by joining purses, we might procure some uncommon advantages for all the children."

In a short time after this letter was written, the little L——s became members of his family; and continued with him for about four years. He realized, very happily, in his mode of instruction, many of his former theories on the subject of education; and the results were highly gratifying. He directed his attention to awaken their senses, and to impress on their minds clear and distinct conceptions. In a minute criticism upon Mrs. Barbauld's Lessons for Children, he has somewhere remarked, that perhaps the optative mood might, with advantage, have been sometimes substituted for the imperative; and the former was happily adopted in his intercourse with his little pupils. One command only was peremptory, that they never should be idle. Scarcely any restraint was laid on their inclinations in the article of play. They were at liberty to devote as much time to it as they chose; but one condition was annexed to this licence; that they *should* play; in fine, that whether

engaged in amusement, or more serious occupation, the object, whatever it were, should be actively pursued. Every appearance therefore, like lounging, gazing with listless eye on vacancy, or languid indifference to what they were about, was sedulously discountenanced. By this means their minds and bodies were kept in a constant state of happy activity.

The personal instructions of the Doctor were, for the most part, communicated immediately after dinner. His professional pursuits admitted only his occasional inspection and direction in the morning; but, in the afternoon, he read the less difficult classical authors with them, or instructed them in the form of familiar conversation. In the latter mode of conveying information, he was peculiarly happy. Without assuming, in the least, the air of a tutor, he stimulated their curiosity, he directed their inquiries, and communicated all the information which they were capable of receiving, almost in the tone of an equal. It was remarked by those who had opportunities of observation, that Doctor Beddoes never appeared to enjoy himself more completely, than during this period. It was evident that he took great delight himself in these conversations, and the gratification appeared to be mutual. He availed himself of some of the principles of Horne Tooke in communicating to them general ideas upon the subject of grammar, and avoided the use of formal syntactic rules. In addition to those instructions which he himself communicated, no expence was spared in procuring for them every possible advantage from other quarters. An artist, to whom he meant to assign the construction of the rational toys, had that plan been sufficiently encouraged, was employed to teach them practical mechanics. Another ingenious artist was retained to instruct them in working in brass; and they thus learnt the principles of some of the most useful machines, by actually constructing them. Mr. Sadler, son of the person who first accompanied Doctor Beddoes to Bristol, taught them

chemistry and pyrotechny; and they had the advantage of receiving anatomical instruction from Mr. King. The ideas derived from these various sources furnished a constant variety of topics for their afternoon conversations, and the impressions received, were deepened by the little discussions or explanations, which took place on such occasions. Whenever circumstances rendered it necessary for the Doctor to leave Clifton, his little pupils were the constant companions of his journey; and any opportunities afforded by these excursions, of bringing them acquainted with natural objects, were not lost. The success of this experiment amply justified the departure from the common methods of instruction. The faculties and habits of observation of his little pupils were awakened far beyond their years, and their general information was equally unusual. Their minds were stored with an uncommon variety of ideas; nor did their more extended acquaintance with other branches of knowledge render their classical attainments superficial. On the contrary, upon their removal to Eton, they were found not inferior, in that particular, to their equals in age, who had been trained under the more rigorous institutions of that seminary.

But the order of time has been somewhat anticipated by this digression; it is necessary to return to the year 1798. Another circumstance concurred to render this year an important one to Dr. Beddoes. It witnessed the opening of the Pneumatic Institution. Although the list of subscribers to that undertaking contained names of such high eminence for science and for rank, that it was honourable to be associated with such characters in the support of any object; the sum subscribed was still, in Dr. Beddoes's apprehension, scarcely sufficient to authorize his setting it on foot. A member, however, of a family no less distinguished for private munificence and public spirit, than for the successful application of the purest models of ancient art, to the embellishment of the

common purposes of life, offered Dr. Beddoes the sum of one thousand pounds to assist in carrying the plan into immediate execution. This liberal friend of science and humanity was the late Mr. Thomas Wedgwood, whose family had always been amongst the most liberal promoters of the Doctor's benevolent plans. To give the aid of his purse and his name to this scheme when it was first proposed, was one of the latest acts of his father's valuable life. He himself had early taken an enlarged view of the probable benefits which might result from the new remedies, and had, upon a former occasion, remarked that "it was worth while to expend the sum subscribed, in order to assure us that elastic fluids would *not* be serviceable as medicines." As all apprehensions of a failure of pecuniary resources were, for some time at least, suspended by this spirited offer, Dr. Beddoes had now no other care upon his mind except the discovery of a proper superintendant. On his success in this particular he naturally calculated that much of the efficiency and success of his new institution must necessarily depend. While his attention was occupied by this subject, a fortunate chance procured for him the services of one, whose rising talents eminently qualified him to enter into his views, and to assist in ascertaining and developing the resources of pneumatic medicine; and the more mature expansion of whose powers has since, at once established his own fame, and extended the scientific reputation of his country. In one of the most remote parts of Cornwall, a young man, only nineteen years of age, "with little access to philosophical books, and none at all to philosophical men," during the course of an education, designed only to qualify him to act as a country practitioner of medicine, detected some inconsequent reasonings upon caloric, which deformed the French theory of chemistry; struck out new views both upon that subject and upon light; and supported them by a variety of novel experiments ingeniously conceived and diversified. His

fondness for chemical pursuits, and a reputation for superior talent, gradually excited attention in the neighbourhood; and at length reached the ears of Mr. Giddy, who sought the acquaintance of the young philosopher. Equally delighted with the genius and the modesty of his new acquaintance, Mr. Giddy, in his correspondence with Dr. Beddoes, spoke of the treasure that he had discovered, and at his instigation, Mr. Davy also addressed a letter to the Doctor, offering to transmit a copy of his observations and experiments for his perusal. It was in the month of April that this offer was made him, and in a letter to Mr. Reynolds he thus alludes to it. "It is strange that so many people should turn against caloric as a substance, at once. I have been long dissatisfied with the common doctrine. In my lectures, I preferred the hypothesis of motion; and indeed the miserable abuse of the theory of latent heat by Lavoisier, seems to me to render its non-existence as clear as any proposition indirectly demonstrated by Euclid. You will see Count Rumford's experiments in the volume of the philosophical transactions just published; and a new correspondent who, by the way, does not know of these experiments, and who seems a clever man, offers me a perusal of some new ones, on friction and percussion, which he says, prove heat to be but motion." From the tone of this letter, it would not appear that Dr. Beddoes had formed any very high anticipations of the merits of what was thus offered for his perusal. The sight of the papers and experiments, however, affected him with an agreeable surprize. As soon as he had gone through them, the hope that he should find in his unknown correspondent the very man adopted for his purpose, flashed upon his mind. He forwarded to Mr. Davy, Count Rumford's experiments, together with a prospectus of a publication which he was then meditating, designed to collect miscellaneous information on physical and medical subjects, from the West of England; and at the same time solicited his per-

mission to enrich his volume with his valuable essay. He also wrote to Mr. Giddy to know whether it would be possible to secure his young friend's services for the Pneumatic Institution; and a negociation upon the subject commenced shortly afterwards, which terminated in Mr. Davy's removal to Bristol in the month of September. He had here access to a laboratory far more suitable to the extent of his views and inquiries than the confined one at Penzance. His genius and his industry seemed to develope themselves with his opportunities, and he shortly afterwards made those brilliant discoveries which reflected splendour on the history of the institution; and by attracting the attention of all scientific men to their ingenious author, gradually led the way to that elevated rank which he now occupies among his philosophical countrymen.

Soon after Mr. Davy's arrival in Bristol, patients began to be received at the Institution. Dr. Beddoes had already announced in his "Suggestions towards setting on foot the projected establishment for factitious airs," that the occasional employment of the more common remedies would constitute a part of the medical treatment intended to be pursued there. To abstain entirely from them in all cases, would have been absurd and impossible. "All that was necessary under such circumstances, would be secured by the inviolable observance of one rule, that the processes should be kept perfectly distinct, in order to render cause and effect apparent." In the very infancy of the establishment, however, the gasses were administered in a smaller proportion of cases than might have been expected from this notice. They were comparatively rarely resorted to. This step was partly dictated by policy. To combat the prejudices of the "small vulgar" was still more difficult than to encounter those of the "great;" and the apprehension of being made the subjects of an experiment, was sufficient to deter even those, to whom medical assistance from other sources was almost inaccessible. Some remedies, however, to which the attention of the medical world was only then beginning to be particularly directed, were here fairly tried, and upon a very extensive scale; and in the mean time, among those patients who seemed to derive no benefit from the administration of medicines in the common form, it was natural that some should be found, not only willing, but desirous to make trial of less usual modes, provided they held out to them any hope of relief.

Notwithstanding the interest with which he watched over the commencement of an undertaking which he had so long, and so anxiously cherished, Dr. Beddoes devoted no small portion of his time to his literary occupations. His first object in the year 1799, was to arrange the papers that he had collected for the miscellaneous volume, the prospectus of which he had circulated some time before. Unwilling to make the labours of others subservient to his personal emolument, he had liberally determined that the profits of this and of any succeeding volumes of the same description, should be presented to some medical charity. With an allowable partiality, he assigned the first claim to the Pneumatic Institution. The future ones were to be determined by lot, from the benevolent establishments of the counties comprised in the circuit, from which he expected and solicited information. The collection appeared early in May, under the title of "Contributions to Medical and Physical Knowledge collected principally from the West of England." This volume would have been valuable, had it contained only the very original essays by Mr. Davy, on heat and light. But it is enriched with several other important communications. Of those of which Dr Beddoes, was only the Editor it is not my business in this place to give any account; but his own contributions require to be noticed, as they all more or less bear the impress of his mind. He has prefaced the volume with some thoughts on the acquisition of physiologi-

cal facts, and on the means of rendering medical charities effectually subservient to the general advancement of medical science. In this introduction he has interwoven the whole of the "Suggestion towards an improvement in the medical and physical department of the Bristol Infirmary;" and has added to it much original and important matter.

There are some observations which, when they are first offered to the mind, strike instantaneous conviction; and a degree of astonishment is felt, that they had not occurred before and been universally acted upon. Such is the character of some of Dr. Beddoes's ideas in the essay under notice. When the attention has been once directed to the subject, the reflecting mind cannot but be struck, upon contrasting the immense sums annually expended in the maintenance of those charitable institutions by which our native country is so honourably distinguished, with their comparatively scanty contributions to the improvement of medicine, and upon recollecting the contented acquiescence, with which the subscribers to such institutions, receive a meagre report of admissions and discharges, in return for that patronage which they so liberally bestow. It is true that there are honorable exceptions to this observation, and some of our most valuable practical information has been derived from those medical officers of such establishments, who have united genius and zeal with opportunity. But these exceptions can only force upon the mind one impression. If the scanty products hitherto collected have proved so important, what an abundant harvest might be expected if a similar degree of honorable industry were universally diffused. "What, indeed," asks our Author, "according to a just estimation, are the facts that have been preserved, but fragments of a mighty wreck, demonstrating the value of the mass that has perished?" Some of these institutions are almost hostile to improvement, and instead of affording, as they all ought to do, a

school of medical and surgical instruction, throw a veil, as far as practicable, over all their transactions, or waste the time of the pupil admitted there, in compelling him to witness and to learn all the details of an exploded practice. As a remedy for these evils, Dr. Beddoes expresses a wish that provision should be made "for the most perfect ascertainment and entire publicity of all the phenomena occurring in such charitable establishments." With this view he proposes that reports should be made at stated periods, by the medical functionaries, of the occurrences in their respective departments; and that any thing unusual should be particularly noticed: If the deviation from ordinary phenomena should be remarkably striking, that it should be verified by a committee, and that all medical practitioners in the place where such an institution existed, together with the subscribers to it, should be present when such reports were delivered. By means of such meetings, he asserts that these charitable institutions might be rendered more effectually subservient to the general good; and his imagination kindles with the anticipation of the brilliant results in favour of human kind, which would be secured by such a plan. "There," says he, "the transactions of many hospitals might be brought under review at once, and contrasted. There, also, will be the greater chance that particulars in the reports shall suggest discoveries to some one among a numerous audience, though the very same particulars, for want of necessary previous associations, should be utterly lost upon the reporters themselves; just as sparks fail to kindle a blaze when they fall upon incombustible materials. So intimate likewise has science rendered the connection between the organic and inorganic kingdoms of nature, that the unprofessional philosopher, well apprised of the desiderata of medicine, may be sometimes more in a capacity to supply them, than the unphilosophical practitioner."

"After considering the stake which society has in medicine; how

often in a man's life it may, according to its power and administration, wound or soothe his personal feelings and his sympathies ; let him imagine himself at one of those sittings, where the business is carried on with a spirit adequate to its importance. What motives for self-congratulation, and for congratulating his whole species, will the scene before him offer! the art of most immediate and most universal concern, brought out of that darkness in which none can distinguish whom it preserves and whom it destroys ! its doubts solved ! its contradictions reconciled ! the causes of phenomena where ease and existence are at issue, detected ? light and order suddenly spread through trains of ideas, that had long been vainly struggling in the minds of the ingenious ! the stores of the most knowing augmented ! the powers of the most acute sharpened ! the interest of all classes promoted ! the fortunate son of Æsculapius retiring, with better informed judgment, to the mansions of the opulent! the humbler practitioner carrying away comfort to the peasant and the pauper ! All things considered, I know not if those assemblies which fix the destiny of distant nations and unborn generations, would appear in the eye of humanity more august, or be found more capable of inspiring exalted sentiments."

The degradation into which the medical profession has fallen, from the intrusion of the ignorant and unqualified into every branch of it, has so far impaired those features of liberality by which it has in general been so honourably distinguished, that it might justify a momentary suspicion that the good to be derived from such meetings as are here recommended, is greatly over-rated ; for it might be apprehended that the time would be wasted in empty cavils or in illiberal insinuations. It might, indeed, sustain a temporary check from such causes, but it could only be temporary. In such a society, crafty mediocrity would soon be detected, and would sink to its proper level, or be frowned into insignificance. The mystery which,

at present, shrowds almost every department of medicine, enables the ignorant to press blindly forward and defy detection. But their career would be checked if the veil were withdrawn, and such an universal interest excited in the study of our common nature, as to lead the intelligent in other departments of society to the acquisition of correct general ideas upon the subject.

The Essays by Mr. Davy already noticed occupy the first place in this volume, and are immediately succeeded by a specimen of an arrangement of bodies according to their principles, from the pen of Dr. Beddoes. It was first printed in the spring of 1798, to illustrate part of his chemical course ; but it underwent some modifications in consequence of Mr. Davy's experiments. In this arrangement, caloric occupies no place. He had long expunged it from his chemical system. His dissatisfaction with it has been already intimated, and it appeared even in the publication which, in 1790, announced the History of Mayow's discoveries. For after giving an analysis of his theory upon the subject of heat, he adds, "I am very doubtful how far the specious theory of our philosophers at present, will prove to be the system of nature : does not the very familiar experiment of the deflagration of gunpowder present appearances directly contrary to its principles? Not to enumerate the other well-known instances of mixture where much heat is generated, and at the same time an abundant extrication of aeriform matter ; here we have great expansion and violent heat. Will it be said that both the heat, that goes to constitute elastic fluids, and that which becomes sensible, flows from the mixed materials in consequence of a diminution of their capacity, and was already contained in them? Can this be proved in the case of nitrous acid and oil, black wadd and oil, lamp-black and oil, iron filings and sulphur? And when we consider the violent concussion which attends the electric shock, does not its power to produce elastic fluids seem more favourable to

the hypothesis of motion?" The subject is again taken up in the paper on the appearances attending the conversion of cast into malleable iron; and is more amply insisted upon in the explanation of the present table. In the course of it, he hazards some conjectures which the philosophical researches of the present day will, perhaps, confirm, as advances seem to be rapidly making towards such a conclusion. He conceives that carbon is not a simple substance. He had, in the first part of his Considerations, hazarded a conjecture which he here repeats, as to its constituent principles. He supposes them to be hydrogene and azote. He expresses the same opinion with respect to sulphur and phosphorus; and, from their fusibility, ventures to entertain some hopes of their decomposition. Under the general name of alkalies, he has included, not only two of the substances usually classed under that appellation, soda and potash, but the earths also; and proposes a query whether all these bodies are not closely combined with oxygen. This conjecture he had originally thrown out in his chemical lectures at Oxford,[2y] where he had also suggested the idea of attempting to decompound phosphorus while in a state of fusion, by subjecting it to intense degrees of electricity. Of metals also he observes that, "notwithstanding their firm, and hitherto, impenetrable structure, the existence of iron in such variety of plants and animals, and of manganese in some plants, suggests an opinion that these metals are compounded by the organic powers: and then, we are warranted by analogy, in surmising that the other metals consist but of the same principles differently modified. . . . Their decomposition would doubtless be followed by the creation of numberless new arts and a great change in the condition of man." From improvements in our knowledge of animal chemistry, he anticipates benefits still more important. This branch

[2y] See Nicholson's Journal, Vol. xxi. p. 68.

of science is involved in great difficulties, on account of the complicated and ever changing texture of living matter. "Sound Philosophy," says our Author, leads us to suppose that here, as in inanimate matter, action depends upon composition; and variety of action, of course, upon variety of composition. In the constitution and qualities of nerves and muscles, there may possibly, within the limits of the living state, exist as wide a difference, (I do not say the same difference.) as between the *nitric* and *nitrous* acids." From the attention which appears to be now excited to the investigation of these subjects, he expresses a confident hope that these difficulties will be overcome; and that the acquisitions for which medicine will be indebted to chemical physiology, will enable it to fix its foundation, upon principles which shall afford it a real and permanent basis.

In the course of the volume, we meet with some reports and observations concerning the respiration of gasses and vapours, partly contributed by correspondents and partly furnished by the Editor. The latter contain some severe animadversions on the illiberal and unphilosophical opposition which the gaseous remedies had to encounter. He indignantly complains of the conduct of "certain British literary ruffians, who engage by the day, or the week, or the month, to assassinate literary reputations on account of delinquencies not literary." The virulence of party zeal and political hostility, if thus exerted, must necessarily be destructive of the best interests of science, and ultimately generate a total inattention to periodical criticism.

He also gives a short account of the trials of pneumatic medicine that had been made upon the continent; which do not appear to have been, by any means, prosecuted to that extent which the success of partial experience might have justified. At the close of the volume he announces his intention of speedily publishing an "Essay on the causes, early signs, and prevention of pulmonary con-

sumption, for the use of Families." This essay appeared in a few weeks after the West Country Contributions. The name of the Author and the knowledge of the peculiar attention which he had paid to the subject, combined with the intrinsic excellence of the work, secured it a rapid sale; and a second edition, to which considerable additions were made, was called for in the space of a few months. It commences with a general view of the subject, and of the immense devastation caused by the ravages of this melancholy disease; and suggests modes of ascertaining its extent with more accuracy, than the inquirer is enabled to do by the bills of mortality and other similar documents. The Author proceeds to correct the common ideas with respect to the degree of suffering endured by its victims. "The personal charms of young females" he observes, "have occasioned them in all countries to be compared to flowers. Hence a young woman whose lungs are fatally affected, is a blossom nipped by untimely frost. The imagination proceeds with the metaphor; and in virtue of such poetical logic, it seems to be concluded that the drooping human being feels, no more than the drooping vegetable expresses." From the influence of such mistaken associations, people in general are so unprepared for the real scene, that when called upon by any circumstance to attend the death bed of a friend sinking under this disease, they have contemplated it with equal surprize and horror.

Having sketched, in glowing colours, the terrific features of the evil which he wishes to remove, he proceeds to state the general plan of his Essay, which is, to circulate such instruction "in the interior of families as may set them on their guard. Experience has shewn, how little has, or can be effected by the occasional counsel of Physicians. A knowledge of the full undisguised truth seems necessary, to excite such a salutary alarm in the heads of families as might lead to the adoption of effectual means of prevention."

He proceeds to enumerate those countries and classes, which appear to enjoy the greatest exemption from the ravages of this fatal disease. "Could a doctrine of exemption" he observes, "be established, it would furnish a moral directly useful: for we should only then have to adopt, as nearly as possible, into our own conduct, the circumstances on which exemption depends. On the other hand, if it shall appear that there are whole descriptions of persons peculiarly liable to the complaint, we may stand a chance of collecting from their history a lesson equally valuable, concerning the habits to be avoided."

Under this division of his subject, he first treats of climate, and its relation to consumption. In more than one part of this treatise he complains of the uncertainty in which this investigation is still involved, and of the neglect of the leading members of the profession in not having given the influence of their authority to elicit the necessary information; so that it seems not yet accurately ascertained, "in what circumstances phthisical invalids may with advantage remove to a more southerly climate, or to what climate they may remove with the greatest benefit." The general result of his inquiries is, that the West Indies appear to be unfavorable to the developement of phthisis. Egypt and Bengal probably enjoy a similar security; and, in general, all latitudes where a regular high temperature prevails; more especially if "dryness be added to constant warmth." The character which Lisbon, Italy, and Madeira have acquired as a safe retreat for the consumptive, he considers as highly questionable; and when favorable results have attended the removal of a patient to either of these spots, he seems rather disposed to attribute them to the sea voyage.

He next enumerates the classes which are said to be exempt from this fatal disease; with respect to whose habits of life he appears to have collected very minute information. These are first, butchers; whose exemption appears so complete, that a dissertation has been

published on the Continent, suggesting the propriety of placing phthisical patients in slaughter-houses; secondly makers of catgut, who, like butchers, are exposed to the scent of dead animal matter; thirdly, fish-wives and fishermen; fourthly, sailors; fifthly, certain descriptions of menial servants, more especially those employed about stables; and certain small farmers. He next particularizes those classes which are most liable to be affected by it, as needle pointers, stone cutters, and performers on certain wind instruments. Powders exceedingly soft or easily decompounded may it appears be inhaled without injury; "not so, substances, however soft, in the form of fibres or small splinters." Next in the list he places those artizans whose occupations are sedentary and inactive, and whose posture is unfavorable, or who are exposed to inhale certain small floating particles, as taylors, shoemakers, weavers, spinners, carpet manufacturers, &c. It is not only among the human species that confinement and inactivity produce these fatal effects; the same law extends to animals also; of which some very curious and interesting examples are given.

It is observed by one of the gentlemen from whom Dr. Beddoes, had solicited information for the work under review, that the Dutch, (those of them at least who retain the ancient manners of their country,) are said to be remarkably exempt from scrophulous and pthisical affections, and this fact is abundantly confirmed by the accurate and sagacious observations of Dr. Cogan; who has furnished a very valuable letter, upon those customs and manners from which their security appears to arise. The simple result appears to be, that the Dutch of both sexes rely for security against the effects of a humid climate, upon a quantity of warm cloathing, to which the females unite the habitual use of a small stove, contrived to keep the feet warm.[2a] Their apartments are large; very inadequately fenced

[2a] A similar contrivance is recommended in another part of this volume, to the adoption of our fair country-women. It might be so contrived as not only to combine neatness, but elegance with utility; and might contain a vessel filled with warm water, instead of a small grate for ashes, if the former were judged more eligible.

against the cold breezes of winter, and very imperfectly warmed; but their dress renders them insensible to these circumstances. In this respect they appear to adopt a plan exactly the reverse of that pursued in Great Britain: where the dress, among females more particularly, is utterly inadequate to protect the frame against the variations of the atmosphere; and the deficiency is attempted to be supplied, by rendering the rooms nearly air-tight, and heating them excessively.

Our Author next exhibits the general result of the facts with respect to the prevailing diseases in Scotland, collected from Sir J. Sinclair's statistical reports in that country. From these it appears that rheumatism, consumption, and low fever, are the prevailing disorders. "The two former," he observes, "stand in a sort of contrast to each other. A multitude of testimonies, (and in the whole twenty volumes there is no opposing evidence) may be brought to prove that, in general, women, especially those who follow still employments; and men engaged in the almost feminine occupations of the cloathing manufacture, become frequently consumptive: whereas the husbandman, and the shepherd, being incessantly obliged to expose themselves to the vicissitudes of the climate, and untaught to employ any precautions against the effect of these vicissitudes, become crippled by the rheumatism, and wear out a wretched existence, under the constantly returning pains of this severe disease." The prevalence of these two diseases, which now extend their ravages in a degree unknown to the ancestors of the present generation, seems to have kept pace, in a remarkable manner, with the introduction of light cotton dresses, instead of the warmer plaid which was formerly worn; a fact which remarkably coincides with what had,

in the preceding section, been noticed with respect to Holland. So long as the inhabitants retained the warm cloathing of their ancestors consumption was scarcely known, and seldom fatal.

From these facts the Author has deduced the following general inferences. Of the classes so privileged as to be exempt from phthisis, it may be remarked, that they all agree in certain leading particulars; in eating plentifully of animal food, in being remarkably exempt from scrophula, in the nature of their occupations being particularly calculated by habitual exposure to render them hardy, and in being often subjected, with one or two exceptions, to the influence of an atmosphere more or less contaminated by animal effluvia. To the latter circumstance however, he is not inclined to attach much importance: he rather attributes the fortunate exemption of persons so circumstanced, to the hardihood generated by their occupations, and the nature of their diet.

Some speculatists indeed have attributed the prevalence of phthisis, as well as of suicide, in our island, to our free use of animal food; but it appears probable, in the first place, that much more animal food is eaten in countries where this fatal malady occurs less frequently than with us; and in the next place, that the free use of animal food, instead of being objectionable, is highly advantageous as a security against its attacks. The salutary agency of animal diet in preventing the developement of Scrophula is now generally known; and the mistakes of those prudent parents who imagined that by confining their children to a vegetable diet, they were purifying their blood, while, in reality, they were starving them into scrophula, are now generally recognized and avoided. The analogy between scrophula and phthisis points out the propriety of an analogous plan of prevention, and the Doctor sums up his advice on the article of diet with a recommendation to use animal food freely, wherever "habitual weakness or the history of the family gives reason

to apprehend consumption." And he even contends that the palate may in some instances, be advantageously tempted by variety. "The unwholesomeness of mere variety of food is a popular error, that requires the more to be exposed, because it may prevent persons who want nourishment, but have a fastidious palate, from eating as much as they otherwise would. Our classical moralists, who sometimes seem to think mere good intention, a qualification for treating authoritatively a topic they do not understand, have sanctioned this error; and it derives some credit, perhaps, from the pious folly of fasting. But all indulgencies are far from being equally mischievous to health. It is not, as Addison supposes, among high dishes, that gout and palsy lurk. They rather resemble those fiends which enchanters of old are said to have imprisoned in phials; and which did not assume their proper infernal shape, till the seals were broken and the liquor discharged into the human stomach."

From diet he proceeds to the consideration of exercise, which he regards as the great means of invigorating the system; and of the neglect of which he complains, as increasing to a pernicious extent, the disposition to phthisical affections. Even among boys it is scarcely pursued with sufficient activity, but among girls its neglect is notorious. Upon both these subjects he insists more largely in a work to be hereafter noticed. One sentence only I shall extract in this place. "Nature," says our Author, "for the most beneficial purposes seems in our early years to have combined two propensities, activity and curiosity; the desire to exercise our limbs and our senses. And the time is, perhaps, not far distant, when parents shall discover that the best method of cultivating the understanding, provides at the same time, most effectually, for robustness of constitution." But though a rational parent may effect much with respect to children, as their natural propensities will induce them to co-operate in such a plan with eagerness and vivacity, the Author acknowledges the difficulty

of providing or recommending such active occupations as might wean adults, those of the female sex more particularly, from the indolence which the tenor of their pursuits soon renders habitual. "Yet he who established it as a maxim, *that the Gods sell all good things for labour*; if the state of society in which he lived, had required him to be more pointed and particular, might have laid it down that the Gods do *not sell health, the best of things, but for labour*. Botany and gardening abroad, and the use of a lathe, or the study of experimental chemistry at home, present some resources. Certain domestic amusements, as shuttlecock, &c. might add to the list; and it might be still farther increased by reviving old, or inventing new games, which would require active exertion, and might beguile the heavy time of evening visits." He acknowledges that the first attempts to put in practice such an innovation, would appear, even to the parties most convinced of its utility, irresistibly ridiculous. But could any thing, he asks, "be conceived more ludicrous than dancing, if familiarity had not taken away its power to produce laughter.[3a]"

3a The exercise of dancing, at least in the form in which it is usually taken, in a heated apartment, at a late hour, amidst a glare of lights, and with various other concomitants which tumultuously agitate the nervous system, he was not, in general, disposed to speak of with much indulgence. To the intemperate eagerness with which it was sometimes followed, he thus satirically alludes in one of his common-place books. "Young people who bring on disorders of the chest by exposure, are not looked upon with strong disapprobation, while those that bring on disorders of the belly by drinking, are severely condemned. But I doubt whether there is much ground for the distinction. Hard drinkers may be said to injure themselves with their eyes open. But is this more the case with them than with hard dancers? All believe a certain degree of excess hurtful: But neither suppose themselves going such lengths on this, that, or the other occasion. They propose to retrace their footsteps on this side danger. Or if the one sometimes brave danger, do not the others as often? The decline of health equally disqualifies both for the offices of life. The temptation of pleasure seems a pretty equal, as it is a common excuse. Orthodox divines measure the punishment of sin, by the greatness of the being whom it offends; which appears pretty much the same kind of justice, as if a man were to be hanged for robbing a lord, but only imprisoned a month if he robbed a beggar. But no orthodoxy will pretend, that a sin against the liver, as far as the dignity of the organ is concerned, is heavier than a sin against the lungs. If the debauchee in drink is disordered next day, so is the debauchee in dancing. The drunkard over-night and next morning, is, no doubt, a most offensive object, nor do I object to his being stigmatized as a hog that lives to wallow in the sty of Epicurus. This is, however, a matter of taste. But looking at the conduct of each party, as it affects health, I do not feel why it should excite sentiments so essentially different."

He next gives a physiological and pathological view of the effects of variation of temperature; and enters into an elaborate disquisition upon the relation between Catarrh and Consumption, that between the scrophulous temperament and consumption, and the formation of tubercles. Notwithstanding the difficulty in which this part of his subject is involved, he treats it with remarkable perspicuity; and he has unfolded several interesting physiological facts, in such a manner, as to render them intelligible to the unprofessional reader.

The important inquiry whether or no consumption has increased in frequency, next passes under his review. In the absence of authentic documents to enable him to determine this question with accuracy, he proceeds to an analytical consideration of such causes as act upon the constitutions of our contemporaries. And he conceives that the customs of our ancestors as to diet, exercise, and other less important particulars, gave them a decided superiority over the present generation. The amusements of both poor and rich were of a more active and athletic cast; nor had the luxury of the higher classes condemned so many of the lower to sacrifice the enjoyment of life, and often life itself, in unwholesome and sedentary occupations. In fact, the manners of all ranks of society tended to the formation of a physical constitution, analogous to that enjoyed by those classes, who were pointed out in the beginning of the Essay, as the most secure from the ravages of consumption. He then proceeds to give a sketch of the phthisical ex-

terior, and as he had, in a former part of his treatise, spoken at large of the affinity between scrophula and consumption, he begins by describing the principal indications of a scrophulous habit, many of which are signs of consumption also.

The next topic which he discusses is the effect of baths of different temperature. He first treats of the blood-warm bath, upon the advantages of which he largely insists, and combats the generally prevailing prejudices as to its relaxing or debilitating effects, by copious details of the customs obtaining, in this respect, in foreign countries; where the invalid is frequently immersed, not only without injury, but with advantage, for hours in succession, and more than once in each day; and where this treatment has been observed to be especially beneficial in diseases marked by the greatest prostration of strength. Without recommending its use to an extent which appears in some instances to be extravagant, he regards these facts as incontrovertible proofs of the safety and benefit of its more moderate application, especially in the forming state of phthisis: in its more advanced stages he considers its use too hazardous to be lightly resorted to.

The succeeding section is devoted to the consideration of "Bed-warmth," the effects of which the Author considers as in many respects analogous to those of the bath. Under this head he delivers a most important practical rule. "Whenever a person of feeble habit feels heated in the morning, let him rise without a moment's delay." The heat of the bed is often increased considerably above that salutary point, which like the warm bath, at once imparts refreshment and vigour; it then produces fever, langour, and inactivity. Even the healthy may suffer some inconvenience from this source, but the invalid cannot hope to escape from it.

In examining the effects of the cold bath he addresses a variety of salutary cautions "to the weak, but especially to the phthisical."

Persons in such a state should be warned against a hasty conclusion, that because it imparts fresh tone and vigour to those already robust, it will produce equally beneficial effects upon the feeble. Several cases are detailed in which its operation proved highly injurious. "It may be in general asserted," says our Author, "that no measure more certainly enfeebles the weak, and more frequently excites pulmonary consumption in the pre-disposed, or hurries on the disease faster when it is forming."

But cold, applied in a much less concentrated form, will often prove destructive to persons with weak lungs. Many have sustained irreparable injury from going in the winter season into damp churches. "So that consumption has sometimes been distinctly traced to a chill received in such a situation." Another source of mischief pointed out, is the custom which obtains among the daughters of less opulent families, of dressing for evening parties, in the depth of winter, in apartments without a fire. In order, in some degree, to obviate the pernicious consequences resulting from this practice, he advises that a small quantity of warm water should be taken occasionally; "which will prevent the chill, without producing any bad effect, if no more be taken than just enough to keep the sensations comfortable." Even washing the head with cold water, without sufficiently drying the hair afterwards, appears to have excited alarming symptoms in the phthisically disposed.

Temporary exposure to cold air will often be of service, though its continued application would prove highly injurious. For want of attention to this important distinction, many have fallen victims to the mistaken plans pursued some years ago, with a view to render the constitution hardy.

He proceeds now to give a popular view of the signs of impending consumption; not with a view to instruct the unprofessional in the medical treatment of it, but to put them on their guard against

impending danger. The first sign which he points out is a lassitude, and indisposition to exertion, which have often been mistaken for indolence. The next is an increase in the general state of the pulse, which becomes particularly evident after the simplest meal, or slightest exertion. With this symptom is often connected some difficulty, or increased quickness of respiration. These are not laid down as absolute signs of consumption, but as signs that render caution and the discrimination of a medical person necessary.

The propriety of exercise in or near consumption is next canvassed. In the regulation of this, greater caution is necessary than is commonly apprehended; as its effects are salutary or injurious, according to the state of the individual. Incessant horse-exercise has appeared to snatch some almost from the borders of the grave; while others have been precipitated thither, from having been forced by their friends to exertion in defiance of nature."

He next offers some reflections "on the removal of the indisposition immediately preceding pulmonary ulceration, and on the prospect of a cure for confirmed consumption." He draws a melancholy, but too correct picture of the general progress of the disease, and inquires whether its almost unvaryingly fatal termination is still to be regarded and submitted to as an inevitable evil, or to be considered as a motive for more diligent exertion to explore an adequate remedy. "The increasing light that has been shed upon the science of medicine, and a clearer insight into the composition of the animated system, have" he observes, "suggested remedies for diseases hitherto esteemed hopeless." He here obscurely glances at the brilliant discovery of Davy, which had not yet been made known to the world. "If such" he continues, "have been the spontaneous fruits of a region where the sounds of human industry have scarcely yet been heard, what may not the soil yield when it shall have been cultivated with an ardour worthy of its fertility."

He next proceeds to announce, in sanguine terms, a remedy that "promises to be sometimes effectual in operating the absorption of tubercles:" This remedy was the fox-glove. It had been successfully administered in some cases that appeared desperate, by Doctors Drake and Fowler, and the reports of this success had kindled his enthusiasm, and elevated his hopes to a very high degree. In the first moment of anticipated victory over the giant malady which it had been the object of his life to oppose, he expressed his hopes in terms too general and decisive; and made a loose comparison between the powers of digitalis in phthisis, and Peruvian bark in ague. This passage was eagerly caught at by the enemies of speculative enquiry and found a ready echo from the stupid and malignant; and if frequency of quotation could give importance to the sentiments of a medical writer, it might, as the Author observed in a subsequent publication, "for its standing, vie with any aphorism of Hippocrates." No allowance was made for the warmth inspired by an ardent zeal for the interests of humanity, nor for that liberality of sentiment which led him to extol the discovery of another, with as eager an interest as the selfish practitioner manifests in recommending one of his own. The passage was modified in the second edition of the work. But although this so immediately succeeded the first, to notice the correction or modification of the sentiments originally expressed, did not suit the opponents of medical improvement; and they still continued to quote from the first edition. I believe that he never found any occasion, from subsequent experience, to retract the more guarded opinion expressed in the second; and to the close of his life, it continued to be a favourite and a successful medicine.

It must naturally excite some surprise to find that in a treatise written expressly upon consumption, by Dr. Beddoes, so little notice should be taken of the effects of the pneumatic remedies. They are only once alluded to, and then only to acknowledge that the very

imperfect trials hitherto made with them, had been " far from establishing any thing like a successful mode of treating consumption."

He concludes his work with a summary of the principles contained in it; but before bidding a final adieu to his readers, he takes an opportunity of again urging the necessity of a more general attention to the laws of the animal œconomy, among the unprofessional. "Something" says he " I may have contributed towards the attainment of remote good, if I have given unprofessional readers, juster views of medicine as it is, and higher views of what it may become. For it is time for mankind at large to feel that the investigation of things appertaining to health, is no exclusive business of the medical faculty; and that till we shall engage in the study of the laws of our own existence, as a common concern, so long will multitudes continue to groan in unnecessary agony, and be cut off from society before their time."

While Dr. Beddoes was thus engaged in communicating to the Public the result of his enquiries and observations upon that fatal disease, to the investigation of which he had so intensely devoted himself, Mr. Davy, in the course of his chemical researches, discovered in an agent hitherto very imperfectly known, properties and powers equally new and extraordinary. The gas named by Dr. Priestley, its illustrious discoverer, *dephlogisticated nitrous air*, and by the French chemists, the *gaseous oxyd of azote*, had such contradictory qualities assigned to it, that Mr. Davy, was induced to examine it with an unusual degree of attention and accuracy; to prepare it with more than common care, and at length, cautiously to respire it. After some timid trials had convinced him that it could be inhaled without danger, he ventured upon a larger dose, and was surprised by experiencing the most vivid sensations of pleasure, accompanied by a rapid succession of highly excited ideas. His report upon the rapturous feelings occasioned by this gas, soon induced others to make trial

of it; and their testimony confirmed, with some few exceptions, the animated descriptions which he had given. It will be easily imagined that Dr. Beddoes, was not a little gratified that the labours of the superintendant of an institution which he had so much at heart, should so soon be rewarded by so signal a discovery. The earliest notification of it appeared, if I am not mistaken, in Nicholson's Journal, for May, 1799, a work which was, not unfrequently, the repository of his speculations. In a letter addressed to Dr. Darwin, in the earlier stage of the investigation of its properties, he informs him of " something extraordinary having been made out at the Pneumatic Institution," although he was not yet competent to pronounce decidedly to what it amounted; "the public however" he adds "can now judge of Davy; I think him the most extraordinary person that I have seen, for compass, originality, and quickness of thought." He shortly afterwards gave a more detailed account of what had occurred, in his "Notice of some observations made at the Medical Pneumatic Institution," a small closely printed pamphlet of about thirty pages. He announces, not without a secret complacency, these first fruits of an institution " for applying chemistry to the elucidation of animal nature, or for pursuing the connection between the properties of elastic fluids, and the conditions of life." He stigmatizes the premature decisions of certain sciolists, who had represented those partial failures which had disappointed some of his previous expectations, as conclusive evidences of the total inefficacy of his plans; and apologizes for his repeated publications on the subject, by stating the necessity which existed of forcibly awakening the attention of the community. It was this necessity that stimulated him to persevere, " even although some of his friends attempted to convince him that he was too eagerly forcing the improvement of medicine; so long as it was too evident that disease and death would not suspend their operations, in compliment to the apathy

of the profession or the public." After this introduction, he briefly alludes to some of the causes which retarded the establishment of the institution, and congratulates himself and the public on his good fortune, in meeting with a superintendant "equal to his wishes, and superior to his hopes." He then proceeds to give an account of the discovery of nitrous oxyd, and describes the effects produced by inhaling it, with equal energy and eloquence. Many details are added from descriptions drawn up by themselves, of the effects of this powerful agent upon others.

From a consideration of the properties which it appeared to possess, the Doctor was emboldened to administer it in cases of palsy, and some trials are recorded where it was, as far as the reports went, singularly successful. The result of these, excited in him the most sanguine anticipations, which if they be thought to border upon extravagance, manifest, at least, the extravagance of no common mind. " I shall not dissemble" says he " that the contemplation of such phenomena revived, in more than their original force, certain well known physiological conjectures, which I had formed many years ago, and concerning which I had so ardently desired that they should be submitted to an experimental scrutiny. *That oxygene should have seldom been administered in its most perfect state; that the newly tried gas may be regarded as a more powerful form of oxygen gas; and that between the two, we should now have at our disposal an infinite series of powers,* are considerations highly encouraging. And the possibility of exalting the bodily and mental powers, and of renovating excitability, (an idea equally remote from the apprehension of Brunonians and Anti-Brunonians) seems now more feasible than ever. Our observations promise a test for the difference in temperament, between different individuals, and between animals of different species. If the organs do not forbid, why may they not assist us in arriving

at the means (which I had sought years before in oxygen gas) of converting torpid into vivacious, cold blooded into warm blooded animals? In another view they are still more interesting. They present themselves as a pledge that by ascertaining the action of the elements entering into his composition, man may sometime come to rule over the causes of pain or pleasure, with a dominion as absolute as that which he at present exercises over domestic animals and the other instruments of his convenience."

It was not merely from the effects of the nitrous oxyd that he was disposed to question some particulars in Brown's doctrine of excitability. Some of his objections he had stated some years before, in the view of the Brunonian system prefixed to his republication of the Elements of Medicine.

Upon the first publication of this pamphlet, the cry of the enemies of medical improvement was loudly raised against the animated descriptions, and sanguine anticipations of the Author. They even went so far, at one time, as to question entirely the properties of nitrous oxyd; and to assert, that those surprising effects, which were said to attend its inhalation, existed only in the imagination of the Doctor and his friends. Repeated experience, however, has abundantly proved that his descriptions were not exaggerated; and other chemists can now prepare it with as much accuracy and certainty, as the ingenious inventor.

The nitrous oxyd continued to be exhibited in paralytic cases, long after the publication of this " notice." Many patients of this description were received into the house, and the trials made with it were attended with remarkable success. But the Pneumatic Institution, was not sufficient to satisfy the zeal of Dr. Beddoes in the pursuit of medical investigation. His attention to the supposed antisyphylitic virtues of nitrous acid, was scarcely less ardent and unremitting, than to the powers of the gaseous remedies. In the year 1799, he published a second collection of Reports on this subject,

and this was succeeded in the following year, by a third. Indignant at the opposition with which this new remedy was assailed, and at the attempts made to discredit the accounts of its efficacy, he has expressed himself, in the latter of these publications, with an unusual degree of severity. In order to bring the dispute to an issue, he began, shortly after, to circulate proposals for an Institution, the object of which should be restricted, solely to the ascertaining the real value of this new antivenereal remedy; and in which the cases should be submitted to inspection and examination from such various quarters, that voluntary or involuntary deception, would be alike impracticable. His first ideas upon this subject were given to the public in a letter in the Medical and Physical Journal for January 1801; and an outline of such an institution in the August following. It is not necessary, in this place, to enter minutely into the merits of the controversy. Perhaps the Doctor has himself stated them with tolerable accuracy in one of his private letters. "Nitrous acid" says he, "seems to fail in more syphilitic cases than mercury; but it has cured many that were incurable by that mineral." In truth, after making every allowance for the precipitate conclusions which may be drawn during the ardour of discovery, and for the occasional fallacy which may perplex the results even of well-conducted experiments, it appears that we are compelled, either to reject all the common principles which regulate our reliance upon human testimony, or to believe that many well-marked cases, both of primary and secondary syphilis, have been cured by nitrous acid. Pursuing the idea that the virtues of the nitrous acid depended upon the oxygene with which it was combined, Mr. Davy suggested the employment of a new acid in such cases. This was procured by slowly adding sulphuric acid to the oxy-muriate of Pot-ash. The effects of this new acid were considerable, and it often atchieved a cure when the nitrous acid had failed.

The object of the Pneumatic Institution was, as has been already

observed, in the outset, purely chemical. It had been defined by the Doctor himself to be "the application of chemistry to the elucidation of animal nature," and we cannot but admire his singular good fortune in meeting with Mr. Davy; the bias of whose mind naturally inclined him particularly to prosecute the chemical department, and whose ardour in the investigation of science equalled his own. But other remedies, as has been already remarked, were frequently made use of, and objects and investigations more simply physiological, occupied much of the Doctor's attention. There was room, therefore, for another superintendant, to whom that department should be particularly confided; and here also he was singularly fortunate, in meeting with a person in every respect qualified for such a situation. To an accurate acquaintance with anatomy, Mr. King united an insatiable ardour for physiological researches, a hand habituated to the arts of design, and a clearness of comprehension and promptness of mechanical ingenuity, which enabled him to devise a mode of executing the experiments, which the Doctor suggested. Nor was this a trifling task. His mind was incessantly teeming with new speculations, the accuracy of which he was eager to decide by such a test; and in cases where the means of effecting this were not at once present to his imagination, the prompt resources of Mr. King seldom failed to supply them. An immense variety of physiological experiments, therefore, was performed, and the Doctor began to meditate a physiological work upon a very extensive scale. Mr. King's abilities as a draughtsman were now put in requisition, and several interesting drawings were prepared; many of which were original; while others were copied from foreign publications of rare and difficult access. I am sorry to have to add to this account, that of a work which would doubtless have proved so valuable and important, no certain vestige exists, except a few of the drawings, engravings from some of which have lately illustrated Dr.

Parr's medical dictionary. There are no other remains which can convey the slightest idea of the extent, or arrangement, of the intended undertaking. Confident in the resources of his own mind, in that memory which retained almost every thing that had ever been reposited in it, and in that facility of composition which enabled him to write, almost with more rapidity than others read, he deferred the execution of this, which he seems on various occasions to have anticipated as the most important of his literary labours, till, to use an expression which he had himself adopted upon another occasion, "the night closed upon the workman and his work."

It was during this year that Mr. Davy published his valuable researches into the nature of the nitrous oxyd. In a chapter on its general effects, a few observations are included from the pen of Dr. Beddoes; from which it appears that additional experience had in no degree diminished his confidence in the powers of this newly discovered agent. He affirms that "after innumerable trials of it, he had never once felt lassitude or depression; and in stating an exception so striking to the general laws, by which the action of stimuli appears to be regulated," he takes occasion to remark, that "to suppose that the expenditure of a quality, or a substance, or a spirit, and its renewal or accumulation are the general principles of animal phenomena, seems to him a grievous and baneful error. I believe," he adds, "that it often happens that excitement and excitability increase, and still oftener that they decrease, together. In short, without generalizing, in a manner of which Brown and similar theorists had no conception, our notions of the living world will, in my opinion, continue to be as confused as the elements are said to have been in chaos. On some future occasion, I may presume to point out the region, through which I imagine the path to wind, that will lead the observer of some distant generation to a point, whence they may enjoy a view of the subtle, busy, and intricate movements of the

organic creation, as clear as Newton obtained of the movements of the heavenly masses."

In the Autumn of this year a typhus fever prevailed in Bristol, the ravages of which were widely extended among the crowded and ill-ventilated habitations of the poor.[3b] In order to warn the humble and less instructed classes against the mischievous effects resulting from the want of cleanliness, and from a variety of prejudices, almost universally prevalent in their treatment of the sick. Dr. Beddoes circulated, in a hand-bill, a few plain instructions for their use. They related to the acid fumigations and to the application of cold air, and cold water both externally and internally. These directions are drawn up with a plainness which rendered them equally intelligible and useful to those, for whose benefit they were particularly designed. Among the lighter labours of Dr. Beddoes during this year, it should be mentioned, that, stimulated by the presence and encouragement of some literary and scientific friends, he published in the month of June, a proposal for subscriptions for rational toys;[3c] The terms were much more moderate than those which were anticipated when the proposal was first offered to the public, and several persons gave the sanction of their names to the scheme. It appears however, that it was never so extensively patronized, as to constitute an object of sufficient interest to the manufacturer, to establish a toy-shop upon this improved plan.

In the year 1801, Dr. Beddoes published a miscellaneous volume "On the medical and domestic management of the consumptive, on the powers of digitalis, and on the cure of scrophula." In the first

[3b] A truly appalling picture of the destruction caused by this fever is given in a letter in the Monthly Magazine for March, 1801. The writer was Mr. Lovell Edgworth, who was introduced to these scenes of wretchedness, by one of the benevolent members of the Stranger's Friend Society.

[3c] Appendix, No. 8.

division of his work, he particularly considers the effects of a modified atmosphere in consumptive cases. Notwithstanding its paramount importance in the treatment of some diseases, and its influence in all, but little attention, comparatively speaking, has been paid to the subject of temperature. Yet a general idea of the important effects that might be anticipated from a careful adaptation of it to the various circumstances of disease, may be collected from a variety of circumstances. The favorable results which have succeeded the adoption of a cool regimen in small pox, and the sudden check often given to the progress of typhus and scarlet fevers by the application of cold water, are evidences of the advantage to be derived from its occasional reduction. Cases of a consumptive nature require, on the contrary, as has been already seen, an elevation of temperature: and the comparative mitigation of symptoms which has been witnessed, during the genial warmth of summer, seems originally to have suggested the propriety of escaping the rigour of our native climate, by repairing to some more temperate region.

There are also some peculiar circumstances which occasionally oppose a due medical regulation of temperature. Prejudices of relations will often interfere with the use of any vigorous means for its diminution; and their indolence or parsimony, or a disposition to shrink from any plans requiring extraordinary exertion or the trial of unusual agents, will often oppose, with equal effect, the adoption of well regulated measures for its increase. No college, as has been observed by our Author, has yet imposed upon the apothecary, the addition of an ice-house as a necessary appendage to his shop; yet, in many forms of disease, ice would deserve to be classed with the most active agents of the materia medica; and on the other hand, although few of our apartments are in any respect calculated for winter retreats for the consumptive, any proposition advising the necessary alterations with a view to adapt them to

such a purpose, has frequently been received with repugnance; and the torpor of the patient combined with this repugnance, has effectually prevented its adoption.

The cases which the Author has collected in the present volume, exhibit decided proofs of the advantages resulting from steadily maintaining an uniform temperature. The means which were made use of to secure this uniformity were various. One consisted in placing the patient in an apartment with cows. The heat and exhalation of these animals, soon raised the temperature of the apartment to a genial point; at which it was steadily maintained, without much difficulty, by the occasional assistance of a stove. The idea of lodging a patient with these animals met, in some instances with serious opposition, and in many more with ridicule. Upon some occasions the impertinent interference of ignorance and prejudice, led to the adoption of a conduct almost brutal. Yet the plan appears to have been strikingly beneficial. One case is related at large: It is that of Mrs. Finch, a daughter of Dr. Priestley, who, though apparently in almost the last stage of consumption, and exhausted by sleepless nights and almost incessant coughing, found every symptom alleviated on the second night after entering the cow-house, and enjoyed a tranquil sleep, to which she had been for some months a stranger. Other cases appear to have been attended with similar results. It is not easy to ascertain, with precision, the mode in which these salutary effects were produced. In many instances they probably depended upon uniform elevation of temperature only; but in Mrs. Finch's case, there appeared to be something specific in the exhalations to which she was exposed. For in two instances, in which it was necessary for her to quit the apartment and exchange it for another, she found her nights more feverish, and the perspirations which had been long suspended return; although the temperature was steadily kept up to a higher point than that of

the apartment which she had quitted. Experiments however seem wanting, to determine whether this would be a general consequence, or whether, in her case, it depended upon particular idiosyncrasy. It appears that in some subsequent cases, an uniformly high temperature was found nearly equally beneficial. Dr. Beddoes is himself strongly disposed to attribute the effects to this cause and to the alkaline exhaltations only; and these, he observes, could be artificially imitated and introduced into apartments properly heated, without the presence of the cows. This plan would combine with it the additional advantage of removing them whenever their effects were in any degree noxious; which they were suspected of being in some instances. These vapours are supposed by the Author to act in a mode analogous to the gaseous remedies. What way is there he asks "upon which we can depend, of making application to pulmonary ulcers, but that, which gasses or vapours offer to us?"

One remarkable effect of this steadily elevated temperature deserves to be particularly noticed. None of the attendants, as far as was known, took cold; and the patients were much less sensible to the chill of the atmosphere, upon quitting the heated apartment, than they would have been, under ordinary circumstances. It is generally apprehended, and the belief appears to be well founded, that a healthy West Indian resists the cold of his first winter in Europe, better than the natives themselves. The difference between the effects of a transitory and a permanent immersion in a heated atmosphere, is one of the most interesting points, connected with the subject of temperature; the former appears to render the system more susceptible of the action of cold; the latter to render it, for a certain time, at least, insensible to its influence.

It should be remarked that, while he thus suggests the necessity of protecting the phthisical patient from the hazards of a reduced temperature, he is not less attentive to point out the modes of re-

straining its excess. It is too common a practice to permit the hectic paroxysm to hold its course unchecked; and the increased heat which accompanies it, is often highly injurious and exhausting to the patient. The Doctor advises that this increased heat should, in some cases, be combated by the affusion of cold water; in others by administering draughts of cold water, or effervescing mixtures, or small quantities of ice. In many instances, one or two tea-spoonfuls of this last remedy will be found sufficient to moderate the heat; a larger quantity may endanger a chill. The effect of taking cold jelly and suffering it to dissolve slowly in the mouth is nearly similar. On the other hand, in the first accession of the chills and torpor preceding the hectic paroxysm, he recommends the exhibition of hot water, with spice, and opiates. By this means the morbid trains of action may be arrested; and although such a plan should not produce an entire suspension of the paroxysm, it will at least, materially diminish its violence.

The next division of his work is assigned to digitalis and contains a number of interesting cases treated by that medicine. The saturated tincture was the form in which it was most commonly exhibited. From these cases many important practical conclusions may be drawn. The variable power of the medicine under different circumstances, merits particular attention. In some instances, the system was sensibly affected by a dose of a single drop; in others fifty were taken without producing any effect, that might not justly be referred to the spirituous vehicle in which it was contained. Another point worthy of observation is, that in some instances where the medicine, when administered alone, appeared inert, its specific effects were very soon detected upon combining it with some other articles.[3d] Of these combinations the Author has given some forms.

3d A case strikingly illustrative of this principle may be seen in the Medical and Physical Journal, Vol. IX. p. 263. A medical man is here the historian of his own case, which

Simplicity is in most cases, and eminently in prescription, the One and the Good. It cannot however be denied that combinations have often produced effects, which would in vain have been looked for from the successive exhibition of their component parts, however sedulously persisted in; and something like a vindication of the occasional adoption of a more compound system of prescription, may be found in the multiplied ingredients which nature has assembled in the composition of many mineral waters. Another important practical observation is that the incipient effects of digitalis upon the system may often be detected by varying the position of the patient. Thus, an intermission in the pulse will frequently be discovered in the recumbent posture, which may be imperceptible when the patient is either sitting or standing up.

At the beginning of the present treatise, the Author has made a few observations upon the frequency with which his former remarks upon this plant were quoted. It is not often that he has condescended to notice objections; here however, lest his ideas should be misconstrued, or his authority misapplied, he states his opinion of its value in more precise terms. He combats the idea that two distinct species of pulmonary disease exist, which have certain symptoms in common, and have hitherto been confounded under the name of *Phthisis Pulmonalis*. Those who have been disposed to question the efficacy of digitalis have maintained that it succeeds in one of these states only, and not in true phthisis; but this opinion is declared to be wholly destitute of foundation.

From the important practical views here exhibited, the Doctor passes on to a disquisition more theoretical; and attempts to investigate the

had been successfully treated by Doctor Beddoes. Seventy-five drops of the tincture of digitalis alone, had been taken for some time, without effect; but less than half that quantity combined with tincture of opium, columbo, and squills, produced its specific action upon the arterial system at the end of five days.

mode in which digitalis operates. His ideas on this subject will not, it may be presumed, meet with very general assent. Contrary to the prevailing opinion which places digitalis among the class of sedatives, he contends that it is a stimulant; and observes that "if he were to exhibit the materia medica upon a map, he should represent digitalis as not merely touching upon opium, but bordering upon it for some space. In another part, it should be contiguous to the vegetable tonics or bitters." The following is a summary of the arguments which he advances in support of this opinion. First, in its primary operation, it increases the arterial action; whether administered in large or in small doses. In the former case, it is succeeded by exhaustion, but in more moderate doses it may be so managed as to produce steady excitement in that system, without any succeeding debility. Secondly, in cases of Dyspepsia, it will, if judiciously administered, act as a stomachic and tonic. Thirdly, like opium an excessive dose of it produces languor, and excessive sensibility, head ach, dimness of vision, nausea, and bilious vomiting. Fourthly, its effects upon frogs (as was proved by a variety of experiments conducted by Mr. King,) are analogous to those of opium; and lastly, like opium it often induces sleep.

The disputes whether certain medicines are to be referred to the class of stimulants or sedatives, have, not unfrequently, partaken of somewhat of that obscurity which involves metaphysical disquisitions; and this obscurity has arisen from the same source, a want of precision in the meaning affixed to certain terms. Perhaps, strictly speaking, every article of the materia medica, upon its first reception into the stomach, acts as a stimulant; we can scarcely doubt that such must be the primary effect of tartarised antimony, jalap, and calomel. We know that the latter, in particular, acts as a powerful stimulus to the arterial, and through that medium to the glandular and lymphatic system; and if its action be watched, a dose of it will

often appear, for a while, to increase those very irritations which it is intended to relieve. But how soon are these effects over-balanced by the succeeding evacuations, and therefore, we do not hesitate to administer this or the preceding articles in inflammatory diseases; or, in other words, under circumstances where excitement is already excessive.

The opinion, however, that the primary operation of digitalis is stimulating, has not been without other advocates. It was early contended for by the more zealous partizans of the Brunnonian system. I well remember its being maintained in the winter of 1793, in the Royal Medical Society of Edinburgh; and it has recently been strenuously supported by Dr. Saunders in his treatise on consumption. The weight of testimony and experience, however, is certainly in favor of its being a sedative remedy. That in one period of its operation it greatly reduces the frequency of the arterial action cannot be denied. If therefore, it should appear to exert for a time a stimulant power, it would seem that the period of excitement is so exceedingly evanescent, that it is scarcely worth taking into the account. And even in the few instances in which it seems to fail in producing the desired effect, and its stimulant properties appear more permanent; a little attention to the patient would perhaps, in general, enable us to account for the existing excitement from some internal source of irritation, without recurring to the agency of the remedy.

In an experimental inaugural Essay on Digitalis printed in Philadelphia in the year 1800, the Author maintains its primary stimulant operation upon the arterial system; but he never questions the fact that its secondary operation is the reverse. His experiments and cases alike establish this point. In eight successive trials which are detailed at large, the results are as follow. The frequency of the pulse was in one instance increased twelve, in another eight, in another four, and in four others, six strokes in a minute. The increased quickness never extended much beyond one hour from the time of swallowing the medicine; and at the end of two, some reduction was, in general, observed below the original standard. In the eighth experiment, where the habitual standard of the pulse was said to be ninety, the medicine reduced the frequency of the pulsations without any previous increase. At the expiration of two hours it had fallen twenty strokes; at which point it remained for another half hour, when the observations of the essayist terminated. These experiments were made in a very unexceptionable form. The subjects of them were all in good health, and the medicine was administered in the form of powder, without any addition except a little water. The doses were moderate; in general, only three grains; but it is worthy of remark that, in the instance in which no increase of the arterial action took place, the quantity had been doubled.

It cannot be questioned that digitalis is a powerful stimulant to the absorbent system; but it does not follow that it should exert a similar effect upon the other systems of the body. This cannot be determined, till we know with more accuracy, how far the actions of certain systems may be associated together; and whether these associations manifest themselves by a direct or reverse sympathy. We know that a full dose of tartarized antimony, though soon after taking it, it evidently diminishes the arterial action, and produces in the whole alimentary canal the most distressing debility and exhaustion, may so stimulate the absorbent system, that effusions of various kinds will rapidly disappear. Cases of this sort are sufficiently numerous. Mr. Cruickshanks, in a letter to Mr. Clare, mentions one of a large swelling of the knee, from a morbid collection of the synovia, which was cured in forty-eight hours, by the vomiting excited by a large dose of tartarised antimony taken, by mistake, for soluble tartar. A very little reading would furnish a multitude of similar examples.

The anodyne effects of digitalis can scarcely have escaped the notice of any one who has been in the habit of administering it; but it is by no means clear that its mode of operation is similar to that of opium; on the contrary, it has always appeared to me to have exerted such effects precisely in those cases, where, from an excess of arterial action, opium would have been inadmissible. When the general excitement of the system has for a while banished sleep, I have repeatedly seen digitalis still the tumult and lull it into quiet. Under such circumstances we may have often witnessed similar effects produced by the abstraction of a few ounces of blood; but surely, we do not, on this account, consider the effects of the lancet as in any way similar to those of opium.

Upon the whole, it appears, that the utmost that can be conceded to the advocates for the stimulant powers of digitalis is, that for a time it may increase arterial action; but this period is so short that it does not forbid its exhibition in diseases of high excitement. At the same time it is not contended that it ought, in such cases, to be relied on alone, although it deserves to be considered as a powerful auxiliary.

The third division of the volume under notice treats of the cure of scrophula, and contains the history of a variety of cases successfully treated by muriate of lime. They are related with a view to solicit the attention of the medical world to a remedy at that period unknown in England. To the end of Dr. Beddoes's life, this continued to be a favourite remedy. Some further notice will be taken of it when we come to the history of the Medical Preventive Institution.

An appendix, containing a report, by Dr. Kinglake, of a number of cases of pulmonary affection, treated by him with digitalis; some considerations from the Doctor's own pen upon the propriety of using caustics in certain states of phthisis; and some further particulars relative to the cases communicated upon his own authority, close this interesting volume. So great a portion of it is purely practical, that, whatever be the opinion of the professional reader upon the reasonings contained in it, he can scarcely fail to derive much valuable instruction from its perusal.

This publication had not long issued from the press, before Dr. Beddoes announced his intention of commencing a series of Essays on the subject of popular medicine; and such was his activity, that the first number was published before the close of the year. He had, more than once, upon previous occasions, given notice of intended publications upon a variety of subjects, which subsequent reflection or want of sufficient leisure induced him to abandon. In his "Notice of experiments at the Pneumatic Institution," *Researches concerning Nature and Man*, are thus announced. This was probably designed to be the title of his physiological work; to which other allusions appear to refer in the short note which has been extracted from Mr. Davy's experimental treatise upon nitrous oxyd. Perhaps, some scattered features of this, as well as of some other projected works, may be traced in the later numbers of these Essays; which appear to be the most valuable, as they are the most voluminous, of all his publications.

The Essays alluded to appeared under the title of Hygëia, and extended to eleven numbers, one of which was published every month. The plan upon which they were written professed to be entirely popular; and, with some few exceptions, they fully merited that title. In a prospectus which was circulated a few weeks before their commencement, and in the advertisement prefixed to the first Essay, the Author explains in a few words the nature of his undertaking; and laments the "*pre-occupation*" which exists even in minds in other respects well cultivated, upon the subject of health. This idea appears to have deeply and habitually impressed his mind, and

is afterwards more amply insisted on in the Essay itself. The inconclusive reasoning with which men otherwise of strong mental powers content themselves, when medical subjects are under consideration, was one of those multiplied evils which he proposed to remedy by the more general diffusion of the elements of physiological and pathological knowledge.

The first Essay is on "Personal Prudence, and on prejudices respecting health." The former division of the subject naturally suggests the contrast between the copious and careful instruction which is so generally imparted where worldly prudence is the object in view, and the scantiness and even total absence of information or advice in those more important points in which health is concerned. By an easy transition, he is led to allude to those effects of disease which not unfrequently interfere directly even with the worldly prosperity of the sufferer, by depriving him of the powers necessary for certain occupations, or rendering his external appearance an object of disgust. Without any sickly affectation of sentiment, the benevolence of the Author here breaks out into an animated refutation of the opinion so frequently entertained, that there exists some sort of necessary connection between deformity of body and unhappiness of temper. He proves that where it does exist, the irritation has originally arisen from subjection to insult, rather than from envy. "Wherever young persons," he observes, "who have unwarily been suffered to deviate into crookedness of growth, are kindly treated, they do not, I am sure, yield in temper any more than in talents to those of more erect figure." For the correction of the feelings of disgust, excited by objects thus unfortunate, and especially for the complete suppression of every gesture or expression of countenance which "degrades it into a mirrour where such defects are reproachfully reflected," he looks to the more general diffusion of the knowledge of our common nature.

This leads him to insist upon his favorite topic; that the basis of this knowledge must be founded in anatomy; and he adverts to the popular course which had been delivered with such success in Bristol.

He proceeds to state some of the gross popular errors which prevail upon medical subjects. Of some of the more absurd he traces the origin. He combats one obvious and strong objection to the more general withdrawing of the veil from the numerous "ills which flesh is heir to" founded upon the gloom and anxiety which such a view would naturally excite, by remarking that according to the precepts even of criticism, indistinctness of image is the great source of terror; and that an evil which is steadily contemplated becomes soon disarmed of half its powers of alarm.

To the universal want of information as to the delicacy of the human structure and the ease with which permanent mischief is inflicted upon some of its more important organs, he attributes the injuries which are thoughtlessly inflicted by boys, upon one another, in our public schools; and which are insufficiently, if at all, guarded against by the master. The instances, however, which he has selected, are, unfortunately, too common to large schools in general. In almost all of them, "danger, in a multitude of forms, lurks about the puny and the young." The blow from a stouter companion, which "after a lapse of many months, perhaps even of years, progressively terminates in blindness, or in pains increasing with age, and rendering life uncomfortable," is inflicted in many a situation, where the more obvious advantages of our public schools, the attainment of profound classical erudition and the opportunity of forming splendid connections, are alike wanting. Had the Author adverted to the cruelties inseparable from the system of fagging, even his eloquence would have scarcely been adequate to the ex-

hibition of the subject in its full deformity.[3e] The propensity to these acts of tyranny and cruelty would, in the opinion of the Author, be effectually restrained by an explanation of the manner in which the most fatal accidents sometimes happen; and by well-chosen facts which should give "minutely but without exaggeration" the history of such accidents. These, he recommends, should be printed, and "supply the place of prohibited or permitted fictions;" and from associations thus early formed, he anticipates the future growth of benevolent affections, which "should spread from family to family, and prompt to infinite acts of kindness." That these associations might not be checked in their growth, he offers a strong objection to the infliction, or at least the public infliction, of any corporal punishment. He deprecates it, from that propensity to imitation, which is a prominent feature in our species at all ages, but is particularly so in childhood and youth. To any person who reflects upon the laws of the human mind, this argument will appear sufficiently forcible to deserve to be maturely weighed. *Maxima debetur pueris reverentia* is a rule of far more extensive application in the education of youth, than may be, at first sight, apprehended.

One objection more may present itself to the extension of the knowledge of the various noxious agents which may incidentally destroy the enjoyment of existence. And this is, that the apprehension of perpetual evil may enervate the mind and extinguish every generous energy. To this he observes in reply that a knowledge of the deleterious effects of certain poisonous substances has

3e In addition to the instances to which he alludes of the tyrannical stronger companion compelling the weaker to warm his bed with his body; the little trembling fag has in some instances been compelled, in the depth of winter, to hold his master's feet in his lap, till they have acquired a comfortable temperature.

been attended with no evil of this kind, but with evident advantage; nor should dissimilar results be expected from a knowledge of those agents which, though not inrolled directly in the catalogue of poisons, produce similar effects. "Lead," says he, does but occasion palsy; and whatever destroys activity and enjoyment, produces palsy too, of the worst species."

Notwithstanding these cautions, he by no means inculcates that slavery which is called "living by rule." On the contrary, he earnestly deprecates it. "Those," he observes, who act upon such a system, are not found, when examined, to be amongst the persons whom "prudential care set out in life, with the knowledge of good and evil." They are, more generally, "drooping and blighted creatures; frequently half insane from regret and remorse; with whom the past is a scar and the present a sore; sensible only in the gross, from what quarter have issued the darts with which they have been stricken; and so wild with fear, that they hear the wing of the angel of death, in the rustling of the gentlest gale of heaven."

The Essay concludes with an appeal which must come home to the bosom of every parent, who is anxious to have his declining years soothed by such filial cares as shall not spring from a modification of instinct alone; but from a deep consciousness of obligation for the greatest of earthly blessings, a sound mind in a sound body.

The subject of the second Essay is "Personal Imprudence active and passive, the incentives to it, its effects and usual origin." It commences with some satirical reflections on the mischievous interference of that tribe of unlicenced practitioners, generally of the female sex, familiarly known by the name of gossips; who without faculties to comprehend the laws of the human system, even if they had attempted to study them, force upon their friends some infallible recipe, for any disorder with which they may be afflicted. Of the most innocent of these compositions it can only be said that they may

occasionally do no harm. But to secure even this negative praise, the disease in which they are administered must be a slight one. In a dangerous seizure, the time which is lost in waiting for the effects of one of these harmless preparations, may render its final consequences fatal as those of laurel water. They may "arrest the rescuing hand, till the silent but progressive finger of Fate, move from TIME IS, to TIME IS NO MORE." These topics are enforced by a great variety of illustrations, sometimes seriously censuring the lurking vanity of these self taught practitioners; at others, presenting a variety of sketches of their plans and conduct, strikingly characteristic and often highly humourous. It would be difficult indeed to contemplate their busy folly without a smile, were it not frequently productive of the most mischievous effects. It is stated as particularly worthy of remark, that the interference of these volunteer practitioners is almost uniformly confined to the medical province alone. Were one of them to produce her case of instruments, it is doubted whether even the politeness due to the sex would induce submission to any surgical operation, though it were only proposed to open a vein: yet the tools of the physician are not less keen than those of the surgeon; but a simple reason will explain the difference; their operation is secret. If it be contended that in the present day, at least, these good ladies are much less frequently suffered to recommend their infallible recipes, than they were formerly; their vanity is equally gratified, and their ignorance proves equally murderous, in another way. At every watering or bathing-place there is always a knot of these dowagers, who hold the balance of medical reputation in their hands, and obtrude their favorite, against whose real ability the very circumstance of his being a favorite with such beings affords a strong presumption, upon every unfortunate visitor whom they can attract within the sphere of their influence. In a work which will be hereafter noticed

he has the following remark upon this subject. "These beings never, I think, undertake to dry nurse the reputation of Lawyers. Were the very persons whose advice so often prevails where life is at stake, to hazard an opinion upon any question involving five pounds worth of property, they would hardly gain so much notice as a glance of contempt."

Our Author adverts next to the multiplied evils which spring from the circulation of domestic treatises on medicine. What, he asks, would be the probable result, were a person to attempt to make a pair of shoes, by the help of a treatise on domestic shoemaking? How would the materials be slashed and hacked, and what would be the sufferings of the individual compelled to wear shoes thus made. Yet unless the properties of the human body be less complicated than those of leather, or it be more easy to employ properly the articles of the materia medica than the tools of the shoemaker's bench, the volunteer shoemaker's efforts would stand the best chance of success.

He proceeds to lay down a distinction between those writings which warn against the destruction of health, and those which pretend to teach people to restore it. "To direct a stranger how to traverse slippery ground without injury is one thing; to instruct him how to set his leg should he break it, is quite another." As this was a point which the Author laboured upon more than one occasion, and as general instruction in preventive medicine has been particularly attacked, from either voluntary or involuntary incapacity in making the distinction, I hope I shall be excused for citing an additional illustration from a subsequent work. "People in common circumstances, do and must manage for themselves and for their children, in the *preservation* of health. In regard to its restoration, the necessity by no means exists to the same extent, or, what is equivalent, it is not felt. The distinction cannot, I suppose, be

stated in terms to silence quibbles; as it seldom can, in practical concerns regulated by probabilities. But *preservation* principally respects the management of diet and exercise; *restoration* the use of drugs."—*Manual of Health*, p. 32. "I may be capable," he elsewhere observes, "of pointing out to a child the deadly nightshade, although, if he have been tempted by its berries, I may be unacquainted with an antidote to the poison. This idea," he continues, "will help us on a good way, although in every case I may not be able to draw the precise line, at which the good offices of the unprofessional must cease."

He proceeds next to advert to the confused ideas generally entertained with regard to the effects of poisons and medicines; articles which according to their respective exhibition may often change their relative situation; and to that unreasonable folly which objects to particular medical agents of approved efficacy, because they may, in some individual instance within the objector's knowledge, have, perhaps, done harm. Dismissing this part of his subject he next inculcates the necessity of forecast; of that deliberate estimate of consequences which will enable the calculator to pursue with persevering steadiness, means which conduct to an end at present far distant from his grasp. He compares the infatuation of the votaries of fashion with that of certain savage tribes, who barter, without reflection, their most valuable commodities for a worthless bauble; and traces with a glowing pencil the abject slavery in which she holds her worshippers; a slavery but little differing in its ultimate effects, from that of the humble manufacturer, who, at the expence of his health, contributes to the decoration of the fair victims who are led for sacrifice to her shrine. In these effects, physical and moral mischief are equally combined.

After a picture of a mass of evil, terrifying it is true, but to the eye of steady reflection not overcharged, he proceeds to point out

the remedy. It consists in inculcating upon the minds of youth a religious, a sacred reverence for health: in establishing such associations in their minds, as may perpetually suggest to their recollection "the laws by which the Creator has attached certain punishments to certain crimes against self." Of those laws, he elsewhere remarks that ignorance, still more certainly than in merely human institutions, is no excuse for the violation and no screen from the punishment. In fact, it might be easy to prove that this "self-reverence," if assiduously cultivated, would be only a refined system of epicurism; if the term had not been so misapplied from gross misapprehension of the doctrines of its founder.[3f] It would tend to preserve the senses unblunted and perpetually awake to the perception of enjoyment. "Tricks," he observes, "that decoy for the moment, we may leave to the juggler, the mountebank, and the fanatic. We need but be perspicuous and impressive. If no crowds drunk with enthusiasm reel to our standard, converts will incessantly come over with deliberate speed. We are the apostles of a faith, among whose disciples there will never be found one apostate. We aim at the gratification of every heart. We teach but the fulfilment of universal desire. How all may dwell in the gardens of pleasure with least hazard of being stung by scorpions that lie hid in their bowers, or being cut off by poisons that mimic their fruits."

The third Essay examines the situation of the individuals composing the affluent and easy classes of Great Britain. It commences with a section on British Characteristics, in which the Author pours forth a tribute of well deserved praise to his native country; and draws a parallel between Britain and Athens. This tribute is distinctive and appropriate; it is not one of those vague

3f See Enfield's History of Philosophy, Vol. I. p. 448, 449.

eulogies which deal only in generals; and it shews that however opposed its author might be to a particular set of men who administered the national concerns of his country, he was not insensible to the proud distinction of having been born a Briton. But after enumerating her splendid successes in the fields of science and philosophy, he pauses to inquire what has been the improvement of health and comfort effected by these successes. And here a gloom is thrown over the scene, and the brilliancy of its colours begins to fade. He combats the position that national manners act, in the first instance, upon national fortune; an error which cast into premature oblivion an ingenious estimate of the times written in the middle of the last century.[3g] Their first effects are produced upon individuals; and in conformity to this view of the subject, he proceeds to trace the operation of the existing manners upon various classes of these individuals. The first that passes under review, is that numerous body of young females who are educated in boarding schools. His observations on this head are the result of numerous inquiries with respect to food, fuel, exercise and cloathing. The mass of suffering of which these inquiries elicited the information, is probably but little suspected; more especially at a period, when all seminaries of education are presumed to be conducted upon principles far more liberal than formerly.

The first deficiency in the system of these seminaries, upon which he enlarges, is that of temperature. Of this deficiency, he thinks that the great prevalence of chilblains among boarding-school girls, often appearing for the first time upon their removal from the paternal roof, is nearly an infallible criterion; "and a certain mark in the puny or delicate of impending mischief." The second is that of

3g Adverting to the calamity which befel the Author of this work, he eloquently remarks that the "intellectual eye is often unusually illuminated before it is dazzled."

meals; which are often deficient in quantity,[3h] or unsavoury in their preparation; and in almost every instance are protracted to intervals far too long. The first medical philosopher of America, Dr. Rush, was accustomed to observe, as a familiar illustration of the injury resulting from long inanition, that "the stomach was like an idle school-boy; while it had nothing else to do, it was doing mischief." Indeed, the evils resulting from too long intervals between meals, can be unknown to few in the present period, when the time of dining is postponed to so late an hour; and its effects may not improbably be traced in the increasing variety and obstinacy of stomach complaints. A more frequent and a more cordial meal would be particularly important in these seminaries; as it would enable the system, to a considerable extent, to resist the consequences of diminished temperature. This law of the animal economy extends to inferior orders of animated beings. Thus, horses are observed to require less food in a warm, than in a cold stable.

The Author devotes a separate section to the article of tea. He begins by considering its exhilarating and, in some instances, intoxicating qualities, and the pernicious effects which, in consequence of these qualities, it produces upon the nervous system. He sanctions his opinion by the respectable authorities of Whytt and Murray. Probably few nervous patients will be disposed to question its exhilarating and cordial effects in the first instance, or the languor and sinking of the stomach, the giddiness and watchfulness, by which these are often succeeded. From the rapidity with which its stimulating effects are produced, and the debility which follows,

3h In a subsequent Essay, it is stated upon the information of one of the parties concerned, that in a certain seminary, an elegant delicacy of appetite had been so successfully inculcated, not by actually professed limitation, but by the fear of ridicule, that forty girls were fed for two days on a single leg of mutton.

it appears to have an unquestionable right to be classed among the diffusible stimuli; and if this be its proper situation, the momentary excitement caused by it must be compensated by a proportionable subsequent degree of exhaustion. From these considerations it is obvious that "tea must affect the irritable habit of children too violently to form a proper part of their daily diet." For the same reason, it should seem that it should be equally avoided by the more irritable and nervous classes, though of more advanced years. "How far in some particular instances they may suit the sickly," says our Author, "is a question foreign to these essays; though it is certain, that by the habitual use of tea and the products of the vinous fermentation, we unwisely deprive ourselves of remedies as precious as fox-glove and opium."

From the subject of tea, he proceeds to that of exercise; the neglect or abuse of which, affords an ample topic of discussion. He pleads with earnestness for its more extensive adoption among the inhabitants of female boarding-schools; whose walks are too generally of so constrained a cast, that they probably tend rather to injure than to do any service. The end of salutary exercise is not answered by those solemn processions, from the line of which no individual dares to depart, and which are often protracted to a dangerous extent, beneath an atmosphere, the chilling influence of which, the exertion made use of is by no means adequate to repel.

The important article of cloathing constitutes the subject of the next section. In this he inculcates a due degree of attention to the substance, as well as to the form of the materials of which it is composed.[31] He particularly deprecates the use of tight stays, and other

[31] We have a law, I believe, which enjoins that all bodies shall be buried in woollen. With all submission to the woollen manufacturers, it was foolish to provide for cloathing the dead in their graves. It is the same to them, whether they be clad in woollen or in cotton. If any provision were to be made, it should have been for the living; to whom what they wear, may easily make the difference between health and disease. But in such cases, putting the thing plain before people's good sense, is better than pretending to force compliance by Acts of Parliament.—*(Note from one of Dr. Beddoes's Common-place Books.)*

ligatures; from the irreparable injury which they often inflict upon the structure of the internal organs. He expresses an apprehension "that the ancient plan of severe constriction too often lurks below the Grecian flow of the external habit." Since the date of this Essay some attempts have been made to revive it with almost all its ancient horrors: compressing the bust into the form of an inverted cone, and presenting an outline alike offensive to classic taste, to health, and to genuine beauty. In this section he alludes to his intended work upon physiology; and among other topics, promises that it should comprehend a minute detail of the effects of various articles of dress upon different parts of the human body, illustrated by engravings, which were to be furnished by Mr. King; a promise which can only increase our regret, that this extensive design was never executed.

From cloathing, he proceeds to the investigation of a variety of other points connected with female education. He complains of the injury that must be done both to the bodily and mental powers, by the number of masters, which, in the more fashionable seminaries in particular, are employed in uninterrupted succession, to overpower the young victim by instructing her in the accomplishments which they respectively profess. To music, in particular, he offers strong objections. For many months it is a severe study; and when its first difficulties are mastered, and its fascinating effects begin to be felt, it is not less dangerous because it has changed its form. Under both views, it is highly objectionable; because it adds to the disposition for sedentary amusements and passive pleasures, in those, with whom every occupation is already sedentary, and every pleasure passive. Thus various are the causes which, in

his apprehension, assail the health of the inhabitant of female seminaries of education. He proceeds in a subsequent section, to question the reality of some of the advantages generally ascribed to these situations; such as, their being favourable to the awakening of emulation, and to the formation of friendships: but, towards the close of his Essay, feeling and acknowledging the necessity of some institutions of the kind, for the children of those who have neither the power nor the ability to communicate instruction themselves; he proceeds to lay down a plan for the conduct of such a seminary, in the highest degree excellent and judicious. He thus escapes the censure so generally thrown upon all projects at reformation, that they destroy or deface what already exists, but give us nothing in its room. The whole of the remarks in this Essay, upon the treatment both bodily and mental of the youthful female, merit the profoundest attention from every individual, who undertakes the important task of superintending her education; and of the parent, before so precious a charge is entrusted to the care of another. In some instances, the Author may, perhaps, be accused of giving to his subject a vividness of colouring which exceeds the truth of nature; and in the fervour of imagination, kindled by intense meditation upon one subject, to have conjured up a host of ideal evils. But although the censure may in some instances fall pointless, and although it cannot in justice be denied that there are schools where the moral and the physical faculties receive a culture alike salutary, and are fostered alike to healthful energy; candour would perhaps acquit the inquirer, who should contemplate those seminaries which are resorted to as the chosen hotbeds of fashionable tuition, as the grand engines of the physical and mental degradation of the female world.

From school our Author traces the youthful female during her entrance into life; and laments that the powers which act during

this period, are, if possible, still more unfavourable than those already enumerated. "It is now," he observes, "that the victims which Pædia had prepared, are sacrificed in countless numbers at the altar of Fashion. The monuments of antiquity generally exhibit some struggle on the part of the animal before he bleeds. But in the victims of Fashion, there is either greater thoughtlessness, or greater indifference to their fate."

Fashionable dress is first noticed under this division of his subject: and he here adverts to the obvious absurdity and danger of muffling up the person to the ears and chin in the morning, and exposing it half naked in the evening, to brave disease and death. He accuses these prevailing errors in female dress, of producing ravages in families, to an extent equal to the operation of war or of pestilence. From the dress of young females, he proceeds to consider the nature of their pursuits and occupations. Novel-reading is particularly condemned. The moralist and the metaphysician have long since traced the injurious consequences produced upon the mind, by an excessive devotion to this species of literature; but it is not so generally known to be as pernicious to bodily as to mental health.[3k] By a succession of melting love tales, of false pictures of human life, and of scenes of fictitious woe, both are alike impaired. The languid

[3k] Amongst the evils excited by fictitious narratives that powerfully affect the passions, the author might have included the effects produced by one species of theatrical exhibitions. Were the votaries of fashion more generally attentive to "the cunning of the scene," there can be no doubt that many nervous subjects would be essentially injured by witnessing the high-wrought scenes of distress in a well acted tragedy. By a wise and beneficent law of our nature, the contemplation of that distress which we are engaged in efforts to relieve, excites no injurious tumult in the system. Such is the reward assigned to active benevolence. But in witnessing scenes of distress, where the mind remains entirely passive, and resigns itself, without effort, to the indulgence of melancholy feelings, these feelings recoil upon the spectator's own bosom; and shake the frame, especially in those instances where natural sensibility has been cherished rather than regulated, to its very centre.

inactivity of many of their other amusements; the late hours; the neglect of all exercise beyond the passive one of going from a heated apartment into a close carriage; all conspire to accelerate that enervating process, which, in no long time, destroys the pleasurable feeling of existence, and invites, in many a varied form, distress and disease.

After thus tracing the pernicious consequences and wide-wasting effects of fashionable manners, he concludes his third essay with assuming a still graver tone. He again insists upon the efficacy of that species of moral instruction, which should combine with it medical information; and which should by facts, and not by mere reasoning or precept, shew how deeply certain immoral practices affect the sensations and existence, not only of the individual who commits them, but of others also. In his treatise on consumption, he had before remarked that "in comparing the manufacture of many articles of luxury with their destination, it would appear as if there existed a solemn compact, in virtue of which, one set of persons had engaged to destroy their health in making, what another set should destroy their health in wearing." He here alludes to those melancholy groups of human beings, whose health is irreparably ruined, and whose existence is in a great majority of instances, shortened, by the incessant pursuit of unhealthy and sedentary occupations. In another of his treatises he has adverted to this subject and presented it under another light. "A comparative view of high life with low," he remarks "would convince us that there is no occasion to cross the Atlantic, for examples of misery to melt over. Sugar is not the only luxury moistened with human tears, or spotted with human blood. Let the dress and equipage of a birth-day lady be analysed. Let the processes, by which they have been wrought into splendour, be brought before the imagination. Give an unexaggerated representation of the dispositions contracted in our crouded manufactories—the savage debauchery of the men—the loss of every semblance of feminine modesty in the women—the initiation of the children in the nomenclature and theory of vices they are physically incapable of practising—the irreclaimable depravity of all. Beside this disgustful and afflicting picture, place the scene in which the workmanship of ten thousand labourers of luxury comes into use, and it will require no oracle to pronounce, whether the consumer gains what the artificer loses in happiness.... A course of lectures upon the bodies of only ten young people murdered by the preparation of the articles of luxury, and of ten others murdered by the use of those articles, might more improve the present age in its individual and relative capacities, than all the elementary treatises of morality that have ever been composed."

The review of the state of the individuals composing our affluent and easy classes, is continued in the fourth Essay, which is principally devoted to the subject of boys' schools. Some of the causes which operate injuriously upon the younger part of the male sex, are similar to those which have been already pointed out in the review of female seminaries; but others belong specifically to boys' schools alone. His first topic is sedentary confinement. The origin of the lengthened hours which in most of our academical institutions, those of a more public kind especially, are past in this manner, he attributes to monastic regulations; and observes that the effects of these regulations upon the present generation, are still more deleterious than they were in former periods. Instruction is thus rendered irksome to the boy, and from association of ideas, the objects of his studies are often converted into sources of permanent disgust. To this forced compression upon the natural elasticity of the youthful mind, he attributes that extravagant pursuit of amusement in the more vigorous, which breaks out too often into destructive and injurious irregularities, or actual violence and outrage; and that torpor and

inactivity in those of a more delicate frame, which have been already stated to be produced by similar circumstances in girls. Nor is this the only evil. The vexation and depression caused by lessons thus accompanied, often lays the foundation of future misery and disease; and the habits of feeling induced, embitter the later seasons of life. There are not wanting proofs, almost without number, of the ease with which forcible impressions early made upon the nerves, recur after a long interval. Nor do these helpless victims suffer from lengthened confinement alone. Other evils are superadded, from the comfortless nature of the scene of that confinement. They are sometimes assembled in large apartments, open almost to all the winds of Heaven, and insufficiently warmed, or even destitute altogether of a fire-place. "Children of both sexes will endure cold to a very injurious degree," says our Author, "without effort or complaint, when they are cut off from play; and it particularly deserves notice, that the children most liable to injury from cold, are precisely those who sit most quiet, when they are intensely affected by it." What lasting mischief must be inflicted by these causes upon the more delicate children of modern times, is sufficiently obvious. At the period when our public institutions were originally founded, "all the habits of mankind were more rugged. There was nothing like that contrast of tenderness and severity, which, at present, exists between school and home. Boys accustomed to apartments with cold floors, loose doors and windows, and walls which did not exclude the most cutting breezes of the sky, made scarce a perceptible transition when they assembled in the school-room."

Another important difference may be found in the general substitution of linen and cotton, for woollen, in our articles of dress. A constitution already inferior in its power of resisting the chill of apartments not at all, or at any rate, very insufficiently heated, receives an additional shock from the want of that protection, which the coarser and warmer cloathing of our ancestors afforded.

But the catalogue of injuries to which boys are exposed, is yet far from its termination. The sufferings of the younger and more timid from brute violence, on which some observations were previously offered in the first Essay, (see page 195) are again earnestly insisted upon. The advantages of the experience acquired in large schools, are shewn to be, in many instances, very questionable, and in all, to be over-rated: and these are more than overbalanced by the various injurious practices into which their inhabitants rush headlong, from the contagion of evil example, and from the very imperfect knowledge, or the absolute ignorance, of the consequences of their actions. In fact, he affirms that, from the repulsive nature of their studies, or the uninteresting manner in which they are communicated, they are "disgusted into neglect of health." Debts are often contracted for the mere gratification of the palate; or sometimes to satisfy the imperious calls of hunger, in such seminaries, (and some such still exist) as curtail the pupil even in necessary food. Habits are thus acquired, which lead in the future scenes of a collegiate residence, to unjustifiable expences that oppress the unhappy victim upon his first emerging into manhood, and perhaps weigh down his spirits and his health during the whole subsequent period of his life. But they are not always contracted upon occasions so justifiable. Indulgencies which are in all seminaries very properly prohibited, are eagerly sought for. The senior boys indulge in the use of fermented liquors, and the younger ones, as far as their resources or their credit can enable them, follow the example. The important organs of digestion and nutrition, are thus prematurely excited and permanently injured. "Two circumstances," says our Author, "which operate elsewhere, as a considerable restraint upon vicious propensities, are wanting in public schools; namely, difference of age, sex, and occupation, and more or less acquaintance with consequences. When such an order of things prevails, it is idle to stop to settle the

account between cause and effect. It is obvious that life must gush out in full streams, as from Seneca in the bath."

The excesses commenced at school are often pursued with increased activity at the university; and though drinking is acknowledged by our Author to have been on the decline while he resided there, and the noble reform which has since taken place in the internal discipline of his venerable *Alma Mater*, must have operated as a further restraint; it is still but too probable, that in many instances, irreparable injury is done to the constitution, by a use of fermented liquor which, from a want of precision in calculating its effects, may be generally accounted as moderate.

The catalogue of evils attendant upon the ordinary process of education, to which a great proportion of the youth of the kingdom is exposed, appears already sufficiently formidable; but one most important article yet remains to swell the account: nor is its delicacy inferior to its importance. The subject alluded to, is the premature excitement or improper indulgence of the sexual passion. I will not follow the Author into any minute detail of the melancholy train of evils arising from this source; but rather, as briefly as possible, point out the remedy. To apply this, it is necessary to trace the evil to its source; and this is very fully, and, in my opinion, satisfactorily done in the Essay before us. In the point in which, above all others, the future vigour of his mental and bodily powers is most deeply involved, the youth is left to himself. He is trusted to the influence of blind chance; or, furnished with information at best casual and imperfect, is left to steer his bark through one of the most dangerous shoals which infest the voyage of life. What wonder then if in thousands of instances, the hopes of the parent and the enjoyment of the child, suffer a common and utter shipwreck; or that, even under circumstances comparatively favorable, the frail bark should sustain a shock, which no future skill or anxiety can ever repair?

The means of preventing this calamity are stated at large in the course of the Essay; and they merit the most careful attention from every one who undertakes the important charge of conducting a human being from childhood towards maturity. Its principle consists in an endeavour to regulate the mode in which ideas relative to sexual distinction, shall be first excited. Unquestionably, as the Author himself observes, the most eligible plan would be to keep young people in entire ignorance. But if this be impossible, (and daily experience convinces us that it is so) the question to be determined is, whether the judicious parent or instructor would leave the formation of such ideas to fortuitous information, derived probably from the most improper and polluted sources, and at a period, perhaps, when the passions were first awaking, by which means the most dangerous associations might be formed, and the most destructive consequences ensue; or, by a grave and calm declaration of the truth, at an earlier period, take off from the subject all that zest which mystery or curiosity could give it, and produce associations of a totally opposite description. The mode in which he proposes that this should be done, is, by instruction in natural history and anatomy; and he explains it in a detail so ample, that it would require no extraordinary powers of understanding to carry it to its full extent. The information thus communicated, he would have accompanied by drawings or preparations which should illustrate the horrible consequences of illicit or premature indulgence.[q] The ideas thus early connected, would not easily be separated afterwards; and the consequences upon the future virtue and happiness of the individual could scarcely be calculated. But to produce its full effect, this knowledge should be communicated early. When the passions have

[q] There exists in the Palais Royal at Paris, a Museum admirably calculated to answer such a purpose. It is singular that such an exhibition should be situated in the very centre of vice and licentiousness.

been already unfolded, and other associations have been established, some few may perhaps be checked in their career; but, in most instances, the effort would be found too late. I can here only glance at the outline of this subject: it would be injustice to attempt an epitome of it. It merits to be most maturely considered in all its relations.

As the preceding Essay included a plan for a rational and healthy female seminary, that under consideration, contains suggestions towards one for boys, upon similar principles, and equally excellent in its details. He advises that its number should be limited; and that to compensate for unusual care and incessant attention and exertion, the remuneration should be more than usually liberal. Nor would this, he apprehends, require any important sacrifice on the part of the parent, or eventually diminish the future provision of the child. The increased expence would scarcely equal the sums which, in the latter years of education, are generally squandered with thoughtless profusion; and for which the unwary spendthrift receives in return, only the seeds of future misery, debility, and disease.

The Essay concludes with a few remarks upon the mode of life amongst males after maturity. However variously a portion of the day may be passed, from diversity of pursuits and occupations, "in the manner of passing the latter part of it, those who find themselves in easy circumstances, or in affluence, are nearly uniform." This uniformity consists in a late dinner and a sedentary evening in a heated apartment; the injurious effects of which are still further increased by stimulating liquors. This leads to some general remarks upon the pernicious consequences attendant upon their habitual or immoderate use; and to a developement of the causes of their more powerfully detelerious influence upon the constitutions of the present generation, than upon those of our ancestors. These causes he conceives that he has detected in the increase of luxurious indulgence

and sedentary occupation. These stimuli are resorted to with the mistaken idea of recruiting a shattered system, and preserving the faculty of enjoyment. The picture which he draws of the consequences of such a mistake, discovers the hand of a master. The colours are striking; they are almost terrifying; and they may be suspected, by some, to be overcharged. But there are too many who will recognize the delineation of their own miserable feelings; and the medical practitioner who has obtained the confidence of many nervous patients, will acknowledge the fidelity of the resemblance. "A short life and a merry one" says he "is a wish, of which I shall not contest the rationality. But the expression is much misinterpreted by uninformed boys, when their blood boils within them from impatience for enjoyment. Or, as the fiery temperament rarely occurs now-a-days, I should rather say, that it is misinterpreted by young rakes, who, feeling already shattered, are glad of a seeming philosophical excuse for resorting to provocatives of merriment, without which, they would no longer know, what it is to spend a joyous day. But nothing is more erroneous than the principle they profess. Life is not to be raised into a bright blaze that shall go instantly out. It never is more languid towards the last, than with those who labour to force it into extraordinary vividness. Nor does the faint wavering flame ever more tediously than with them, linger in the socket. In cases of gout, spleen, apoplexy, dropsy, and in all other diseases of intemperance, there is often an interval between a predominant uncomfortable state and the grave, as fearful as that which Shakspeare plants between the formation of a plot and its execution, and always infinitely longer. Before the loss of feeling and motion from the palsy, what years of wearisome stagnant being; of stretchings without relief! what uneasy sense of the flesh melting away from the bone! very similar is the unnoticed transition, to regular and accepted disease in other instances! Among the modern devotees of

Bacchus, few are allowed to escape this sad purgatory of suspended animation; and indeed but few of those moderate but regular wine bibbers who look upon the worship of Bacchus with abhorrence."

The subject of the fifth Essay is Temperature and Hardiness; with some remarks upon diet. The Author begins with stating and regretting the inaccurate ideas entertained upon this subject; and the little attention that has been hitherto paid to it, compared with its great importance. He first considers it with relation to the infant state. He inculcates the necessity of attention to the apartment in which the little stranger is to make its first entry into life; so as to obviate the risk of currents of cold air being applied to any part of its tender frame. Poverty and inattention often expose the new-born infant to such accidents in the hovels of the poor; but without care, the children of the rich may sustain equal injury "from the shrinking of a sash-frame or of a board in the floor." The heat should be regulated by a thermometer. If the use of such an instrument be not thought superfluous in a hot-house, for the purpose of securing the well-being of an exotic plant, it should not be thought unnecessary for the regulation of the temperature in which a little being is to be situated, equally tender with any exotic plant, and arrived from as warm a climate. The motion given to infants should also at first be gentle, on account of the extreme susceptibility of their mucous membrane; and to diminish this extreme susceptibility "the use of the cool bath at first, and afterwards of a cold one, is the safest and most effectual method." The severe discipline of washing in spring water of the natural temperature, should only be gradually resorted to; and never, until the strength of the infant be sufficient to resist the chilling influence of the medium. When the skin is in a hot and dry state the body may often be bathed with advantage with tepid water; or the child

should be taken into a room without a fire, and gently carried about, till it returns to its natural temperature. The same plan should be pursued when it is hot, restless or uneasy in the night; for which purpose it should be taken out of bed. On the other hand, when the extremities are cold and clammy, gentle friction before the fire with the hand, or with a soft flesh brush is recommended; with the internal use of small quantities of thin animal broth a little above blood heat. To this, immersion in a warm bath at ninety-six degrees may be added; and repeated (if occasion require) many times in the day.

To a plan which in its detail requires such minute attention,[3r] it may be expected that much objection will be made from the ignorance or prejudice of nurses; but the Author warmly contends that such prejudices are by no means insurmountable, provided sufficient care be taken to convince their reason in a simple and familiar way. In like manner, the common and almost universal error into which such persons fall with respect to the diet of infants, which they often persist in giving to them in a form liable, in the debilitated stomach that often accompanies the cold and clammy state just alluded to, to run immediately into acidity, may be corrected by shewing, by the most simple experiments, the acescent nature of the aliment which they are so fond of administering.

In a more advanced age, similar care with respect to temperature is still inculcated. It is only, by degrees, that the young animal should be exposed to the open air; and it should never be permitted to remain in it till it be chilled, nor to "encounter rude blasts, till it can move briskly enough to produce warmth within; and then only at intervals successively prolonged."

3r Minute as some particulars of it may appear, the Author only describes the kind of attention really paid by himself when he became a father.

But a natural ground of objection is here anticipated. The superiority of those of the human species who have been accustomed to face the severest variations of temperature, to "the inactive fireside *tenderling*," is obvious to the most superficial observer; and the observation is in general connected in the mind, "with the effect of certain cold mediums in giving hardness to certain inanimate bodies." From the connexion of these ideas, it was naturally concluded that "to endow a young person with this most desirable quality of body, there was nothing to be done but to expose him sufficiently to cold." From this prejudice many constitutions have sustained irreparable injury. Its influence, however, at present, is by no means so extensive as formerly. A good constitution may be gradually enured to bear long continued cold without detriment; and the discipline of temperature should be applied with a view to induce this state; but the instant that a chill occurs, the process should be stopped; for in the strongest constitutions "long and repeated chills will in the first instance enfeeble, and in the second bring on susceptibility to the operation of the powers that superinduce violent diseases."

One great source of injury from diminished temperature, the Author traces in the custom of bathing or swimming, when too long protracted. It requires a hardy frame to resist, for any time, the influence of a medium which must subduct the heat of the body so rapidly. A variety of judicious cautions is added, on the subject of cold bathing. He cites examples of its dangerous effects when the body, after being much heated, was beginning to cool. He recommends that the system in general, and the stomach in particular, should be in a moderate state of excitement before going into the bath; (a precept of the utmost practical importance to those who are at all delicate,) and he illustrates his position by a view of the effects of cold in fevers; where the excitement of the surface is such

as to sustain its application even in an intense degree, not only with security, but with advantage.

"Hardiness," says our Author, "the most enviable of all the attributes of animal nature, can neither be acquired nor recovered but upon certain terms." What those terms are,' he now proceeds to lay down; warning the reader that some privations and some attention will be required. One prominent error which prevents this enviable state of the frame is, the dependance that is placed upon external warmth for preserving a comfortable state of sensation. It is a fact incontestably proved, that "continued warmth renders the system less capable of being called into strong, healthy, or pleasurable action." From ignorance or disregard of this law of the system arises the desire of heated rooms, from which every breath of air is, as far as possible, excluded. Nor is this the only source of injury. He again alludes to the late meal, taken in a heated apartment, of which the elevated temperature is still further assisted by the free use of wine, succeeded by liquors at once stimulating from temperature and from their natural qualities. This is one obvious source of that relaxation with which hardiness is incompatible. As far as possible, he recommends that all such practices should be avoided; that the heated apartment should be frequently relinquished, and only gradually returned to; and that a substitute for external warmth should be sought in exercise, and in the pursuit of some employment sufficiently active to resist the cold. In this way the fund of vigour left, may be preserved unexhausted, or it may be "enhanced, if unimpaired."

With respect to dress, the Author observes that a sufficient quantity of cloathing should be worn to preserve the frame comfortably warm. And although warm and sufficient cloathing be but a very imperfect substitute for the warmth excited by active exertion, there appears to be "no comparison between a load of cloaths in cool rooms, and

light dress in hot rooms, where these two circumstances only are to be taken into account." The result of our erroneous system in this particular, is easily calculated from what had before been observed upon the subject in the Treatise on Consumption.[30]

The next division of the Essay consists of instructions how to escape the common diseases from variations of temperature. Of this class the most common is catarrh. He unfolds, more amply than he had before done, the theory of the celebrated John Brown upon this subject; to whose talents and sagacity he pays a high tribute of praise. It is well known that the merit of this philosophical explanation of the phenomena of what is vulgarly called a cold, consists in correcting the mistaken ideas of its origin; and in proving that, in reality, it is not cold that is the mischievous agent, but heat, applied to a surface the excitability of which had been previously accumulated by a refrigerating process. Upon this luminous theory are founded both the means of prevention and of cure; and the danger resulting from sudden alternations of temperature, more especially from cold to heat, and from the indiscriminate use of stimulating remedies in recent catarrh, becomes apparent.

From acute, the Author proceeds to the consideration of "chronic catarrh not inflammatory," which frequently terminates, in what has been called, the catarrh of old age. One of his remedies in this harassing complaint deserves to be mentioned, both on account of its simplicity and its efficacy. By the use of a kind of veil consisting of a sufficient number of folds of muslin or gauze, the air becomes so far tempered in its passage to the lungs, that invalids suffering from this form of catarrh, or from any unusual delicacy or susceptibility of the mucous membrane, have been enabled to encounter its variations, in all circumstances with unusual impunity,

[30] See page 166, *et seq.*

and in some, without sustaining any inconvenience whatever. It possesses the further advantage of communicating a degree of moisture, to the dry and parching winds which often occur in our spring months, before they are admitted into the lungs.

The Author closes his observations with remarking how essentially the comfort of the aged is promoted, by steadily maintaining an elevated temperature. He had found it capable of entirely suspending the distressing complaint above alluded to. Hence he expresses a hope, that in some future more enlightened state of society, edifices may be constructed with a sedulous attention to these and similar conveniences, and serve as "conservatories of old age:" where the aged occupant might find himself completely sheltered from the inclemencies of the most severe, and the changes of the most variable climate.

The sixth Essay treats of Scrophula; a disease which from the wide and still increasing extent of its ravages, divided the attention of the Author nearly equally with phthisis. After a few prefatory remarks on the distinction between chronic and acute diseases, and the frequent mortality by which maladies of the former class are attended, although they excite a very inferior degree of alarm,[31] he goes on to speak of the very general diffusion of the complaint in question. He endeavours to give the reader what he calls "a rude notion of scrophula," by describing the change induced in a gland by a taint of this kind; and from thence proceeds to describe the scrophulous constitution. Of this, one of the most general signs is what is commonly reckoned a fine complexion; not such indeed as, to the well judging eye, would appear to merit the appellation; but

[31] In one of his common-place books, he has this observation upon the subject. "Some diseases have the fierceness of a lion. There is alarm enough when these suddenly pounce upon their prey. Others are asps: they fasten upon the bosom unperceived by the inattentive eye, and inflict a fatal wound without terror."

such as may charm the superficial observer, and often occurs in the pictures of ideal beauty presented to us by the novelist.[3u] A skin of such transparent delicacy, as to shew the ramifications of the vessels distinctly painted upon it, in lines of a darker or lighter blue; with a cheek, either bloodless, or coloured with a scarlet rendered more vivid from its contrast with the pearly whiteness of the neighbouring features; will continue perhaps to be admired, till the vulgar notions of beauty be so far corrected, that, in the words of our Author, "the standard of health shall become the standard of beauty also."

This exquisite transparency of complexion may, in some rare instances, exist without being actually accompanied by scrophula. It should, however, always be regarded with vigilance, as shewing a tendency to it; and the necessary precautions should be attended to, in order to prevent the probably impending mischief. When "the temperament verges towards the formation of actual disease" symptoms of a more declared nature manifest themselves; of which one of the most striking is a tumid upper lip. "It is true," our Author observes, "that there are many individuals and families entirely free from any taint of this nature, who have a prominent upper lip." But this is sufficiently distinguishable from the scrophulous enlargement of that feature; which will, in general, be remembered not to have uniformly existed, and will, from time to time, be observed to vary in size. The Author does not profess, in a tract upon popular medicine, to lay down a criterion which shall

[3u] It would be waste of labour to illustrate this remark, by quotation from the common herd of novels; but the following is an extract from one of a far more respectable description, and was doubtless meant to be highly interesting. "Mary had a complexion, which, in point of fairness and transparency, could not be excelled. Her blood absolutely spoke in her cheeks; the soft white of her hands and neck looked as if they would have melted away beneath your touch." *Godwin's Fleetwood.*

enable the uninstructed to discriminate with exactness; but only to give such a warning as shall set them upon their guard, when any such suspicious appearances present themselves. Caution in this case is the more necessary, because the tumid lip is often supposed to be a sign of worms. This complaint may indeed often co-exist with general scrophulous affection; and although it may be comparatively very unimportant, may lead to the use of remedies which may prove essentially injurious to the constitution.

Other signs of the scrophulous constitution are a large lucid eye with a pupil much dilated; which is generally esteemed beautiful; although "there is no doubt that it betokens constitutional debility wherever it is habitual." The head also, generally attains a larger size than usual.

"The intellectual superiority of children of the scrophulous temperament," says our Author, "has long been noticed; and it has certainly been found to exist in a large proportion of cases. Nor is this to be wondered at; for it is not in scrophula alone, that this phenomenon occurs. That sensibility or openness to impression which is one of the principal constituents of genius, has often been observed to accompany different diseases of debility." But this compensation, as far as it is a compensation, for impaired health, no longer exists when the disease has made considerable progress. For it then often happens, that the intellectual functions sustain equal injury with the bodily organs. "Such cases," he continues, "almost universally belong to the class marked by a symptom easy to be distinguished, and of which the very first appearance, should be the signal for seeking instruction how to arrest the progress of the whole complaint; and for persevering, not only till so much of it as has actually taken place shall be removed, but till the constitution has lost its scrophulous tendency. The symptom to which I allude is an enlargement and a hardness in the belly, especially towards

evening." This form of the disease particularly invades the children of the poor; or any other infants who are ill fed and ill managed. The complexion, here, possesses none of that brilliancy which has been described above. It is pale and bloated; the mental and corporeal faculties seem overpowered by a corresponding languor; or, in those instances, where the superiority of understanding already noticed exists, it manifests itself only in a considerateness beyond the years of the patient. To this variety of the disease, the author proposes to give the name of the *phlegmatic;* to that before described, of the *sanguineous* scrophula: A distinction which appears well founded, and is supported by many analogies in the classification of diseases.

This form of scrophula may more readily arrest the attention of opulent parents than the former; but even these often content themselves with half-measures, which stop far short of eradicating the malady. The prevailing idea of worms induces them to resort to some vermifuge medicine, by which the symptoms may, for awhile, be palliated. But the deleterious influence of the malady is only suspended, or it is driven to inflict its ravages on some other part of the system. It is however among the poor, that the disease under this form, makes the most fearful havock. It rapidly advances towards that species of decline, known by the name of mesenteric atrophy. The Author enlarges, in this place, upon the important effects which might be looked for, if such proprietors of extensive landed estates or large manufactories, as were actively benevolent in attending to the state of their poor dependants, would inform themselves of the symptoms of this melancholy affection, and of some of the more obvious means of preventing it. Of these symptoms he gives a description drawn up with his usual force and accuracy, and the features of which could scarcely be mistaken, even by the most uninformed.

There remain to be noticed two other symptoms of the general scrophulous disposition. These are, a weakness, weeping, inflammation and other affections of the eyes, and chilblains. Certain varieties of the former complaints, will pretty generally, by medical persons, be acknowledged as symptoms of scrophula; but the propriety of classing chilblains in the same situation, will, from the universality of their occurrence, be questioned by many. It is however observable, that children who have any scrophulous tendency, suffer from these affections in proportion to that tendency; and our Author affirms that "it is very commonly observed that those who have chilblains when young, are, after their disappearance, destroyed by some complaint of the scrophulous class." This fact has given rise to some hasty and mistaken conclusions with respect to the retrocession or translation of the morbid action.[3x]

In order however to prevent misconstruction, the Author observes in this place, that several of the indications of scrophula above enumerated, and indeed, all, in a different climate, (slow tumours of the glands excepted,) may exist without a scrophulous tendency. For many of these signs are only evidences of constitutional debility: "and it is owing to the nature of our climate, to our diet, to propensities transmitted from parent to child, or to some other unexplored causes, that scrophula so frequently attacks people distinguished by these peculiarities."

An account is next given of the graver scrophulous complaints,

3x Perhaps however, where no other constitutional symptoms exist, chilblains, should be considered in the same light as the brilliant complexion alluded to in the beginning of this essay; as a subject of attention, rather than as a certain sign of actual danger; as a proof only that there is something wrong in the management of the patient, which should be checked in time, lest it should lead to worse consequences. It would be a sufficient evidence for instance, that the object of our attention, has been, at least, improperly treated with regard to temperature; and the great influence which cold, in every form, has in producing scrophulous affections is sufficiently known to every medical observer.

of which the catalogue is truly formidable. For the terrifying, though concise, pictures, which he draws of these complaints, he apologizes by remarking, that "his object is to deter parents from ever remaining content as long as they perceive a child of scrophulous temperament suffering from local or general debility". And he deprecates that complaisance in the medical practitioner, and the union of mistaken pride and mistaken tenderness in the parent, which leads to a dependance upon accident or upon anticipated change of constitution, to the exclusion or neglect of a persevering application of proper remedies. On the necessity of patience and perseverance he particularly enlarges. It may be necessary that the remedial process should be continued or resumed from year to year. "But who" he asks "grudges pains and perseverance when the question is the reclaim of a piece of land from the waste? shall we hesitate to devote as many months to health as we are willing to devote of years to gain? and shall we account it a small thing, to escape, when we are threatened with deformity, mutilation and torture?"

To render these cares more efficient and the detection of any menacing disorder more prompt, he advises that children should be early taught to discriminate exactly between the parts of the body. Many dangerous complaints might probably be checked or detected in their first origin, were they accustomed accurately to distinguish the seat of any deranged or uneasy sensation. This would be one effect of the general diffusion of anatomical and physiological information among heads of families; They would teach their offspring this sort of discrimination, and would, themselves, frequently examine them, in order to detect any "deviation from the healthy standard." From this, and from the other important uses to which such information may be subservient, the Author anticipates that the reader who has thus far attended upon his instructions, will not be disposed to consider the recommendation of these studies, as either absurd or unnecessary.

He next treats of those causes which favor the production of scrophula; among which he enumerates, descent from marriages contracted at too early or too late a period of life, and from parents previously diseased; the small-pox, which has hitherto been one of the most active instruments in awakening the scrophulous diathesis into activity; and, in an inferior degree, measles, low fever, scarlet fever, and the malignant sore throat. It is a matter of familiar and even daily experience, that all these leave the system in a state of debility favourable to the developement of scrophulous complaints.

Having thus sketched a picture of the ravages of scrophula, and traced its exciting causes, he proceeds to offer some "hints towards bringing up children not to be scrophulous." Under the head of diet, he enlarges upon the mischiefs which have often arisen from confining them too closely to a vegetable regimen. This practice has indeed, of late years, much declined; "as has also the custom of frequently administering purgative medicines; except, where the parent is more than usually apprehensive of worms." He again insists upon the importance of attention to temperature, and exercise. He again deprecates long confinement to depressing studies, which often over-power the mind at the same time that they debilitate the body, and concludes his essay with remarks upon certain mistakes both in opinion and practice. He questions the advantages which have been supposed to result from the use of sea water, unless accompanied by other curative means; and particularly warns the friends of the scrophulous patient against identifying the time assigned to a course of sea bathing, and water-drinking, with the time necessary for eradicating scrophula. He again dilates on the necessity of long protracted remedial plans and constant vigilance. Medicine thus administered, he acknowledges to be an evil; but he contends for its adoption as the least evil of the two. To inforce the importance and truth of his instructions, he recommends that

the friends of scrophulous patients should acquire as accurate an acquaintance with the disease as possible, even from actual observation of its worst forms..... "Let them put themselves first in the place of a patient whose flesh is melting down into matter, amid alternating chills and heats and perspirations and languors and pangs, and then in the place of a parent bending over so heart breaking a spectacle..... Their affection may not perhaps need such a spur. But by exercises such as these it will cease to be blind, without ceasing to be ardent." "We know" he continues "what a sublime function Aristotle assigned to the ancient tragedy. But there is a far more effectual purifier of the soul from unwise purposes and mean desires than fictitious distress; a purifier which, in that first faint dawn of the science of human nature, it could not be expected that the eye even of an Aristotle should discern. It is the *pity* and *terror* raised by a proper contemplation of the actual, home-bred miseries of life."

Nor would such feelings and reflections be accompanied with pain alone. Far otherwise. If they were followed by that energy of conduct which a view of the subject without a veil is calculated to inspire, the momentary endurance of painful sensation, momentary in comparison of the importance of the effects to be produced by it, would be compensated by a rich reward; a reward compared with which, the sensations excited by any drama, however appropriate the distribution of poetical justice, would be feeble and unimpressive.

In a short appendix to this essay, he contends for the feasibility of giving practical instruction on the art of preserving health. The plan of effecting this which he suggests, is by clinical lectures on preventive medicine, in imitation of those which are given in modern schools of physic, in practical medicine. He alludes to an institution which afforded him abundant facilities of realizing his ideas; and he professes his readiness, provided only ten heads of families could be

found "disposed to learn from the book of nature, how to guard their progeny against ill health; to give them the best assistance in his power." "I would pledge" "he continues" "all I am worth; that those who could overcome their first nameless and unfounded apprehensions, shall not only not meet with any thing to give them the slightest feeling of repugnance, but that they shall be gratified in a high degree as well as instructed."[3y]

From scrophula the Author proceeds, in the seventh essay, to treat of that formidable disease which he has elsewhere designated as the giant malady of our island. At the commencement of it he places in melancholy array, statements of its mortality collected from a variety of documents. The details here given are sufficiently alarming to excite the apprehensions of every father of a family; and they must be heightened upon observing from some subsequent statements, that the ravages of this fatal disorder are evidently on the increase; the proportionate mortality from this source, being much greater at the close, than either in the beginning, or the middle of the last century. But the waste of life, as he observes, gives but an imperfect idea of the misery connected with consumption. For if some apparently fortunate individuals, in a family predisposed to phthisis, escape the doom to which their relatives are devoted, they will most frequently be found a prey to other complaints. "They would hold" says the Author "their station among the living, not by the tenure of good health, but merely by favour of one bad disorder in possession keeping out a worse." Of this he brings forward a striking example in a letter written by "a patient of great talents

3y Something of this kind was actually carried into execution in the popular course of anatomy delivered under the Doctor's auspices in 1805: Several of the more interesting and less disgusting effects of scrophula were exhibited to a select audience, in a variety of the patients of the Preventive Institution.

and observation, who looked forward to that fate which consumption so often brings upon females in their prime of life, and which, in this instance, could not be averted." The letter was drawn up at his request. It presents the melancholy picture of a family, in consequence of one important error, the neglect of preventive medicine, harassed by a multitude of morbid sensations, deprived of the enjoyment of existence, and sinking into a premature grave. In this history, it is further remarkable, that although the intellectual powers were more assiduously cultivated, and the glitter of frivolous accomplishments less sought after and less valued, than is the case in many families, the plan of education was found nearly equally pernicious in its effects, from the unfortunate oversight above alluded to.

The great mass of disease, however, which produces such wide spreading havock and such multiplied misery, our Author observes, "is far from being equally distributed among the members of society; though no age or station can flatter themselves with complete security." He proceeds, therefore, to state what descriptions of persons are more or less liable to seizure. Thus some have such claims to it from descent, that they can scarcely hope to escape it without particular pains; while others on the contrary, would never have been consumptive, had it not been for the nature of their occupation, or from some incidental occurrence.[3z] The inevitable fate to which the pointers of needles are exposed, is a striking proof of this position. The fine particles of steel driven off in the processes of this trade, are drawn in with the breath and lodge in the lungs. So notorious are its effects, that it is only by the lure of high wages, that men can be engaged to undertake this branch of the manufacture. They "are said to be fully aware of the fate

3z To some of these circumstances he had previously adverted in his Essay on Consumption, but the catalogue is here more extensive, and the detail more minute.

that awaits them, and, in despair, to neglect all means of relief." Many other artizans exposed to the floating particles of earth or metals, suffer in a similar way; and the more delicate dust that arises from flax, silk, and cotton, appears from variety of proof, to be capable, under certain circumstances, of producing effects equally melancholy. The flax-dressers of England, the silk-winders and spinners of France, and the cotton-spinners of Scotland, in no long time exhibit similar phenomena, resulting from the nature of their respective occupations. "They lose their bloom and vivacity. They are seized with a dry cough by which they soon come to be continually harassed. They complain of oppressive pain in the chest. Fever often succeeds, and they die consumptive.... All these are the effects of disorder in the functions of the lungs. It is more than probable, that the office of this organ is to dye the white globules of the chyle into the red particles of the blood. This process being interrupted, no wonder if the roses of the cheek should wither."

To the list of trades whose influence seems unfriendly to human life by their tendency to produce pulmonary affection, may be added also paper-makers, gilders, carpet manufacturers, tailors, and lace-weavers. The first of these suffer in many situations from being constantly immersed in a warm, moist atmosphere: gilders inhale noxious vapours from the heat of the apartments in which they work, and the volatilization of mercurial particles. This trade is eminently unfavourable; and even those constitutionally strong so rarely resist its deleterious influence, "that no less than six out of seven are said to die consumptive in their apprenticeship." The other trades seem to operate deleteriously, by means of the fine particles of floating fibres of linen, wool, silk, and cotton; which the strong and healthy might inhale without injury, but which act with murderous though slow influence upon those previously debi-

litated by sedentary occupation and close confinement. Thus, too, if the view be raised to the higher classes " we shall perceive," says the Author, " that it is upon the lilies of the land, who neither toil nor spin, that the blight of consumption principally falls." Their delicacy renders the irritation of slight causes, as fatal in their consequences to the tender organization of their lungs, as the particles of flint and steel to the more hardy needle-pointer. " Thus," continues he, " consumption may be induced in two very different ways; by the constant operation of violent causes, where there is no more pre-disposition than the structure of the organs concerned necessarily brings with it, and by the operation of slight causes, where there exists a strong predisposition. Here the habit compensates for the inferiority of power in the immediate agents." In certain individuals, a single pinch of snuff, or the inhalation of the fumes of oxygenated muriatic acid will produce all the symptoms of complete catarrh. Nay certain chemical processes have induced so violent an affection of this kind as to terminate in complete phthisis. Analogous effects may every day be observed in variable climates from the vicissitudes of the elements. And " if a rigorous and variable climate be capable of producing this fatal complaint; upon whom" asks the Author " must it principally exert its baneful influence? unquestionably upon those who by descent, by defective original conformation, and by peculiar habits of life, have a more than common tenderness of the parts upon which the atmosphere acts."

He proceeds now to enlarge upon each of these predisposing causes. He gives a sketch of the disorganizing effects produced in the lungs by phthisis as detected by examination after death; and proposes a theory of the various causes from which tubercles may originate. He examines the relation of scrophula to consumption, and combats the idea of its universality; at the same time he remarks

that " it remains an undoubted truth that the slightest exciting cause is more apt to produce consumption in the scrophulous than in others.[1a] Catarrh is particularly apt to lay the foundation for consumption in scrophulous habits." Hence he urges the necessity of early attention to it, and of adopting decided measures for its removal; and he warns those more advanced in life in particular, to beware " not to let chronic catarrh degenerate into consumption." He adds some cautions against using violent efforts in speaking or singing, which have sometimes induced fatal consequences, even where the chest was not originally weak. Of the truth of this he gives some striking examples.

He next offers some hints as to the mode of correcting the phthisical temperament. And here he complains that " the difficulty is to create a resolution; not to give proper directions. He recommends that the preventive system should commence from the birth. Where the infant is descended from a puny, consumptively disposed mother, he advises that she should not be permitted to suckle it. He recommends as a substitute, cows' milk, diluted gravy, bathing at a proper temperature, " gentle friction of the extremities, and even of the chest and stomach, that the system might be cherished by heat of its own producing" and in fine, the calling into practice all the means previously suggested in the Essay on Scrophula for strengthening weak constitutions. He recommends such gentle and interesting exercises as " should engage the mind while they put the limbs in motion." " *Task exercises*," says he " hold the same proportion to health, as the castigations of penitents to piety and virtue." He

[1a] The Author's reasoning, in this place appears less conclusive than usual. One of his leading arguments to prove that chilblains are marks of a scrophulous constitution, is, that children who have suffered severely from those affections, are more likely than others to fall into scrophula as they grow up. If this argument be well founded, it appears to apply equally in the present instance; and to establish the relation between scrophula and phthisis.

recommends also that exertion of this active and interesting nature should be continued for some time; and he warns the friends of the puny and delicate not to expect that short, and perhaps immoderate, exertion, can counteract the injurious effects of habitual indolence. On the contrary, it often proves highly detrimental from its disproportion to the powers of the invalid.

He goes on to point out symptoms which denote imminent danger, and should therefore immediately awaken attention and alarm. Such are, in addition to those before pointed out in his Essay on Consumption, "almost any indistinct indisposition after the period of childhood, accompanied by falling off in flesh; habitual excess of expectoration though of phlegm alone, and shooting pains or uneasiness in the chest of a suspicious subject. He points out also a number of false opinions, generating fatal delays and errors; and particularly adverts to that delusion, happy perhaps to the sufferer, but certainly not to his friends, which veils the danger, and conducts him without apprehension, though alas! seldom without severe suffering, to the borders of the tomb. He insists upon the spontaneous origin of consumption in families where no predisposition to it had existed in a former generation; and laments as one of the fatal errors alluded to, the difficulty, with which so unpleasant a truth is, in general, admitted. He deprecates the tampering with inefficient remedies, while perhaps the irrevocable hour for producing any salutary change passes by; and concludes with offering a set of maxims which well deserve his recommendation of being "hung up in the heart of every father of a family."

The question whether consumption be or be not contagious, passes next in review; and the Author, notwithstanding the opinion on the affirmative side universally entertained in the south of Europe, agrees with the majority of his medical brethren in the north, in denying its existence. "What alone," he observes, "gives a colour to the idea here, is that a husband or a wife no way predisposed, shall sometimes follow the fate of the partner for life. But for this," he adds, "an especial reason may be assigned. The physician is doomed to witness the most humiliating scenes in the tragi-comedy of life. But he is, in return, the privileged spectator of the most ennobling; where the fortitude of those who suffer, generously contends with the devotion of those who soothe. But, what may most console us for the base and selfish alloy in our nature, is the affection we find subsisting between persons who have long been united. Where neither dislike nor indifference has followed intimacy, this sentiment which in ordinary situations, retires from view, bursts forth in the hour of danger, strong and undisguised, as it shewed itself in ages, when the sincere expression of the feelings stood in the place of that circumspect and disciplined demeanour, which looks round among the by-standers, before it dares listen to the voice within. Every one sees how much self-neglect is attached to affection of this degree. The consequences of self neglect can as readily be conceived. What more in order, than that the strongest constitution should be enfeebled by the impression of cold received under the most unfavourable circumstances; and which must be intense indeed before it can be sensible to an occupied mind? What more likely, than that the firmest chest should be shattered by the incessant aggravation of catarrh? Sorrow willingly joins exposure and fatigue. So that, without contagion, these allies will find no more difficulty in their operations, than associated armies before an otherwise impregnable fortress, when its walls have been rent by an earthquake to their foundation."

In the conclusion of this Essay he condoles the mind of the reader who has accompanied him through the melancholy scenes of suffering now existing, by a prophetic anticipation of brighter and happier scenes in future. From our progress in civilization and

our advances in useful knowledge, he anticipates the rapid approach of a period, when we shall no longer be contented with having every thing about us, cloaths, tables, chairs, pictures, statues, all exquisite in their kind, except our progeny. "Some few families," he observes, "have taken the most determined steps, even from the cradle, to resist the giant-malady of our island. There, the human plantation flourishes like scions removed from shade and rubble to a rich and sunny soil . . . As soon as such examples shall become a little more common, it will appear manifest that the devastations of consumption proceed from domestic mismanagement, and not from the unalterable dispositions of nature."

The subject of the eighth Essay is the Preservation of the physical power of Enjoyment, including some remarks on food and digestion. It has so close a connection with the termination of the fourth, that it would perhaps have appeared a preferable arrangement, if it had followed it in immediate succession. A general outline is there traced, of those evils which are here given in detail. The Author begins with a description of the stomach and of its various states of distention and emptiness, with the corresponding sensations by which those states are accompanied. The progress of digestion is described in a manner strikingly clear and intelligible; and this is followed by an inquiry into the principal agents by which this process is impaired, and the digestive organs injured. The first of these agents to which he adverts, is the use of fermented liquors. He relates some facts and experiments by which the extent of this influence has been, or may be, rendered obvious to the senses. The injury arising from any liquor of this class, is first, as might naturally be expected, in proportion to its strength. Indeed the more palpably baneful operation of spirits, in comparison of wine or other fermented liquors, has rendered dram drinking a secret practice; and "the difference between drinking port or

madeira, and brandy, is the difference between respectability and disrepute." Persons whose ample fortune enables them to be curious in the selection of their liquors, flatter themselves, upon this ground, with a hope of exemption from some of the evils which are pretty generally apprehended from a free use of them. Very long keeping, it is true, causes a loss of the bulk of liquors, and an evaporation of a portion of their alcohol; but this is the only process which in the opinion of our Author can diminish their injurious consequences.

The next circumstance by which the effects of fermented liquors are modified, is the shorter or longer interval, in which they are taken: "Healthy people, I presume," says the Doctor, "would be sensibly less injured by a course of vinous stimulants, if the quantity taken in the afternoon, were regularly distributed throughout the day." The analogy of diseases in which cordials are given at measured intervals, sanctions this opinion. For the purposes of health, it seems that to take them after a meal, is of all periods the most improper. "Proper food in proper quantity is exciting enough for the strong, and without caution, is apt to be over-exciting for the weak." Another circumstance by which these effects are modified, is the age and strength of the subject exposed to their influence. They act with peculiar severity upon the tender organization of children. They stint their growth and impair their appetite. Numerous experiments prove this fact; and the indigent classes have, in some instances, availed themselves of a knowledge of it, to still the cravings of that hunger, which they had not the power of appeasing by a sufficient quantity of wholesome food. These facts ought to operate as a serious warning to the imprudent parent, who indulges his children in such a fatal gratification. They want no source of artificial exhilaration to beguile their time; however it may be sought for these purposes, by those of more

mature age. And even for these, the Author anticipates a period, when the diffusion and communication of knowledge and science, and healthful, social exercise, shall produce, in a permanent form, those pleasurable feelings of existence, which, when arising from the products of vinous fermentation, can only be momentary, and must be succeeded by a proportionate degree of gloom.

The injurious effects of fermented liquors, in large quantities, seem to be pretty generally acknowledged. The difficulty is, to impress a conviction, that their habitual use, even in quantities generally accounted moderate, is injurious to health. The decisions of prejudice, are here supposed to be sanctioned by fact and experience. That ignorance which because it knows nothing fears nothing, and that "gentle dulness" which in our days no less than in those of the satirist "ever loves a joke," will unite in deprecating the idea, that a glass or two can do any harm. And although their jokes be pointless, and their assertions manifest a total unacquaintance with the laws of the human frame, the common practice of society will bear them out, and they will conceive their decisions unanswerable. They perpetually remind the opposers of fermented liquors that all who use them are not injured. "But neither do all who are exposed to its contagion catch the plague: and yet is not the hazard sufficient to induce every man in his sober senses to keep out of the way of infection? That every man shall become a valetudinarian more or less miserable, if he daily drink a quarter or half pint of port wine, from his fourteenth, fifteenth, sixteenth, seventeenth, or eighteenth year, is to the full as probable, as that he shall have a dangerous disease, if he come within reach of its effluvia."

The Author proceeds to advise all persons to discontinue the use of these dangerous stimulants. The languid and uncomfortable feelings which might at first, succeed the privation of the accustomed

indulgence, might be relieved by the use of water impregnated with carbonic gas, or flavoured with the mineral acids. And where the functions of the stomach had not materially suffered, even these substitutes would soon cease to be necessary.

He next treats "of the undefined indisposition and specific disorders, produced, or whose production is favored, by the operation of vinous and spirituous liquors on the digestive organs." His delineation of these affections is marked by that strong and forcible expression which particularly characterizes his descriptions of disease. From the first faint warnings of languor and uneasiness to full formed indigestion and hypochondriasis in the one sex, or hysteria in the other, his sketches are marked with the minute accuracy of the Dutch artist. He expresses a doubt whether the most healthy and well-regulated stomach can at any time correct the acetous fermentation into which wine has a tendency to run; but in that whose powers are impaired, the acescent process is alike rapid and certain. Our general plan of diet also, appears singularly qualified to favour this process. The tendency to acidity in the food usually taken for breakfast, may be ascertained by the most simple experiment. It is only necessary to expose a small quantity of sugared tea and bread and butter, moistened with saliva, to a heat of 98 degrees. The mixture will become acid in a few hours." The portion of these materials which is converted into an acid in the stomach, may at first, bear but an inconsiderable proportion to the whole mass; but this proportion rapidly increases with the progressive debility of the organ, and the sensations produced by it acquire a proportionate degree of progressive severity. These feelings are, at first, relieved by taking animal food at dinner; but if vegetables be mixed with the meal in any considerable proportion, or, above all, if pastry or fruit be added, the acescent process is excited into fresh activity. Constant experience shews the truth of

this. Confirmation of it may be collected at every social table. In fact, the unabated relish for fruit pies, and the gratification of that relish without future suffering, afford no bad proof that the individual has not committed any inexpiable sin against his stomach; and he may therefore, with the more confidence, proceed to abandon altogether the use of the pernicious stimuli above alluded to. Upon the mingled mass of aliment taken at dinner, wine is often poured in no inconsiderable quantities; and "a meal from the garden is suffered to be heaped on a plentiful one from the kitchen." For a short period, the stimulus of the wine appears to relieve the digestive organs; but the relief is transitory only, and the future sufferings are not the less severe for having been awhile suspended. In such a state, the use of tea and coffee is only adding fuel to the flame.

The acidity thus induced, is one of the first stages in the catalogue of uneasy sensations, which attack the person who indulges in fermented liquors. Flatulence aggravates his uncomfortable feelings still further, so that when the powerful acid already alluded to, is not acting upon the tender nerves of the stomach, the whole alimentary canal is condemned to experience the most oppressive sense of distention. These combined evils harass the patient for some time before indigestion be fully formed; but he has intervals of long ease and complete relief from these sensations; and it is only gradually, that these intervals are curtailed. Habitual indigestion is, in most instances, soon succeeded by low spirits. The picture of a patient under their unhappy influence is traced in all its gloom. The fearful ideas which embitter the days of such a person can only be exceeded by the horrors which infest the night, and render it no longer a season of repose. After observing that it "is a season of peculiar agony, and that its horrors are often deeply imprinted in his morning countenance, our Author represents the unhappy patient,

after struggling for a time with frightful dreams, as awaking suddenly with a stifled scream. "It is then" says he "that the greatest possible quantity of horror is accumulated upon every object that passes before the mind in review. The merchant fancies his ships all wrecks and his debtors all bankrupts. The most pious communicant accuses himself of having partaken of the Lord's supper unworthily. The physician cannot believe but that he has poisoned his most interesting patient by a slip of his pen, and in every noise of the night he hears a summons to the consequences of his oversight."

That a continued series of unrestrained indulgence would produce the consequences above described, would be generally acknowledged with little hesitation; and it is by no means certain in the generality of cases, even although the career of vicious gratifications have been suspended, whether the change has taken place sufficiently early to avoid the punishment which the laws of our being have annexed to it. Hence our Author renders a service to morality, in warning the female sex against a too ready assent to the maxim that a reformed rake is an eligible partner for life. Independently of the probability of the recurrence of depraved habits, there is still greater probability that a perpetual train of uneasy sensations, will render the temper permanently irritable, and cloud every scene of domestic life with gloom and vexation.

Severe study, although often accused of impairing the health and spirits, is in Dr. Beddoes's apprehension, rarely the real cause of such complaints. "Should we" he observes "trace back the history of the pale, tremulous, unnerved and dyspeptic student, we shall commonly arrive at a period of his life, when his devotions were openly or secretly addressed, to divinities of a very different stamp from Minerva and the Muses."

Another fruitful source of dyspeptic complaints he discovers in the occupations of a large portion of that class of young men who

are clerks in merchant's compting houses and other similar situations. Boys are now placed out in such situations at a much earlier period than formerly; and the consequences are truly dreadful. They do not appear merely in the train of chronic complaints treated of in this essay, but they often terminate fatally at a very early period. The Author expresses himself upon this subject in very forcible terms. He declares that "it seems the next thing to reviving the practice of that ancient people, whose hearts commerce had hardened, till they came to sacrifice their offspring to Moloch."

The next section treats of hysteria, which, in females, produces so many complaints analogous to those referred to hypochondriasis in males, that medical writers in general, confess their inability to distinguish between them. Like hypochondriasis, it is in general accompanied by some symptom of impaired digestion, and it is aggravated by the same causes. It should however be remembered that, from the greater susceptibility of women, these causes act upon them with much more energy. The quantity of wine which many allow themselves, produces the most serious effects upon inactive, delicate and nervous females. It very often acts upon them directly as a narcotic; at least so directly, that the previous stage of excitement can scarcely be detected. Such a stimulus therefore, ought to be entirely discarded by any individual of the softer sex, "who has to complain of want of power in the stomach."

The great object of the former part of this section is to place and keep the stomach in a strong state: In the latter the Author proceeds to speak of preventive regimen, and of some improper means which are resorted to for temporary relief, when its powers are impaired. He alludes to the injurious consequences which often succeed an unadvised use of emetic and cathartic medicines, in order (to adopt the popular language) "to get rid of the bile." He warns against those errors of diet which may defeat the best concerted

plans and throw the patient many degrees backwards; and proceeds to furnish some admirable hints for the moral treatment of the hypochondriacal patient. To apply these in their full extent, might not be in the power of many of the friends of patients in such situations, as it would require a knowledge of the science of the human mind. "It is given to few" says the Author "to pour oil into the wounds of the mind, and to allure the harassed thoughts into the shady groves and pleasant fields of imagination." But on the other hand, it requires only a common understanding, united with a due degree of sympathetic feeling, to warn us "not to repel the communications of the hypochondriac when he desires to unburthen his soul of his griefs, nor to treat every new complaint as ideal."

He closes his essay with a review of some of the more palpable evils of which the foundation is generally laid by the use or abuse of fermented liquors. These are various diseased affections of the liver, palsy and gout. After speaking of the number and fatality of the class of diseases first alluded to, he observes that "nothing more completely destroys the faculty of pleasurable enjoyment, or provides a larger share for all the modes and degrees of misery, that can stand in the interval between untainted health and the last expiring agony."

He proceeds to place in succession the individuals of this fearful catalogue of evils; from the first obscure and uneasy sensations which shew that all is not right within, to complete disorganization of the important viscus in question, and the fatal dropsy by which it is so frequently, in this country more especially, succeeded. He shews the reciprocal connexion existing between these affections and those of palsy and gout. He examines the commonly received doctrine that gout is a preventive or a cure of other diseases, and sanctions his doubt of the justice of this opinion, by the venerable authority of Heberden. The first fit or two may perhaps relieve the

misery resulting from various undefined sensations excited by indigestion, or the stimulus of a diseased liver. They are relieved upon a principle of therapeutics which in many other diseases directs the exciting of external inflammation upon a less important part, to relieve the internal suffering of some more essential organ. But this remedial effect of gout soon ceases; and with the agonizing pains of the affected limbs, the sufferer has to endure all the complicated miseries of a debilitated stomach.

"Nations" continues our Author "advanced to a certain point in policy, offer brute animals to their divinities. At a more barbarous period, human victims are offered; and in the conduct of the most civilized communities about which history furnishes information, we have a singular proof of the observation that extremes meet. For among them also, human victims are sacrificed. It does not signify though there be a little difference in point of ceremony. The result is the same; only that in refined states, the number of victims is incomparably greater, at least in proportion to their population."

"Every apartment devoted to the circulation of the glass, may be regarded as a temple set apart for the performance of such sacrifices. And they ought to be fitted up like the ancient temples of Egypt, in a manner to shew the real atrocity of the superstition that is carried on within their walls. Then, and not till then, will every person be put fairly in a condition to judge whether he will join in the celebration of these abhorred rites. Among the subjects which may with propriety be selected, either for representation, or for exhibition in nature, the disorganized liver, and the complaints consequent upon its disorganization, would form some of the most appropriate. In this walk, what good may be done with a fiftieth portion of the genius of Hogarth! a set of sketches contrasting our customs with those of savages, in their tendency to disfigure, enfeeble and

demolish the human frame, would, I suppose, require scarce any thing beyond decent skill in managing the pencil."

"An infinity of subjects present themselves on the first glance. What is there, for instance, in the refined Briton, with his features all obliterated, and his face all carbuncles, that renders him unfit to be a companion to any tattooed, antarctic savage? If the East can produce its Faquirs with their legs and arms distorted, and rendered useless by constant confinement to the same position; cannot the West match them with figures equally disabled by their own endeavours? For my part, I know no right our crippled Bacchanalians have, to set the pleasures they derive from the process by which they have been reduced to their present state, above the satisfaction the Faquir finds in being followed and feasted by his countrymen and countrywomen. The motives of the Faquir of Brama seem of a more refined and respectable character than those of a Faquir of Bacchus; implying greater elevation and force of sentiment:—Among this or that uncultivated tribe it may be the fashion to squeeze the head into an unnatural form. But we—do not we also take pains to derange the interior full as much as they can disfigure the exterior? The hordes of the wilderness, it is true, sometimes practice horrid mutilations. But then, they suffer the residue of the frame to enjoy its full measure of vitality. But we drain off from every fibre its spirit and strength, leaving a vain image stuffed out to the human dimensions, with the dregs of nerve and muscle. In fact, whenever the Genius of Civilization shall take it into his head to compare notes with the Genius of Barbarism, he may adopt the language, in which some modern versifier makes the muse of painting address the muse of poetry—

"a son of mine,
"Has more than followed every son of thine;"

but, I doubt much, if the Genius of Barbarism can justly pay himself the same compliment."

From the similarity of symptoms and of causes in hypochondriasis and the more advanced forms of nervous diseases, the reader is naturally prepared for the consideration of the latter, which constitute the subject of the ninth essay. After a short outline of the nervous system, the Author proceeds to give a general idea of the diseases which have obtained the name of nervous. In these cases, bodily suffering is not all. "The shadowy trains of mind" sympathize with the derangement of the corporal functions; and to our imperfect acquaintance with pneumatology, the Author is disposed to attribute the acquiescence, with which man is permitted to suffer in his higher powers, without any *rational* means of relief being attempted. In a majority of cases, when we hear of an individual suffering under mental derangement, he is already contemplated as having left void his station in society; and the most sanguine friend scarcely ventures so far to give way to the illusions of hope, as to anticipate a final recovery.

At the head of the diseases treated of in the present section he places Epilepsy. Of this, he gives a description drawn up in a style of such appalling eloquence, that perhaps, by a nervous patient, it could scarcely be perused with absolute safety. It is well known that the sight of a sufferer under a paroxysm of this disease, has sometimes so deeply affected the mind of a nervous or irritable spectator, as to excite a similar seizure; and the description here given, appears, in terrible impression, only to fall short of the reality. The account which the Author has drawn up of its usual symptoms, is enriched by copious extracts from the singularly interesting journal of a person who suffered under it for seven years; and who by the help of a strong mind and powerful voluntary efforts, was enabled, in many instances, to modify its violence, and to record for the information of others, a variety of curious phenomena, which attended his different seizures.

The attempt to epitomize this case, or rather to condense the

epitome here given, would be in vain; no point of it could be omitted without injury; and to give it in detail would protract this analysis to too great a length. The whole account suggests many valuable hints with respect to the mental as well as corporal treatment of the epileptic patient.

A minute analysis is given of those cases in which the attack comes on very gradually: so gradually, that its approaches may have been protracted for months or even for years. Among the symptoms of such cases are enumerated impressions of terror made in early life, and continuing to recur long afterwards; unusual difficulty in composition, if the patient be habituated to that species of mental exertion, and what is still more striking, inability to comprehend passages of his own writing, although at other times they should be sufficiently intelligible; frequent weariness of mind; a difficulty of recollection and frequently of comprehending the sense of a sentence addressed to him, even although it be of a very simple kind. This is sometimes complicated with a partial loss of hearing; owing, in many instances, to the various internal noises which distract or overpower the attention of the sufferer. A partial *paralysis* of the memory, if the term be allowed, by which the trains between a particular idea and its appropriate word are for a moment dissevered; so that one word of somewhat analogous sound or sense, shall be substituted for another, although, perhaps, it shall be immediately corrected when the sound strikes the ear of the speaker. There will also occur stupor; in some instances, followed by torpor, in others by an unusual hurry of ideas, over which the mind has no controul.

To these symptoms is frequently added a singular degree of restlessness and inquietude; "in which the mind so far partakes, as to feel the task of pursuing a train of close reasoning an absolutely impracticable effort. This seems to evidence a thorough derangement of the sensitive organs.... For an individual possessed of well culti-

vated intellectual powers will, in this manner, be sunk to the level of those, who, from habits of frivolity, are sometimes wholly incapable of fixing their minds steadily upon any one point." The Author, rather sarcastically, attributes to this source the necessity, in polite circles, of "changing the topic of conversation every second minute. To conceive the condition of the head in such cases more distinctly, we may recollect how it fares with the eye when weakened in such a manner, that the first instant it is cast upon an inscription the characters are perfectly plain, but in a little time they seem to run into one another, then become undistinguishable, and at last vanish altogether." Among the more evident menaces of epilepsy the Author next mentions flashes of light before the eyes, head-ache, dizziness, and a variety of other unpleasant sensations which are much more frequently met with in practical books, than those minute variations in the state of the intellectual functions which have been already enumerated. And if we find it necessary to resort to means which may properly be called mechanical, to relieve this derangement of the bodily organs, it will be no less necessary to apply mental remedies, to rectify the derangement of the understanding. The patient whose journal has been alluded to had contrived a process, by which he was frequently able to insure an accustomed association of his ideas, and by this means divert an impending paroxysm! And it appears from a curious case recorded on the authority of a French physician, that "whatever binds the animal actions to their habitual succession" has a similar effect. The case is that of a porter who having one day a very heavy burden on his back, felt himself all at once in the crisis of an epileptic paroxysm; which, however, he so far resisted, as not to fall as usual, but to walk for a very considerable distance, without being able even to communicate his situation to his wife who was walking beside him. Although he could neither see nor hear, yet something which he could not explain

enabled him to keep up, and go instinctively forward. In this instance, there seems to have existed "a partial suspension of the animal processes, while a certain part went on uninterruptedly. The muscles employed in bearing a burden acted perfectly; while those of the voice refused their usual co-operation with the ideas."

The review of this case leads the Author to consider some of the innumerable varieties of imperfect epilepsy; where "some animal motions stop or run into disorder for a time, and then return to their usual rate; while the rest go on in the way to which they have been trained by long habit". Hence, various seizures may occur, closely allied to epilepsy, but not fully answering its nosological definition: amongst which he classes somnambulism, talking in sleep, and the convulsive startings which often seize nervous patients upon first sinking into slumber.[4b] To similar causes may be referred various distressing and agitating dreams. The glare and heat of fashionable parties, operating night after night in succession, upon debilitated females, frequently produce this state of feverish or agitated sleep. Exhausted by long watching, and often by tumultuous emotions, how can they expect the refreshment of repose? Under such circumstances, sleep no longer retains a just claim to the title of "tired

[4b] This phenomenon is happily illustrated in the following extract of one of his letters to Dr. Darwin. "I have at present a patient who miscarried near the end of her fourth month and had much hæmorrhage. Whenever she goes to sleep she has convulsive twitchings of many of her muscles, but not at other times. There appear to be two distinct causes for the convulsive motions that happen in sleep, or in going to sleep.—1. The accumulation of sensorial power so well explained by you. 2. The other is the want of controul of the voluntary power: occurring under circumstances where you cannot well suppose the excitability to be accumulated. This is well illustrated in some of Fowler's experiments, *(On animal electricity)* where, upon applying the two metals to an entire frog, he produces convulsions or not, according as the animal is or is not aware of the application: so that his exerted will, in the former case, stops those movements which the irritation would otherwise occasion."

nature's kind restorer." Hence result many important cautions to be observed by those of more delicate organization before they resign themselves to sleep. A season of quiet should intervene, and every means should be resorted to, calculated to calm the tumultuous ocean to rest. Nocturnal parties are, of course, utterly incompatible with such a plan, and should be sedulously avoided.[4c] "The night is the season in which the vulture of fashion flies abroad for prey. Many of the primrose cheeks and aspen constitutions which are to be met with so abundantly in the great world, exhibit the consequences of his secret depredations. The valetudinarian must retire early to his couch; and rise early, if he expect to rise with alacrity. And in every case, the great secret of calm slumbers would be found in such occupations as should amuse and interest the mind without exciting agitation."

From the soothing power which is possessed by the beautiful scenes of nature, travelling is recommended for nervous patients; but they should avoid resorting to those places which are most crowded by invalids. In many of these, they are exposed to all the evils connected with the dissipations of the town. The revival of the early associations of youth, which would bring back the sensations of a more healthy period, would also be salutary. Cooling the head by the application of wet sponges applied to the outside of an oil-skin

4c Even the student, who pursues nocturnal studies with too great avidity, and protracts them to too late an hour, will often find that his mind is too highly stimulated to subside into tranquillity, till after many a weary change of posture. I know a gentleman engaged not unfrequently in literary composition, who, if his studies have been protracted to a late hour, never attempts to go to rest, till he has diverted the current of his thoughts by the introduction of some totally opposite train of ideas attended with little interest; and till, by the gentle muscular exertion of walking for some time up and down his apartment, he has, in some degree, equalized the excitement of his system. Plans of a similar nature were resorted to by the epileptic patient alluded to in the Essay; as appears from a part of his journal.

cap, or, in other cases the blood warm bath, would be also useful agents in procuring tranquil repose.

The Author next proceeds to trace the close affinity between hysteria and epilepsy; to illustrate which, he gives a case containing such a minute account of symptoms, that if it be not drawn up by himself, (which is rendered dubious by the marks of quotation affixed to it,) it must have been, at least, traced by some one endowed with uncommon habits of self observation. He afterwards forcibly describes many varieties of this complaint; particularly enlarging upon that morbid sensibility which renders existence, in many instances, an almost uninterrupted series of painful sensations. "That the dropping of a hair-pin on the floor should make a person start from her seat and fix her in a preternatural posture, by occasioning preternatural fixed contractions of the muscles, or agitate her by contractions and relaxations equally preternatural, till she sink into insensibility from which she awakes into vehement delirium, is hardly credible to those who are conversant only with the healthy, and the sorts of sickness to which the robust are subject. On comparing an individual liable to these sad varieties of being, to the engineer, who stands unmoved amid the thunder of a battery; to the seaman, who maintains his footing upon the deck or ropes of his vessel reeling under the shock of the elements; or to the Indian, who exhibits the signs, and probably feels the throb, of intense delight, while the flames are preying upon his flesh; how astonishing do we find the range in human susceptibility to the effect of the powers by which we are surrounded! how important is it to consider the causes of the difference, if on the one hand, we should have as much reason to suspect, that resistance to pain may be united in the highest degree to capability of pleasure, as we have on the other, to be persuaded, that those who have become in so high a degree sensitive, are nearly lost to all but painful emotions;

and that if their organs are like wax in being impressed by external appulses, they too often resemble adamant in retaining what impressions they may receive."

The Author proceeds to the consideration of "some of the principal symptoms of nervous diseases separately considered," as convulsions and spasms, catalepsy and giddiness. To the latter in particular he devotes several pages. In his view of the subject he differs from Dr. Darwin. He considers an aptness to this sensation as nearly the same thing as aptness to become nervous. It is an almost inseparable attendant upon an advanced stage of indigestion. Dimness of vision and noises in the head often acknowledge a similar origin. From what has been delivered by the Author upon former occasions, it will easily be seen why these distressing affections should especially harass the intemperate votary of pleasure, the sensualist, and the drunkard. The great security against this unpleasant feeling consists in strict temperance and moderation in every kind of animal gratification. Some of the prevailing habits of fashionable society are considered as particularly favorable to the excitement of this affection. It is well known that "a feeling of vertigo seldom fails to be experienced, when a number of impressions are received in rapid succession by any of the senses. . . . A great number of objects viewed in rapid succession breed indistinctness in strong-headed people, and dizziness in others." The same rule obtains with respect to ideas, if poured upon the mind too rapidly. From this source proceeds, first, embarrassment of thought, and then giddiness.[4d] The mind is hurried on too rapidly to be able to grasp completely any object presented to it. Hence the utility of such a study as geometry, in which it is necessitated

[4d] See what has been before said in the third Essay under the head of Fashionable Female Education, *p.* 205.

to make gradual advances. But with this slow investigation of any subject in all its relations, many habits of modern society are wholly incompatible. In order to frequent even what is called intelligent company, an individual who is ambitious of appearing with any reputation, must crowd his memory with an indistinct mass collected from all the various publications of the day. Indistinctness of conception is not the only evil attendant upon these miscellaneous studies. Many of them, as novels in particular, are intrinsically injurious. The mention of this popular sort of reading, again calls forth the Author's indignation; and the warmth of this feeling has, perhaps, led him to assign the origin of certain diseases, with too great boldness, to this source.

But independently of the evils arising from the indiscriminate, or what he elsewhere calls the "lounging perusal of multitudes of volumes without any specific object," the Author suggests that, in early life, even though the books be in general of an improving class, too much is read. On this account, at the same time that he does justice to the talents of those who have so largely contributed to the mental improvement of the rising generation, he feels inclined to doubt whether, upon the whole, their labours have not been injurious, from their providing such various intellectual stimulus for the infant student. "The Juvenile Library" he considers as "a repository of poisons." To form the youthful mind he recommends that the instructor should "trust principally to the senses directed by the living voice." By a contrary plan the foundation is laid for that delicacy of temperament, which invites the melancholy consequences that are the subject of the Essay under notice.

Another fruitful source of distress to most nervous patients, will be found in the extreme readiness with which they are affected by variations of temperature: hence the frequent occurrence and alternation of chills, shiverings and heats. In guarding against the uneasinesses

and the frequently injurious consequences of this alternation, he recommends a plan, differing in many respects from that commonly recommended, to insure hardiness and health. He warns the nervous invalid against making extraordinary exertion; he admonishes him to be careful, and recommends a variety of contrivances calculated to protect him from the inconvenience both of heats and chills: he laments that, even in societies whose boast it is to set people at their ease, the use of many little contrivances for this purpose, should be rendered impracticable from a dread of ridicule. But, at any rate, he exhorts the nervous sufferer to make no rash experiment upon his own powers, either of bodily exertion or of resistance to cold; but to adopt caution at first, and to subdue the morbid influence of both these agents by degrees.

Tremours and startings constitute another division of the long train of evils to which the nervous patient is subject; and another, of which the occurrence seems still more formidable, is the disunion or weakening of the accustomed trains of action. "This is general," says our Author, "in all nervous complaints. The expression that "a person is fluttered," means nothing more nor less than that his thoughts and actions do not proceed with their usual regularity. Hence arises the loss of memory so generally complained of by the tremulous and over-sensible, the epileptic, the hysterical and the hypochondriac." No symptom is more common than this, in advanced stages of nervous affection. And the progress may not, in some instances, be checked till it terminates in idiotism or fatuity. These associated trains, in children, are so weak that they are easily dissevered entirely, by causes which, in the more adult subject, produce only a temporary *dissociation*. Hence "very intelligent children are frequently rendered idiots for life by convulsive or epileptic fits."

"Other nervous complaints no less bring on mental incapacity of

every degree; sometimes blank idiotism, sometimes idiotism with intervening accessions of frenzy," as was the case with the celebrated Dr. Swift. The melancholy close of the history of a man, who, in the maturity of his intellectual powers, excited universal admiration, and who, at last, "expired a driveller and a shew," has arrested the attention of all his biographers; but their endeavours to account for this deplorable termination of a career, the opening of which was so brilliant, have hitherto been unavailing. Pursuing the train of reasoning which originated in the fourth, and is continued in the present Essay, Dr. Beddoes has attempted to give a physical explanation of the causes of this humiliating catastrophe; and has, not improbably, developed its real origin. With a mind that could not be unconscious of its own superiority, festering under the irritation of desertion, and brooding over neglect; with passions of that ardent cast by which genius is generally accompanied; with no friendly voice to cheer his solitude, and no friendly council to warn him of consequences, would it be wonderful if he fell into errors that shook his nervous system to its foundation, engendered a gloomy misanthropy, and realized his own dark prediction that he should "first die at top?" Nor should this investigation be censured: It is capable of affording posterity "more than one useful lesson. It will teach how essential it is to check even slight seeming nervous disorders in their commencement; and how such unwariness in youth as a little information would correct, may proceed through protracted misery, up to criminality, idiocy, and madness."

The grand principle which the Author himself lays down, as the deduction from the present Essay, is "the necessity of avoiding all predisposing causes of nervous disorders." Of the exciting causes he says nothing: For wherever the predisposing causes have operated with their usual effect, it is in vain to seek to avoid them. In such cases, the valetudinarian must seek "not how to shun, but how he may become, once more, enabled to encounter the annoyances of

life;" and while he is pursuing the remedial process, he must "suppress, as far as possible, every species of vehement emotion."

As a further illustration of the subjects treated of in this Essay, he offers a few remarks on the subject of fear. In a great majority of instances, he observes that, terror has been the first origin of fits. The unexpected sight of any object, in itself really alarming, as witnessing a dangerous accident; or of any object only rendered so by early associations excited by imprudent expressions of antipathy in relations or friends, as in the case of spiders, toads, and the like, has often produced these formidable consequences. The importance, therefore, of suppressing the appearances of such feelings before children, becomes evident. Objects generally contemplated with real or affected antipathy, may, by means of natural history, be rendered sources of interest; and the youthful mind may be disciplined still further, by teaching young persons "to act over and over again" the proper parts in dangerous emergencies of common life. "*Shew me what you would do if your cloaths were on fire or if you saw another person in that situation. In a case of apparent death from drowning, let me see how you would go about to restore animation.*" What hardihood might not the mind acquire by these and similar processes!

This interesting Essay concludes with a doubt whether that excessive accumulation of comforts, for which our own country is, above all others, distinguished, may not too often contribute to generate that over-strained sensibility to the petty vexations of life, which often tends to excite nervous diseases. At any rate, the Author warns the indolent not to place too much reliance upon these externals, for warding them from the attacks of such diseases; but rather, to cultivate as far as possible, that degree of mental and physical hardihood, which should render the nerves at once keenly alive to pleasurable, and dead to painful sensations.

From the more serious degrees of nervous affection here treated

of, the transition to insanity is easy; and accordingly, this most deplorable of human calamities constitutes the subject of the tenth, or more accurately speaking, of a second division of the ninth Essay. The Author introduces this subject by remarking that insanity is more thought of in England than elsewhere; and the impression made upon the minds of our countrymen from this source, is conceived by him to be materially deepened, by the various delineations of this disease "under some of its most subtle combinations," from the magic pencil of the poet of nature. It is in characters "where reason is on the poise, where there exists a sort of dubious twilight between sanity and insanity," that Shakspeare has most successfully poured forth the magic combinations of his own mighty mind; and this is one of the principal engines by which he sways, at will, the feelings of his reader.

The common and obvious division which would strike the mind even of an uninformed spectator, upon contemplating a numerous groupe under the influence of derangement, would be into two classes; of whom one should be "storming with a degree of fury unknown in civilized life, and the other wrapt in tenfold gloom." This division has been adopted in a general way (for the separation cannot be exact) by medical writers. Hence the names of *Mania* and *Melancholia* have been applied to express the states of raving and melancholy madness.

The latter of these states is first sketched by the Author with his usual accuracy and force of delineation. The changes induced in the living system and the disorganization discovered after death are minutely described; and the analogy of these appearances to those which are observed in epileptic and apoplectic patients and in such persons as have injured the stomach by various species of excess, is established.

Of the "mental part of melancholy" he gives this simple defi-

nition; that it consists "in having the attention fixed upon a single object, and forming erroneous conceptions concerning that object." In Mania we generally find "a more general erroneousness of the judgment, and a greater violence of the movements connected with those errors." After thus briefly stating the mental distinction, he proceeds to give a vivid description of the physical phenomena of Mania.

The reader is next presented with some curious calculations; relating to the proportionate number of females and males afflicted with derangement, from which it appears that, in this country, the former is the more numerous class; to the influence of certain complexions, or rather, of the constitution generally connected with those complexions, in predisposing to this complaint; and to the greater liability to it connected with certain periods of life. A remark of much greater practical importance is given, on the authority of Dr. Pinel from the register of the Bicêtre at Paris. "I found," says he, a great many monks and priests, as also a great many country people, who had been driven beside themselves by horrid pictures of futurity: several artists, as painters, sculptors and musicians: some versifiers, in extacy with their own productions: a pretty considerable number of advocates and attornies: but there does not appear the name of a single person accustomed to the habitual exercise of his intellectual faculties; not one naturalist or natural philosopher of ability; not one chemist or geometrician." This analysis of the records of an asylum in which so many lunatics had been received, and the fidelity of which cannot be questioned, suggests some valuable hints with respect to the studies most proper to be pursued when any tendency to this calamity manifests itself.

The validity of the distinction above alluded to between raving and melancholy madness, is questioned with much ability. And the fact certainly appears to be, that the phenomena which are laid

down by nosologists as characteristics of these two different states of derangement, often alternate in the same individual; or, in a succession of individuals, slide into each other by such imperceptible gradations, that the distinction cannot be maintained as exact. Melancholy is generally supposed to be connected with a torpor of the mental faculties, but, upon an attentive review of the circumstances of the patient, such a supposition will often be found to be completely erroneous. They are frequently in such cases exercised with the most intense energy.[4c] The transient spectator, however, will scarcely admit the truth of this position. "Once or twice," says our Author, "I have known these mistaken inferences corrected, by a burst of feeling issuing from the gloom of abstraction, like lightning from the bosom of a thunder-cloud!" but it more generally eludes superficial observation. Against this error he warns the reader: "we may find occasions," he observes, "for pronouncing that sensibility is misplaced, but it is much seldomer lost or decayed than is commonly supposed. *Where the treasure is, there will the heart be also.* But if the treasure be in a wrong place, is there therefore no heart?" The feelings may be intensely concentrated and absorbed in some object which (though most probably erroneously) appears to the melancholic of primary interest; and other objects do not possess sufficient influence to rouse him from his abstraction. Just as in common life if "we are lost in thought the clock may strike unnoticed. The sound cannot introduce itself among the links of the passing train of our ideas. The melancholic is still more lost when the fit is on him, and he notices nothing."

"The transition to outrageous action is nothing more difficult to comprehend. What more natural than that feelings and ideas

4c The reader is referred to what the Author has before said upon Dr. Brown's division of the passions into exciting and depressing; see page 109 *and seq.*

strongly worked up together should excite a corresponding energy of muscular exertion?"

A question of more subtle nature is next discussed. It is whether madness admit of an essential character; and it is determined in the negative. By what standard shall we accurately define what ought to be deemed false conceptions of things, or irrational emotions and actions? Men whose range of information is limited, readily attach the imputation of extravagance, to any mode of conduct differing from their own; and to this hasty judgment they are disposed in proportion to their own deficiency. Those of more extensive knowledge "do not extend the boundaries of insanity so unmercifully; but they have no exact criterion by which to distinguish it. They too can only judge of others by themselves. When the mind is occupied and the active powers employed for an end which they cannot conceive as attainable or desirable, then the party seems no longer in his right wits!" But how many who pass uncontrouled among the sane, "would appear subject to the most irrational feelings and actions from false conceptions." How many parents continually "waste the inheritance of their offspring, in an incessant round of wrong headed projects for increasing it." There is here evident false conception and injudicious adaptation of means to the end in view, and this would furnish "*primâ facie* evidence of irrationality."

Dismissing these nice discussions, the Author proceeds to point out some peculiarities of the confessedly insane. One of his first positions is "that the mind acts with unusual energy; and that torpor is inconsistent with insanity in any form." His objections to the supposed occurrence of this condition of mind in hypochondriasis have been already alluded to; they are here repeated with additional illustrations. A second position is, that "for the most part, the ideas in insanity are vivified; or that they are exalted to the

force of impressions." The permanence of these impressions becomes the characteristic sign of complete derangement. Thus, as he observes in a manuscript note upon this subject, "if a countryman wandering in the dark should encounter a black sheep, and his terrified imagination immediately represent the animal to his mind as the Devil, this is not insanity; for the returning light of day, or even that of a torch would correct the mistaken impression. But should the delusion continue, in spite of these circumstances, there would be no hesitation in pronouncing upon the case".

In consequence of the activity of mind in derangement, and the confusion between ideas and impressions, "from a small germ of fact there shoots out in a moment an extensive ramification and luxuriant foilage of imaginations; all equally distinct to the mind with the first perception." Hence originate the dark suspicions, the uneasy apprehensions, and the strange ideas with respect to the various metamorphoses which the patient fancies that he has undergone, that constitute such prominent features in the history of mental derangement.

The Author next proposes as a question for the consideration of the philosophical pathologist "whether dreams are not sometimes continued, without a break, into insanity; and whether they do not increase the susceptibility to its exciting causes." In proof of the affirmative of this proposition, he cites some remarkable examples, and deduces some important practical inferences. Thus, in cases where uneasy nights are observed, whether there exist or no any family disposition to insanity, the means suggested in a former Essay for procuring tranquil repose, should be assiduously resorted to: "the state of the patient during the day succeeding unpleasant dreams should be noted; and on the accession of any suspicious appearances they should be put on an abstemious diet, carried to fresh scenes, have blood taken from the head, and diligently pursue

such a course of medicine as their symptoms seem to require." The medical treatment which, in confirmed insanity, might be productive but of little effect, is often decidedly efficacious in its forming state; and hence the importance of detecting its earliest approach becomes manifest.

"Delirium" is considered by the Author as having "just the same relation to insanity that dreams have; that is, as being undistinguishable while it lasts". Delirium too seems to have the same varieties. In its treatment also it acknowledges corresponding laws. If delirium "can frequently be arrested by words uttered in a loud voice; by the introduction of a new face, or any impression strong enough to supersede the imaginative ideas," so also may insanity. Of the truth of this proposition the examples adduced afford the most satisfactory evidence.

A view of the various circumstances which operate as remote, predisposing, or occasional causes of madness, and of the transition to insanity, is next sketched with peculiar force. Among these, injuries of the head, habitual intoxication, fever, and the indulgence of violent passions or emotions of any kind, hold a pre-eminent rank. The connexion by which injuries inflicted upon certain corporal organs, bring the mind into sympathy is, as yet, obscure; but we know that the fact exists. "Blows on the head give occasionally bolder relief and brighter colours to certain ideas. Certain states of the brain may take place independently of local injury, which may distribute excitement to that organ unequally; and hence, particular trains may act with tenfold energy. In this manner, many mental phenomena which occur in mania, may admit of probable solution; and the revival of long-forgotten trains, (as for instance of a language acquired in early youth, and, during many years of life, apparently obliterated from the memory,) which occurs sometimes shortly before dissolution, may be explained in the same way.

It is well known that William Penn found a part of the spot which he had selected for the city of Philadelphia, occupied by a few Swedish families. An intercourse with their English neighbours rendered it necessary that they should acquire their language; and this circumstance gradually effaced from the younger members of the colony all recollection of their native tongue. An aged and highly respectable Swedish clergyman informed Dr. Rush, that he had often been struck with astonishment at hearing some of the oldest members of his congregation, at the moment of dissolution, pour forth their prayers and ejaculations in the Swedish language; although from intimate personal knowledge, and previous intercourse, he was enabled to affirm that during health, in a great majority of instances, their memory had retained no trace of it. It will not be wondered at, that frequent intoxication should have a tendency to produce insanity. Fevers may act in a similar way from their frequent determination to the brain; and the passions, if indulged without restraint, or suffered to prey upon the mind without gratification, may produce all the extremes of maniacal or melancholy derangement. False notions of religion, and the inordinate pursuit of wealth with its attendant anxieties, often produce similar effects. The enthusiast may, according to his temperament, imagine himself surrounded by all the horrors of damnation, or may feel his mind perpetually exalted by a succesSsion of extatic visions: the speculator may feel his toils rewarded by an immense accumulation of imaginary wealth; or, while that wealth is really overflowing his coffers, may shrink from the horrors of fancied poverty. These effects will, in most instances, be modified by the previous character or habits of thought of the patient. "The unfortunate father," says our Author, "from whom Garrick caught the gestures and countenance of his Lear, was, probably, of a temperament the reverse of sanguine, and little accustomed to the dreams of hope, even before

his infant dropped out of his arms from the balcony into the street. So his imagination could but perpetually reproduce the scene in its original horrors. We know from the records of insanity, that another parent, of a disposition previously more cheerful, might easily have mistaken the pillow, for the child sleeping after he had been dressed by the surgeons: and kept eternal watch to prevent him from being disturbed by any noise."

After thus briefly sketching the principal phenomena of derangement and marking some of its transitions, the Author proceeds to offer some hints on the subject of prevention. "The first great preservative of mental as of bodily health is active occupation . . .Mere labour is not enough. The thoughts and actions should be combined in efforts to produce some useful or curious purpose." Yet even here some degree of caution may be necessary. "The uniform operations of ingenious artizans sometimes wear a course in the brain, along which the torrent of imagination rushes with destructive violence."

Temperance is of immense importance. "Repeated drunkenness brings predisposed persons nearer and nearer to insanity; and the time at last arrives, when the fire kindled by intoxicating beverages, continues to blaze on without intermission." But above all, the discipline of the passions should be inculcated. Rational information should be communicated; and the facts respecting the power of imagination, should be brought into view, and presented in a judicious selection, "from the first whims of caprice, up to the wildest ravings of amorous, avaricious, and religious insanity." The intimate connexion between the moral and physical state of man, "the sympathy that exists between the stomach and the spirits," should be pointed out to young persons, and their own feelings may be appealed to for the truth of the doctrine proposed to them. The wise counsel of the Author of Zoonomia is enforced; viz. "to

orce by frequent repetition, upon the disordered mind, rational ideas exactly the reverse of those by which it has been disturbed." Attention in the choice of books is also inculcated. The mind should be diverted from the perusal of writings "congenial to a dangerous habit of thought," and attached to "such as are at first least likely to please." By a sedulous and enlightened application of these few principles, much might be effected in restraining or counteracting mischievous associations, and forming new ones of an opposite tendency.

In vindication of the opinion that a knowledge of the excesses of the imagination would operate as a preservative against them; the Author refers to the small number of poets who have become insane. "None at least, perhaps, have derived their insanity from their poetical vein. Yet, as from the nature of their favorite pursuit, they must often purposely stimulate their imaginations, and exalt them almost to an ideal phrenzy, such a consequence might have naturally been apprehended." His explanation of this phenomenon is ingenious. "They have," says he, "a practical knowledge, at least, of the way in which imagination is affected. They are therefore in the secret. They stand in the situation, in which we would wish to place those who seem in most danger. They are not merely worked up by passion; but however much they may work themselves up, they have a goal in view, which hinders their thoughts from going away past recal.

With the above remark, the Author terminates his Essay on Insanity. The connexion between the subjects of the third, fourth, eighth, ninth, and tenth Essays has been already adverted to. In the third and fourth we have seen how various causes, of which some may appear to the superficial observer of but little comparative importance, operate materially upon the future health, and impair alike both physical and mental energy. We have seen how the imprudencies of a more

advanced, but still youthful, period, impair the power of enjoyment, destroy the functions of the stomach, and lead by sure although scarcely perceptible gradations, to some of the most melancholy evils which afflict humanity. Probably, if the analysis of these Essays have been executed with any success, this connexion will be more easily traced in so brief an abstract, than amidst the multiplied mass of illustration and allusion, and the frequent introduction of various analogies, which are met with in the original work. So multifarious was the information possessed by the Author that his mind seems to have been crowded with images, which suggested every possible variety of illustration; and in consequence of this, his subject occasionally becomes "dark from excess of light." By attention, however, the thread of his argument is easily retained, and we trace, though sometimes after long intervals, the full illustration of his precepts and doctrines. When, for example, in the Essay on certain parts of female education, he enlarges upon the mischievous absurdity of overwhelming the mind of the shrinking pupil, by a succession of masters, and distracting and frittering away her attention by an endless variety of pursuits and occupations, the common reader will certainly not anticipate, and perhaps will scarcely trace the connexion, between the whirl of ideas thus excited, and that, which in more advanced life, and under circumstances less favorable, terminates in vertigo and epilepsy. But when the various moral and physical causes which tend to produce this distressing affection, are attentively reviewed, the connexion becomes evident. In the Essay of which the analysis has been just completed we have a picture of human calamity still more awful, yet originally indebted in many instances, to sources apparently equally unimportant, for some of its most terrific colouring. In cases such as those of which this Essay treats, the mere administration of drugs is nothing.

Proverbially difficult as the task may be, the Physician must, in such circumstances, "minister to the mind diseased." He must give a new direction to the course of ideas. He must dissever or revive old associations, or form new ones according to circumstances. The complete victory over this, the most humiliating and afflicting disease to which human nature is subjected, is perhaps reserved for a distant age. Whenever atchieved, it must be atchieved by one, who, to a profound acquaintance with the physical laws of the human system, shall unite the capacity of applying all those principles, which can be derived only from metaphysical research equally profound, into the laws of the human mind.

The concluding essay in these volumes consists of remarks on various miscellaneous topics, chiefly relating to prophylactic medicine. It sets out with an observation upon the folly of making such a parade about humane societies for the recovery of the drowned, and such an outcry about the appearance of a mad-dog "while we neglect calamities so much more frequent than the one, and so much more terrible than the other." The attention of mankind is too frequently occupied by objects in an inverse ratio to their relative importance; and this conduct he compares to "the paying tithes of anise, and mint, and cummin, while the weightier matters of the law are neglected." Probably, the victims of hydrophobia scarcely exceed one in a million annually. From documents and calculations it appears more than probable that one in each hundred of the inhabitants of England and Wales perishes every year in consumption. It is the characteristic of barbarous nations to be impressed by what is extraordinary only; to attend with interest to an eclipse or an earthquake, and to contemplate with indifference the ordinary revolutions and magnificence of nature. With respect to the present question our habits appear equally unenlightened with those of the savage. If one or the other must be neglected let us make a fresh choice "let us take heed to our habits and leave casualties to shift

for themselves. It would, I believe, says our Author, make a very trifling difference in the bills of mortality or in the sum total of human misery, if we thought nothing of the events, however melancholy each singly may be, which come upon us *through the visitation of God;* provided we were emancipated from such personal misfortunes as can be immediately traced up to our own ignorance or folly."

The list of these misfortunes, may be swelled by the insertion of some disorders which "have been heretofore generally referred to the class of *incidental;* as if they were the products of the seasons, or the effects of causes out of the reach of human prevention." One of these is Cholera, which so frequently appears in the commencement of the autumnal months. Of this disease the Author gives a minute account. He traces its probable origin from errors in diet, and offers some important hints and precautions on the subjects of its prevention. It is obvious to remark that, in Cholera, the peculiar susceptibility of one set of organs, the stomach, liver and alimentary canal, connected with a certain season, invites dangerous and sometimes fatal attacks; but in all states of the system, particularly in weakly people, common Faintness and transitory Feverishness are occasioned by very obvious oversights. "Fatigue from travelling or from long efforts of attention, especially when combined with fasting, is one of the conditions under which they are most apt to occur." The necessity of the very gradual administration of aliment to a person long deprived of food is generally known. The caution which cannot be dispensed with in an extreme case of this kind, is required in a proportionate degree, in the instances just enumerated; and in a variety of other cases of long inanition. Yet our habits of life are frequently in direct opposition to this rule; and feverish affections more or less slight are induced in consequence. Hence results the obvious propriety of not suffering organs so important to fall into a state of exhaustion.

He proceeds next to give a general idea of Febrile contagious

diseases, and of the laws by which they are propagated; which comprises a condensed view of the existing state of opinion and information relative to this subject. The general results are first, that "certain disorders, and fevers among others, are communicated by actual contact of the person labouring under them; and even by a near approach without actual contact." Secondly, that "the power of contagion to infect, extends but a little way from the patient in whom it is generated, when he is confined where the air has free entrance and egress." In proportion as science has been extended, the terrifying apprehensions of a diffusion of contagion to a considerable extent in the atmosphere, have disappeared. It is now known that the plague itself is not communicable beyond a distance of three feet. Probably, few contagious diseases, in ventilated apartments, can infect at so great a distance. But if this be the case where ventilation and cleanliness are attended to, imagination can scarcely go beyond the limits of fact, in painting the scenes of misery which arise from the combined influence of filth and confinement. Even beneath our temperate skies, these causes co-operating with febrile disease, soon acquire a poisonous activity superior in its relative mortality to the plague itself. The consideration of these facts and of the laws of contagion, has led in many situations to the adoption of houses of recovery and fever wards; and the results have at once been honourable to science and soothing to humanity.

But, in addition to the powerful influence of ventilation and cleanliness in preventing the propagation of infectious febrile diseases, modern discoveries have proved that "the contagion of low fever (and probably of all contagions producing febrile disorders) may be destroyed in all their states, by the fumes of some of the mineral acids; and that these fumes can be safely disseminated through the air of apartments without removing the patient".

The history of the discovery of acid fumigations, and the mode

of employing them is next given, together with a variety of salutary cautions calculated to preserve the attendants on the sick from the risk of contagion. These principles, the Author supposes, might be found as successful in arresting the progress of Scarlatina, as they have been proved to be in Typhus; and it will be remembered that, if the superior advantages of cleanliness and ventilation protect the mansions of the opulent, in a great degree, from the latter of these distempers, they are by no means secure from the visitations of the former.

A hasty sketch next succeeds of the benefits which have been derived from the fever wards, houses of recovery, and boards of health which have been established in many large and populous towns. Dr. Glark's suggestion of a national board of health for the prevention of contagious diseases, is mentioned with approbation, and the Essay concludes with a proposal for the enlargement and organization of such an institution, and an extension of it to chronic diseases also: and after giving some idea of the wide extent of misery inflicted by these diseases upon the humbler classes, he remarks that he does not see "in what respect, the title of medicine to a national establishment is inferior to that of agriculture."

Such are the contents of the three volumes of Essays published under the title of Hygëia. The analysis of them into which I have entered, may, I fear, be thought by some to be unnecessarily protracted. One circumstance which has increased its length has been that they contain occasionally, the sentiments of some of his former publications expanded or illustrated. For which reason I contented myself with a more scanty notice of such publications; preferring the opportunity which a review of these volumes afforded, of presenting his opinions in one collected view, and in their most impressive form. In addition to this they have always appeared to me so full of originality and ingenuity, and so strongly illustrative of his peculiar cast of thinking upon a variety of topics, that I have found

a compression of their contents a singularly difficult task. Of popular systems of medicine we have had enough. We have treatises and compendiums which profess to inform even the most ignorant, how to treat all the diseases which assail the human frame. The volumes which have just been noticed are not of this stamp. Their plan and their object are widely different. No one could be more fully aware, than Dr. Beddoes, of the evils produced by writings of the former description. In a prospectus which preceded, by a few weeks, the appearance of this work, he observes that, as general education unwisely excludes the knowledge of the human frame, the public at large must be totally incapable of profiting by writings, to which such knowledge is an indispensable pre-requisite. "Hence," says he, "I conceive that in the generality of houses there cannot be an inmate more dangerous than the *Family Physician*, and that a system of *Domestic Medicine* must prove a constant source of domestic mischief."

The general impression left upon the mind by these Essays is that they contain many valuable observations, of which a great proportion was never delivered before, and a still greater, never delivered so well. They are not only calculated to impart most important and novel instruction to the general reader, but also to present many valuable hints to the medical practitioner. There are few who would not find the time bestowed upon them, amply rewarded, by seeing new lights cast upon some of the most tedious and difficult diseases which afflict humanity.

Their defects are, an occasional want of that "lucidus ordo" which is so necessary to give an inquirer into a new science clear ideas upon the subject; and, as has been elsewhere hinted, an occasional repetition of the same ideas, beyond what was strictly necessary either for conviction or illustration. The nature of a periodical publication written upon the spur of the moment,

and a profound feeling of the importance of certain leading ideas, will at once account for and excuse these defects. Of such imperfections in his work, the Author was as fully sensible as the most fastidious of his readers. Even while the concluding Essay was printing, he expresses in one of his letters, his dissatisfaction with the arrangement of certain parts of it; and observes that "whenever he has an opportunity of revising it, it will undergo great change as to form, though not perhaps as to substance." Some months before his decease he had meditated, and even announced for publication, a condensed edition of Hygëia in one volume. I should have gladly communicated this as a valuable legacy to the public, had any traces of the execution of such a design been found amongst his papers.

The praise of ingenuity, of acuteness, of eloquent and forcible description, has I believe never been withheld from these volumes; but they have been objected to, both in their general scope, and their particular detail. The propriety of popular instruction in medicine has been questioned; whether it be extended to the cure, or be, as in the present instance, restricted to the prevention of diseases. It has been questioned whether it be practicable to keep separate these two branches of knowledge. To me I confess the distinction is sufficiently apparent; and I could not state it more clearly than the Author has himself done in the second Essay (*see page* 199). But if this objection be got over, the other still remains; we are warned against the consequences to the comfort of the individual, of presenting before him images of disease, which are in general observed to impress the young medical student so forcibly, as to generate a variety of uneasy feelings, and inflict upon him, in fancy, those calamities, the history of which he is studying. Nor is it, we are told, till he be further advanced in knowledge, that these apprehensions subside. What then would be the effect of general instruction, obviously of a more imperfect kind, and which could not

be expected to be sufficiently protracted to correct itself, as in the case of the medical student?

This objection certainly possesses some weight; but I apprehend that it will in a great measure be disarmed by one or two considerations. In the first place, a system of preventive medicine does not, by any means, enter into that minute detail of individual diseases, which a system of practical medicine must do. It only lays hold of some particular instances, to the danger of which every individual is more or less exposed. If it be admitted that from the present habits of civilized society man is thus exposed, is it philosophical to withhold instruction even although it should be attended by some present pain, when the want of it may involve him unconsciously in permanent misery? Much of preventive medicine consists, of course, in prudent cautions, in tracing the consequences of actions beyond their first momentary effects, and in fencing the system against certain diseases, which in many families, and the number of such is, I fear, daily increasing, will, without such cares, demand their victim with a rigour which no prayers can soften, and no efforts can avert. Pictures of actual suffering are held up only as warnings to make the lesson more impressive. "Does the reader revolt," says our Author in allusion to this subject, "at so painful an employment of his thoughts? Does he not know that, in this world, disagreeable things must either be thought of before hand, or endured?"

There are, however, it must be confessed, some passages in the Essays which treat of nervous diseases, of epilepsy and mania more especially, which it might be scarcely prudent to entrust to the perusal of a person disposed to hypochondriasis or any similar affection. But it is one thing, to withhold this terrific painting from those whose minds are debilitated by disease; and another, to present it as a tablet of instruction, a beacon or warning to those who are in health. Nor is it to be rejected because although it may prove a source of

the most salutary instruction to a strong mind, it may overpower one less capable of imbibing it. The aliments from which a sound and vigorous digestion would extract healthy juices only, might in certain conditions of a debilitated stomach be fermented into poison. But is this an argument why the aliment should be withheld from all?

Objections have also been offered to particular passages of these volumes. Popular prejudice will plead loudly for the use of tea; but although general opinion is certainly in its favour, many authors have, upon various occasions, cast doubts upon, or wholly denied, its salutary effects. The late benevolent Jonas Hanway, introduced in the Journal of an eight days Journey through a part of England, an Essay on Tea; in which he condemns its extravagant consumption, on the grounds both of health and policy. His Essay passed under the review of the Colossus of modern literature, who confesses himself to be "a hardened and shameless tea-drinker; who has for twenty years diluted his meals with only the infusion of this fascinating plant; whose kettle has scarcely time to cool; who with tea amuses the evening, with tea solaces the midnight, and with tea welcomes the morning." The opinions of this great man might, in other instances besides this, be sufficiently imposing to consecrate error; and his example and authority have been fondly quoted by many a sedentary student, who while he conscientiously avoided the more dangerous and undisguised seductions of the various modifications of alcohol, has conceived that the use of tea was equally friendly to health and to morals. Persons however of this class, may probably expect to endure some of its most injurious effects; for the stomach that is not habituated to a stronger stimulus, is the more sensibly affected by that under consideration. The writer of this Memoir is confident that he has seen the common effects of green tea, watchfulness at night, or languor and gnawing pains in the stomach during

the day, produced much more frequently, in instances where the patient habitually drank water, than in those where he lived more generously. And the example of the great Lexicographer himself, if attentively reviewed, will probably afford strong reason to suspect that he was a frequent sufferer from its deleterious influence. That morbid hypochondriacal feeling which so often clouded his mighty mind, arraying the past in gloom and the future in horror, was, most probably, greatly aggravated by the indulgence of which he innocently and unthinkingly boasts. His remarks upon the subject, will afford a strong additional proof of the justice of the remark in the commencement of these Essays, upon the inconclusive reasoning with which men, of otherwise strong mental powers, content themselves on medical subjects. Though he admits the increase of the diseases commonly called nervous, he attributes that increase, not to the use of tea, but to the increase of luxury. In this, it is probable, that he is, to a certain extent, correct. The important point to insist upon is, that tea is especially pernicious to a system previously enervated by luxury; and that where a predisposition to these unfortunate affections exists, it should be withheld, with almost equal care, as an additional load of bed-cloaths from a patient burning with fever, or an additional dose of spirits from one already intoxicated.

In one part of his review, Doctor Johnson contends that tea neither exhilarates the heart, nor stimulates the palate. Yet, the terms in which he speaks of the solace which he derives from its use, certainly contradict, from his own experience, the former part of this proposition. He questions the effects of tea upon the health of the drinker, because, he observes, that "after soliciting them year after year by this watery luxury, he has not felt them." How much he was probably deceived in this, has been already hinted. Although the external appearance of Doctor Johnson had suffered much from

the ravages of a disease which had assailed his early infancy, his form appears, in subsequent years, to have shewn a robustness and nerve analogous to his vigour of mind : and it is improbable that the relics of the affection alluded to would have been sufficient, alone, to have induced those hypochondriacal feelings, which occasionally contracted his great powers and capacities to that dwarfish scale, the traces of which have, in some instances, been imprudently blazoned to the world, by some of his biographers.

Many will be disposed to think that the picture of the evils attendant upon the common seminaries of education is overcharged ; and that the depressing effects attributed to the nature of the studies pursued in public schools, in particular, border upon extravagance. I should myself have been disposed to think so, were it not for the striking proof of its truth which is furnished by Hayley's life of Cowper. Perhaps the greater portion of the misery which darkened the future life of that amiable poet, might be traced to the sufferings which a timid spirit underwent amid the shock of a public school. The publication of this instructive piece of biography, was subsequent to that of Hygëia ; the Author had therefore drawn his information from other sources ; and this proves that the affecting example furnished by a man whose genius and whose heart were equally admirable, is unhappily not a solitary one. I am indeed aware that the melancholy dogmas of a certain religious system, seem afterwards to have materially contributed to the production of this effect. But, if his life be reviewed, it will be seen that his first alienation of mind did not proceed from this source, although it invited its influence ; and it may be advanced as a maxim in morals as well as in medicine that, " Causa occasionalis non nocet nisi prædispositis."

In like manner, he may, perhaps, be said to have spoken with too great severity of female boarding-schools. Many of the errors of these institutions proceed, no doubt, from that ignorance, of which

their conductors participate in common with a great portion of society. The bodily and mental functions are both favored by simplicity of diet ; and a too blind obedience to this rule may have led to mistaken ideas both as to the nature and quantity of aliment proper for youth. In like manner a desire to render their pupils hardy and active, may induce them to be less attentive to their state with respect to temperature ; and to mistake the torpor of disease for voluntary indolence.

Another remark may be offered in excuse for the plans generally pursued at such seminaries. To use a familiar illustration, the article must be manufactured in a style to meet the demand. If, in consequence of an ill-judging taste, superficial accomplishments attract the attention due only to virtue, to real good sense and solid information ; and if parents cannot rise superior to the desire that their children should be educated conformably to such a standard, what remains for the conductors of such institutions, but to " sigh and submit?" And such, I have no doubt are the feelings of some, who, if left to the unrestrained exercise of their own judgments, would form the minds and persons of their pupils, to that lofty standard which English women only have yet attained,[4f] and of which an example may be seen in the wife and biographer of Colonel Hutchinson.

It will, perhaps, be objected that, here as well as in some others of his writings, he has represented the existence of Scrophula and Phthisis, of the former more especially, as too general, and excited needless alarm. The uninformed and blind partiality with which fathers and mothers, in general, review their progeny, may easily prompt such a remark ; and happy will they be, if bitter experience do not correct their hasty judgment. But I am afraid that few

[4f] See the Edinburgh Review, No. 25.

intelligent parents of a numerous family, will be able to take such a review, with entire satisfaction. I apprehend that many of them, if they recal to mind the system of physical culture pursued with regard to themselves, will be able to recollect various particulars of diet and exposure, which although they bore them without inconvenience, their children cannot sustain with impunity. The habitual contemplation of human suffering which is inseparable from the duties of the medical profession, may perhaps cast a gloom over the prospect of the present condition of human existence. But allowing for this effect, there is still ground to apprehend, if the habits at present existing amongst the affluent and those in what are called easy circumstances, should continue to prevail, that our physical state will come to be too faithfully characterized by the picture of moral degeneracy given by Horace :

" Aetas parentum pejor avis tulit
" Nos nequiores, mox daturos
" Progeniem vitiosiorem."

It is not that our manners are more corrupt than those of our ancestors, but we are subjected to the operation of too many debilitating causes, from which they were wholly exempt, or to which they were only partially exposed, to be able to resist, as they could, the consequences of excess. The more serious effects of this difference are detected only by the medical observer, but the lighter ones are observable in every festive party, and are strikingly evidenced in the spiritless inactivity of fashionable young men. The charms of beauty, or the animation of sprightly music, do not act as a sufficient stimulus upon their exhausted excitability, and we see many of them not affectedly, but really, exhausted by the effort of one or two dances. Doubtless, as our Author has elsewhere observed, the fashion of apathy and indifference, and a studied neglect of the female sex, may, in some instances, be followed from affectation ; but it was

assuredly begun from necessity, by some enervated debauchee, to whom life had lost its charm ; and a similar necessity still preserves its existence. It is probable that if such ideas of the origin of this fashion were more universally diffused, the feeling of shame might operate as a moral remedy.

Before the subject of these Essays is finally dismissed, it should be noticed that a principal part of the fourth Essay had to encounter upon its first appearance particular severity of censure. " This was," as the Author himself elsewhere observes, " in order." It is a melancholy reflection that the annals of mankind will scarcely furnish an instance, where any attempt to confer benefits upon them, however essential or important, by unusual means, has not been assailed with vehement hostility. I believe, that some even of the literary journals joined the popular clamour. Their conductors, as men of science, ought to have known better. Such censure must strike the philosophical observer as in the highest degree imprudent and injurious. Assuredly, there can be no impropriety in communicating any information with respect to the physical state of man, provided it be done with a becoming seriousness : And I am yet to learn that this Essay is deficient in this requisite. But however spurious delicacy[15] may affect or feel offence, the facts remain unchanged ; they exist : shall we attempt their correction or no ?

[15] " I call those *over delicate* who would sooner commit a great than a small crime ; sooner break a rule of morality than of decorum. I call Lady Macbeth *over-delicate*, when she urges her husband to commit a murder merely to save an oath. I call the Archbishop of Novogorod *over-delicate*, who thought assassination less odious to Heaven than three Lutheran churches. I call those *over-delicate*, who rather than that mention of certain things should arise, would risk the danger of their unexperienced children debauching themselves to death.—Those I repute truly delicate, who are studious of decorum, except when some duty calls upon them to violate it."

Note to the Eighth Essay.

In addition to this vindication, I am happy in being able to add one still more ample, if

I am far indeed from contending that any thing could so effectually stem the torrent of the passions, or withstand the force of temptation, as deeply implanted religious principle. But there are those who are unfortunately strangers to its obligations. To supply this deficiency, how desirable would it be to form associations in early life, which should inseparably connect the idea of temperance, moderation and self denial, with real happiness. Nor would such an association weaken, in minds differently impressed and differently educated, the sanctions of religion. On the contrary, an additional motive to virtuous conduct would be furnished, by every additional proof that the Author of nature has "not only assigned eternal rewards to virtue, but that, even in this life, the lines of our duty and our happiness are so frequently woven together."[4h]

After this very ample analysis of one of Dr. Beddoes's most important medical productions, the attention of the reader will

that were needed, from one of the Author's common place books, referring to the spirit in which a popular book of medicine should be written. "Such a book should be frank. The Author must be guided by the idea that he is performing a very sacred duty, which is in danger of being violated by nothing more, than by suppression. He must pierce through the disguise cast over the sickly, by the arts of the Taylor, the Milliner and the Embroiderer. He must follow them into their retreats, and uncover the nakedness of human nature. He must penetrate to the skin, and even deeper than the skin. Whatsoever it may cost an Author in his feelings or his fortune, (and there are subjects of popular medicine which it is scarcely possible that he should consider without anguish, or treat without appearing grossly imprudent) he should assume that intrepidity of spirit which Luther displayed, and which he described when he said, "Offence here; offence there; necessity breaks through iron bars and takes no offence. It is my duty, so far as can be done without danger to my soul, to spare weak consciences. But I must provide for my own soul, though half or all the world should take offence."

"Freely to acknowledge and freely to preach the word, is the noblest act in the conduct of a christian man; and on that should be staked life and limbs, fortune and honour. A clear conscience that is sure of its affair, does not stand hemming and hawing, but speaks out plain and straight forward."

4h *Mackenzie* in the *Man of Feeling.*

perhaps be relieved by the perusal of a few extracts from a series of his correspondence; the greater part of which, as appears from frequent occasional references to different topics which they contain, took place while these Essays were in the course of publication.

In a short time after the first discovery of nitrous oxyd, it was incautiously administered to a highly hysterical female, whose case is alluded to in the "Notice," as affording a decided warning against its employment in similar affections. This Lady paid an accidental visit to the Pneumatic Institution, in company with a gentleman who was perfectly sceptical as to the wonderful powers attributed to the newly-discovered agent. At his instigation, his fair companion, who had scarcely more faith than himself, and felt no apprehension of any ill effects, inhaled a portion of the air. Most distressing consequences ensued: she was seized with violent hysteric paroxysms; their severity excited considerable alarm; and Doctor Beddoes, at once anxious for the reputation of the new remedy, and interested by the sufferings of a lovely and elegant woman, though previously unacquainted with her, complied with the entreaties of the gentleman whose imprudent request had been the source of the mischief, to receive her into his own house, in order that his medical cares might be more unremittingly devoted to her. The acquaintance thus accidentally begun, was soon improved into a cordial intimacy between the fair sufferer and Doctor and Mrs. Beddoes. Certain domestic circumstances of an unpleasant nature in which she was involved, heightened their sympathy, and produced an acquaintance with some other members of the family. A younger sister, in particular, soon partook of that regard which the elder had excited. Both were afterwards occasional inmates of his house, and with both he occasionally corresponded. The topics discussed in this correspondence, of which I have been permitted to make use, are very various. The passages selected are principally taken from letters addressed to the younger

sister, during a residence of some months on the sea-coast. She had been threatened with a pulmonary complaint, and had removed thither for change of air. In these letters, he at times assumes the character of the purely medical counsellor; at others, his object appears to have been, to support her spirits and to animate her exertions, by proposing interesting subjects for her observation and inquiry. With these, he has occasionally mingled observations on life, pregnant with good sense, but generally delivered in a playful and unassuming style. So few of these letters have any date, an omission of which the Doctor was habitually guilty, that it would, in a majority of instances, be a vain effort to attempt to class the extracts from them in their due order of time; but as their subjects are general, accuracy in this respect is of little importance.

No. 1.

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"Your sister says that you are very industrious; and that you read a great deal. I am very glad to hear this; not that I think reading a great deal, absolutely and inevitably, a good thing. It is often a very bad thing, as I think that you will easily perceive upon a little consideration; though probably I have had more opportunities of knowing in what respects it is bad, than you have. In general, whatever reading creates no disposition to observe nature or life, soon cloys; and in such reading, all degrees of feeling are experienced, from keen relish, through indifference, to satiety. Have you no acquaintance who resort to a book to keep themselves from yawning, and often without finding the intention answered? Now, at some former period, it is ten to one but the very same book would have given the very same person exquisite entertainment. I believe, all books that do not refer to some natural object or to some general question, come under this description. But is it not curious enough

that there should be a kind of reading which proceeds in exactly the reverse order; beginning in indifference or aversion, and perpetually increasing in interest as you go on? This is the case with almost every kind of science after the elements are mastered; and the examples of Law, Mathematics, and so on, are a standing paradox to desultory readers, who can never comprehend the increasing ardour of their respective students, because the fact is so contrary to their own experience.

"Science of every kind is to be recommended, because some degree of bodily exertion is indispensable in most sciences; and books alone, must some time or other induce languor. In your situation, I know the difficulty of putting in practice any thing you might wish of this kind. But I am mistaken if you have not an active curiosity and a firm mind; and these will conquer, in a great measure, the disadvantages of situation. You will ask me what you can possibly do? I see no physical science you can meddle with, except Botany; and what is usually called understanding botany, is only the art of readily finding out the name of a plant, in a catalogue very ingeniously arranged by Linnæus. But this is worth while, as in making out the name, you must observe some curious things; and as discoveries respecting the qualities of plants are hourly making, which can have little interest, except to those who have a knowledge of the particular plants in question. You may, ere very long, be in a situation to command all the resources of science and literature. You can very easily make yourself mistress of Arithmetic, which you will find very useful and agreeable, *after a time*, and why you should not go on to some Mathematics afterwards, I cannot conceive.

"You will find a prodigious advantage in some connected study, if you meet with incidents in life that wound your sensibility. And those who have the habit of resorting to any occupation, when they feel the first sting from disappointed ambition or love, will much less often grow mad or miserable than their neighbours."

No. 2.

"I feel my dear ——, what discouragements you have to thwart you: and am very far from presuming that if I were in the same situation, I could bear up under them. It all depends very much upon the power of the mind, to force itself from the present scene, and fix itself on prospects at some distance. A girl whose spirits are broken in early life, has suffered one of the greatest of misfortunes. Cheerfulness and beauty set one another off: But gaiety is the charm more to be depended on for giving pleasure to those continually about you; and with; regard to yourself there cannot be a question. And I believe gaiety once lost, is one of the most difficult of all things to recover. I have often witnessed the conversion of gaiety into gloom: I do not know that I ever saw the return of the former in all its original freshness and glow. How far it is possible for you to save yourself from this mental palsy, I can scarcely judge; but those who fall into it can hardly be retrieved by the most prosperous circumstances. The sure way of avoiding it, is to prevent the imagination from resting on the particulars of an odious situation. You have, I believe, as cheerful a mind as almost any of our French prisoners; you have not the prospect of a longer captivity; and you know that they have successfully relieved themselves from the horrors of their situation by the most simple of all expedients. By a knife and a bit of ivory, and often by a few straws and threads of silk, they were able to set damp, darkness, filth, short allowance, and I know not what besides, at defiance. Without doubt, had they made these nuisances the frequent subject of their thoughts and conversation, they would have been wretched in confinement, and moped or mad for life. Whether I could follow it or not, is another question; but the rule I should wish to observe in disagreeable circumstances, would be to forbid my senses to dwell upon them; and above all things, not to make them the subject of meditation, condolence, or complaint. I think I could prove to you that in the situation in

which many women whom I have known, have found themselves within these few years, the resources you can command would have appeared capable of conferring the highest happiness.

"I had a good deal more to say, but I will first request you my dear ——, to tell me under your own hand, whether these thoughts give you any feeling like having drank a cordial; or whether they seem as comfortless and unrefreshing as advice usually does."

No. 3.

"My dear ——, I was sorry on opening the parcel brought by Miss W. to find nothing but the book. Your letter has made me a great deal more sorry still. You describe your want of power to overcome your difficulty with so much force and feeling, that one would think it impossible you should not have the energy to overcome it, oppressive as I am very sensible that it is. I am sure it is impossible, my dear ——, that a young female that has so much to recommend her at first sight, and so much more on better acquaintance, should, *time enough*, fail to be noticed by some person whose notice is worth having. And I am also sure you will then be sorry you gave that time to present misery, which would have rendered you more capable of enjoying future happiness, and more certain of its continuance. Here, I see a number of young women destitute of your advantages, working in the face of difficulties, much less indeed than those you labour under, but still discouraging. Could you act up to your conviction, you would equal them at least in their highest excellencies; and you will feel the keenest mortification, if, on coming hereafter into their society, you feel an inferiority which your conscience will tell you, was simply such as you sunk yourself to.—I used to tell the young men at Oxford, that I was sure they would be at a great loss for mistresses and wives; as the young women their equals would be so superior to them, that they would not be able to find any not above their own level. This improvement

has gone on working in secret, but its effects must appear. And from the public changes of Europe, another tone in ten years time, perhaps, in five, must take place in society.

I assure you, if you were to write, you would soon do it with relish for the employment. About the time I was obliged to begin these essays on health, I felt low and averse to the task I had imposed on myself. I thought I could not execute it at all. It had this striking difficulty;—that every body else has failed. I went to work *doggedly* and *dissatisfiedly*. I wrote a few lines, then took up a book, and, with a strong sense of guilt, put off my labour till next day. However by some imperceptible change, I am come to like it excessively, and look forward with delight to the hour when I am to return to it. So would you ——, who want such a refuge.

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P. S. I hope the sight of this ungenteel paper will not shock you out of your inclination to write to me. I promise you, if you will encourage me by saying you have satisfied yourself for *one* fortnight, I will write you a golden letter on gilded paper."

No. 4.

"My dear ——. When Anna said last night that she would write to her friend ——, I thought to myself "I should (not I shall) write to my friend, the public." But you see how I attend to what I feel to be my duty. I do not know whether you have had experience enough in the ways of wickedness; but when you have, you will know that it is common for people of bad habits to do a thing quite different from what they ought to do, if not its opposite. Thus if Mamma says "Charles, come hither this moment!" supposing Charles to be a *pretty* naughty boy, he will fix himself on the spot, as if rivetted there: But if Charles be a *very* naughty boy, what ought he to do? Why, you goose, if he means to act in character, he ought to bounce out of the room. Now when I have a thing to do which

will as little admit of delay as a leg of mutton will bear keeping in Jamaica, I always set about some other thing—either write a letter to a person I have not thought of this twelvemonth, (do not tell your sister that I durst not have written this to her, because she would have taken it to herself,) or I take up a book which carries me half the distance of the globe from where I ought to be. Can you tell the reason of this? Is there any other beside the pleasure of sinning? or is it from the love of liberty? as thus; "I say to myself, you must do so and so—upon which myself answers, *must*, *indeed*, Mr. I! on what compulsion *must* I? tell me that;" and immediately betakes himself to something else. Or is it to shew what you *can* do, that things are put off to the last moment? Or is it for the same reason that many people put off their will to their death-bed, or never make any will at all? And if this be the reason, what is the reason's reason? Is it that a thing becomes disagreeable by being considered as an obligation, and so you put it out of your thoughts as much as you can?"

No. 5.

"No sweet ——, you need not despair of yourself. You have fallen short of some, no doubt, in positive acquisitions, but you have worked your own head more effectually than most of those who have had the best opportunities of instruction; and certainly you will not fall short of any expectations which your conversation or letters might raise: You will soon get more instruction.

"I think that whoever has intense feelings, (which is the chief cause of excellence) must feel emulation on hearing others praised; and for the same reason, that spur would be no longer felt, when the sensibility was wounded by other causes, as your's has been. You have just done what I wished, and I do not find any reason to differ from you. But I am excessively pressed by the printer for matter

for my Essays, and when he is supplied I will read you over again, and tell you my objections, if any arise".

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No. 6.

" Before Anna took up the pen,[41] I was going to say to you a thing which will appear very common-place. But in truth, seeing Macbeth, put me in mind of recommending it to you, to pay a good deal of attention to Shakspeare. When I was almost a child, I read Shakspeare, and I was pleased with the incidents in his plays, and the story. But his obscurities, and my inability to feel *that* excellence which makes me think him so highly worthy of your attention, was an immense drawback upon my pleasure; and, except the passages to be found in all selections of poetry, I saw nothing of Shakspeare for some years. Meanwhile, I met with the criticisms of Voltaire and other French writers, and the objections which I now feel to be so paltry, alienated me more from him, and this sentiment was strengthened by the childish and now forgotten idolatry paid him by Garrick. I have since been more slow to conclude that an object was worthless, because admiration was injudiciously shewn. It could not fail that Shakspeare should fall in my way soon after leaving school, and that I should look into him. That was enough. I soon, but at first with reluctance, was obliged to acknowledge his powers. By degrees, he seemed a being of an order superior to all those who have left any thing written behind them; and the experiment of Monday convinces me that I am not likely to change my opinion. I knew exactly every step in the developement of Macbeth's character; and the single passages (some of them worth a volume of the best productions of others) which paint so vividly

41 Doctor Beddoes, appears to have been called away, after writing the first sentence of the letter of which this is an extract; and Mrs. Beddoes had added a few lines in his absence.

what passes within the several characters, were familiar to me.— However I found that Shakspeare did not want the recommendation of novelty, which is so necessary to almost every thing human besides; and it would be impossible to convey to you an idea of the anguish I suffered, when L— spoke to me while the play was going on. But it is time for me to tell you that, it is not altogether because he has courted the gay, and the tender, and the terrible graces, with such success, that whatever falls short of him is feeble, and whatever tries to go beyond him, borders upon the disgusting, that I mention him to you; nor because reading him once, is but a preparation for a greater pleasure in reading him again. It is, because along with the riches of his fancy, he throws out in his fits of playfulness observations upon life, that would set up half a dozen moral philosophers. M—— would laugh were you to tell her that I mentioned Hartley to you; and you may think my language pedantic, if I tell you that Shakspeare first dramatized what Hartley afterwards analysed; and by studying both, then looking around you, and observing what passes in your own mind, you will, if I mistake not, understand yourself and other people better; and I know in general, and am confirmed by a passage in your letter in believing, that this would give you high satisfaction.

" I am sorry that Shakspeare has given no lessons applicable, at once, to young women of the present age; he would have lessoned them so agreeably and so forcibly. I only mean that he has drawn no character, which can be a pattern for you, for instance, in the particulars of conduct. Women were then, except a queen by chance, insignificant characters in comparison of what they are now. He has passages, however, applicable to all situations; and these, and the characters he has traced with such peculiar happiness, will enable you to make out what he does not immediately supply. Were I a Shakspeare and wished to impress something very useful upon young

women like you, what do you think it would be? Why, in earnest, to learn to see and hear themselves admired with little emotion. It is impossible for men to have eyes and mouths, and not to express, by both, what they feel on seeing a lovely young woman. But then, it might be worth her while, to consider whether she should ascribe much merit, even to those who express those feelings in the most agreeable manner. You will easily believe that almost every man who marries a handsome woman, merely for that quality, repents and makes his wife repent. Many would admit this and act in the face of it. We poor human creatures are always losing the benefit of those rules which are drawn from a multitude of examples, because we place ourselves above, at least, apart, from others. I would lay a wager, that almost all the women who have figured in certain trials, said or thought that it was very wrong in general, *but their's was a peculiar case.* But as it is not your fault, I dare say you will take care it shall not be your misfortune, that you are what all women wish to be. It is common to all persons of any taste to admire the poor Apollo and Venus, which have so suffered on the road from Rome to Paris; and I suppose, if handsome ladies were to lay stress upon this consideration, and to apply it, they would not so lavishly reward the slenderest of all species of merit, and which is shared by so many."

No. 7.

——— "Later years
"Sacred to study, teach me to regret
"Youth's unforeseeing indolence, and hours
"That cannot be recalled."

"So, in some poem, says an old man to an enquiring youth. I do not however suspect my dear ——, that you labour under a want of foresight, or, notwithstanding what —— says, of industry. But it is very heartless to go on making acquisitions, that can answer

only a future purpose, without encouragement or participation: and I do not know how you can escape indifference or despondency, except by resolutely fixing your imagination upon a period when you can turn to account whatever knowledge you now acquire: a period most likely, for you, at no desperate distance.

As to Botany, Martyn's and Rousseau's letters, or Botanical Dialogues, published by Johnson, will be introduction enough. But then Withering's arrangement of British plants is quite necessary to make out particular plants. In botany I am much struck with Miss ——'s industry, whom I have seen week after week, drawing every weed she could find. But this minute industry I cannot enter into: For not many pounds you can buy sufficiently good figures of all the British plants, so that all this labour seems to leave a person almost where they were before. It might make the hours pass less heavily in a prison, where all other occupations were forbidden; but I should think those who were free to chuse would resort to something else; and I have put ——, on learning Latin and Greek, which I dare say she will accomplish. And I confess where there is time, and a little assistance can be had, this is among the resources which I would recommend it to a young woman to provide for herself. It is not merely as objects of taste, that I think the writings of the ancients worth some study, but because the manner in which the poems of Homer and Virgil, &c. &c. have been connected of late years with the history of mankind, has opened an inexhaustible fund of the most entertaining sort of speculation. By connecting the manners of different uncultivated tribes with Homer's heroes, the spirit of Homer has perhaps been better seized by some very recent critics, than by the Greeks themselves. The ease with which Greek may be learned by pursuing a plan different from schools, has been clearly proved by the L—'s; who, in three months, during which they have devoted a very small portion of the day to it, have become able to make out prose and verse with great ease.

In Arithmetic, you should have a book explaining the reason of the processes; which, if taught by dry rule, seem to me quite insipid, or even odious. But I believe there is no one, who perceives how the tedious counting of piece by piece has been gradually expedited, so that you can now do by a few strokes of a pen what would have taken hours, but is amused by this remarkable specimen of human ingenuity. Several books fully explain the *rationale* of arithmetical operations. The best I know, is a little book of Condorcet's, which I should think might be had, under the title of Condorcet's arithmetic, in French, from Deboffe or any French Bookseller in London. I doubt not but it will occupy you agreeably. Let me know if you cannot get it.

"I would tell you not to let these studies, if you follow any of them, make you too grave: but I believe if they give you any sort of satisfaction, and are accompanied by the consciousness of time well employed, they must have a cheering effect."

No. 8.

"My dear ——, I am very much obliged by your letter. It breathes the tranquillity, which you say you enjoy; and though I thought you had a peculiarly happy manner of expressing yourself ever since I had any means of judging, it shews you to be improved in this talent. Probably you talk so well because you feel so happy.

"I am very glad you can take pleasure in Botany. Pray collect all the sea and other plants, whether you know them or not. Arrange them like yourself; discover the class and order when you can go no farther. When you have made yourself mistress of a certain number of plants, you will read Dr. Darwin's Phytologia with much advantage. I am afraid Search is scarcely to be had. I could never procure it but on loan.

* * * * * * * * * * * *

"I have several essays to forward to you. The one on consumption would have answered your question about bathing. I am quite a slave to these essays. The necessity of finishing each by a certain day, lies sometimes like a stone on my heart. I shall be emancipated however, in three months, and shall rejoice in my emancipation as much as any person of my acquaintance in their's. Farewell and proceed as well as you do now."

No. 9.

I have this day seen your friend, whose first appearance answers perfectly to your commendations. I also agree with you in thinking her dangerously ill, and can by no means promise myself that I can do what you wish for her. I shall do all I can, as you may well suppose. From an expression in one of Mr.——'s letters I imagine they are in narrow circumstances. Do you know? I ask you, because in the plan upon which I should put them, I should study œconomy as much as possible; and attend to points, of which I should be careless in the case of the affluent.

"You do not enter into so many particulars about yourself, as I should wish to be acquainted with. Have you made a nice collection of plants? Did you bathe? you seemed to "have a great hankering" after the cold water. I wish you could have seen that essay of mine. I presume there is enough said to deter any person with a tender chest from cold bathing, who has not a mind to get rid of the miseries of life. And this is a very clumsy way of going to work: the pistol, laurel water, or a cord is a thousand times preferable. I do not say that no such person can bathe once or twice without detriment. But from every immersion there is danger, and then what have we to set on the other side of the account? It is just neck against nothing.

No. 10.

"Since you give me so much encouragement, I will certainly have the pleasure of writing to you again, my dear ——, on our

return. I should know much better what to say, if you would have the goodness to mention to me as particularly as you can, those reflections and feelings which strike you, when occupied by any of those subjects, to which I may have induced you to pay attention. Perhaps Condorcet may furnish little scope for any matter of this kind. The *most* curious thing, and what alone can make the elements of arithmetic interesting to a person who is not incited to study them by any of the ordinary motives, is to consider how people advanced this art from actually counting things in nature, to its present expedition. This is not so difficult to come at, when one sees distinctly what those operations were, of which the figures we now use are the symbols. After a certain period, it seems that many nations *fixed* the objects they had to number. Thus Homer, I think, makes Proteus *five* his sea-calves. Then, the fingers of the two hands making ten, a notch was cut, or a stroke made by some coloured body. This was the origin, and most difficult step in decimal numeration. If men had had any objects capable of placing before their eyes some other number, as familiarly as their fingers place ten, the figures towards the right hand would have had a different value: for as they went from the five fingers of one hand to the ten of both, so some nations made advances towards doubling ten. Hence a *score* means twenty; but no system of numeration was ever founded upon this. The Greeks and Latins I think, are without any word for twenty corresponding to our *score*. Therefore it was never much a custom with them to consider twenty as an unit, and draw a *score* for every twenty in counting. It is quite an odd thing we should have a separate word for twelve.[4k] I do not recollect hearing what may have been the natural cause for the term *a dozen*. It can hardly have been the ten fingers and two

[4k] The following extract from one of the Doctor's common-place books, shews that he afterwards met with a solution of this difficulty. Twelve. *Tvalif* Gothic: *tva*, two, and *lif*, left; *i. e.* two remaining above ten. Eleven, *endlufon*; one left above ten.

legs; for they cannot be made into a groupe, as the fingers of one or both hands so easily can. In some languages, I should think, there must be a second term for five, in consequence of considering the figures collectively; but upon the succession of the decimal numeration, this term was lost in many."

No. 11.

"——— Oh yes Delphine. I find I am not quite callous. I did not think any person was now living, capable of writing half such a book. What talent in rendering sentiment! inferior to none but Shakspeare. What delicacy of touch! equal to Sterne. What copiousness! equal to Richardson. What happiness in pourtraying character. What variety! above Fielding. *Vive Delphine.* * * *

Little Anna desires her love to ——. Little Anna is not the wretched being she was when you were here. She runs, wild of wing, from room to room; understands every thing, says nothing, laughs at every joke, dances to every tune, conveys her opinions most decidedly by pantomime, as, to day, when I asked her whether she would have pudding or pye. I think by the way, it will often happen that the most intelligent children will be longest in talking. They can do without words."

No. 12.

"Yes, my dear ——, I think your protegés an interesting pair. The female, handsome, sensible, unaffected! You and some of your friends, I suppose, have entered into a combination, to change a certain leading article in the world's creed. For heretofore it has been thought that a young woman could almost as soon pass through the eye of a needle, as unite these qualities.

"But do you know that these good people afford a subject for much speculation? I do not know if their case is exactly what I conceive: But it was a love-match, I guess, therefore a sacrifice on the Lady's part; since, on the smallest signal, Cupid would have

waited upon her with Plutus in his train. So far they have little missed Plutus, and have been infinitely better off than the couples whom *he* joins in "holy matrimony." Pity that they may stand some chance of not always so continuing. But already there comes a rub. A long indisposition puts to shame the all-sufficiency of love. They feel, nay they express their sense of the superiority of those, who hold the accommodations of life snug tied up in their purses. But for you, they would probably have felt the difference more in their present distress. But they by no means repine. But will not most people so circumstanced come to repining? What think you, —— of an illness of long continuance, of a rapidly increasing family without increase of means? Only consider what a mother feels at the sight of children she cannot educate to her ideas, or provide for. Her thoughts must sour at her heart, unless she have super-human patience and sweetness of disposition. All the casualties of life will promote the fermentation and set the mind on the fret. It is a sad reflection, but the honey-moon will not shine at all, or only furnish light just to heighten the gloom. A pair of turtle-doves converted into cur and cat! What a shocking metamorphosis! The Wife, if she do not scold downright, shewing an unalterably cheerless countenance! The Husband croaking! The Children running about dirty, if not ragged; in perfect contrast to their mother's quondam elegance. So there seems no medium between affluence and lucrative industry or labour. In one case you have the means, in the other you are without the desires.

"So you may moralize a whole autumn's day, by the sea-side, on the future fortune of your friends, if the case suits them. I know nothing certain about them, but that they are now not affluent."

No. 13.

"Had you been a judge in Israel, I suppose you would have made rare work for the tooth-drawers and the gougers. For you know the

law is, an eye for an eye, and a tooth for a tooth; and you would have seen these retaliations punctually executed. If you had been a puritan in Charles the first's time, you would have beaten old Praise-God-Barebones himself, in starchness. But you cannot be a judge in Israel, nor a puritan in Charles's reign. You may be an old maid though. It is not likely, I am sensible; but if you should, you will be the pattern of the whole sisterhood. Don't you know why? I will tell you. You require letter for letter so precisely, that no doubt you will be equally punctilious in exacting courtesy for courtesy, nod for nod, and visit for visit; and I am not sure if you will give your husband a kiss extra.

"For my part I have been busy beyond example, but this day I am released from my Essay-bondage. I have finished nineteen long ones; the last, last night, and now I am a little my own master again. * * * * Had I had a moment's time I would have told you about poor Mrs. —. I can tell you nothing agreeable; after her relapse things went on ill, and I see no sign of amendment. * * * I never saw a man make more exertions or shew more affection for a woman, not even for a mistress, than her husband. He is really unwell and may be thrown into a consumption; by frequent colds, not by contagion.

"I wish you may have got a fine collection of sea plants. The fuci, and which are extremely elegant, abound I believe on your coast. I perceive you were nettled, by the charge of a little obstinacy. But you see what some people call obstinacy, others may style firmness. At all events, it is good to know the worst that those who in general think well of us, have to say. This is rare, men and women are such hypocrites."

About this period, Doctor Beddoes published a short letter in some of the medical and literary journals, containing some important queries. He was inclined to apprehend that the long and severe scarcity

which prevailed in 1801 might possibly render general, that physical degradation of the younger parts of the more indigent classes, which is too evident in those individuals who are employed in certain manufactories. He wished therefore that those who had opportunities of observation, would endeavour to ascertain whether the children of the poor who were born during this calamitous period, had come into the world more puny, meagre or smaller than in more plentiful times; and whether there had prevailed among them, shortly after birth, any greater mortality than usual. Some other inquiries related to the state of the mothers, particularly as to the comparative frequency of miscarriages. Had these inquiries been met by a correspondent ardour of investigation in other quarters, they might have led to the establishment of some highly interesting facts in physiology, illustrative of the influence of the condition of parents on the number and condition of their progeny.

In the winter of 1802, we find him eagerly engaged in promoting an inquiry into the virtues of a medicine, which was asserted to have a specific effect in relieving the gout. The discoverer had communicated the secret of its origin or composition, to Doctor Bradley of London, and to Doctor Beddoes. A pamphlet appeared upon the subject, containing an account of the circumstances that had led to the alleged discovery, with reports of several cases. It contains one letter avowedly written by the Doctor; but internal evidence renders it highly probable, that his contributions to the pamphlet were by no means confined to that part of it which bears his signature.

The occurrence of the Influenza in the spring of 1803, drew Doctor Beddoes into a controversy on the subject of its contagious nature. It was carried on in the Bristol newspapers, and continued for some time. The Doctor maintained the affirmative side of the question; the negative was supported by Doctor Fox, an eminent

physician of that city. The controversy terminated without any apparent change in the sentiments originally entertained by either party. Upon a hasty perusal of these papers at the time of their appearance, I confess that the force of argument appeared to me to preponderate on the negative side. But the subject of contagion is of too subtle a nature to allow of its being discussed upon the present occasion. Soon after the correspondence with Doctor Fox was terminated, Doctor Beddoes attempted to bring the question to a decisive issue, by the collection of testimonies upon the subject from all parts of the kingdom. He circulated an address to this effect in the Medical and Physical Journal, and afterwards communicated to the public the information that he had collected, through that medium. The preponderance of evidence in these collections also, appears to be against contagion. He had promised to close the series with some observations from his own pen; but these were first delayed, in order, as it was stated, to comprize some information expected from the Continent; and finally, never appeared.

In the course of the year, Doctor Joseph Frank of Vienna, one of the most justly celebrated among the foreign improvers of medicine, called upon Doctor Beddoes at Clifton. Availing himself of the interval of repose which the Continent enjoyed, he visited, during the peace, several countries of Europe; and England among the rest. His object on this journey was, chiefly, to survey the various charitable Institutions for the relief of the sick, and to examine into the internal œconomy of public prisons. Upon his return, he published in the German language, an account of the observations collected on his "Medical Tour." Among other circumstances he gives a copious detail of the particulars of his interview with Doctor Beddoes, with which the reader of his life will probably be amused. For the translation of the passage I am indebted to my friend Mr. King.

"After visiting the Infirmary, I was desirous of seeing the Pneumatic Institution. This Institution was, several years ago, established by subscription; as, at that time, a flattering idea prevailed, that the application of various gasses afforded particular remedies, especially in affections of the chest. Since that hope has been, (at least to a considerable extent) disappointed, it is simply employed as a Dispensary. From time to time however, some pneumatic experiments are still made there. The celebrated Doctor Beddoes presides over this Institution with considerable zeal: indeed it is indebted to him for its origin. I was very anxious to become personally acquainted with a physician of whom such various opinions are entertained, both abroad and at home. With this view I had procured several letters of introduction to him: amongst others I was favoured with one from his father-in-law Mr. Edgworth, with whom, and with his interesting family, I became acquainted at the house of Madame Lavoisier in Paris. Doctor Beddoes does not properly live in Bristol, but in the adjoining village of Clifton. All his acquaintance had told me before-hand, that I should find in Doctor Beddoes, a man, whose *premier abord* was rather repulsive. On entering his house, I gave the servant my introductory letters, that his master might be somewhat prepared, and not taken by surprize. After waiting about half a quarter of an hour, Doctor Beddoes appeared with several books under his arm. The first words that he addressed to me were, "Which Doctor Frank are you? for there are a great many of you." Before I could answer him, he laid before me, in a row, several books, all written by Franks, constantly asking as he turned them over, "Is that you? Is that you?" The first that met my eye, was a Materia Medica, by Solomon Frank. I protested against this being mine. Then followed some of the works which I had written in elucidation of the Brunonian system. Having now recognized me, Brown became the first topic of our conversation. We were soon agreed upon

what was worthy of praise and what of censure in that system. The conversation shortly after turned upon foreign medical literature; when I soon found that Doctor Beddoes reads German as well as he does English; and is intimately acquainted with all our best authors. Among all the theories applied at present to the practice of medicine, that of Reill pleases him best. Doctor Beddoes, in his conversation, which grew every moment more interesting, shewed the same fire and animation that are observable in his writings. On this occasion, as well as at subsequent interviews, he constantly insisted upon what he had asserted in his works, with regard to the utility of various gasses and the digitalis purpurea, in phthisis. He proposes to add to his former publications upon this subject.—The inspiration of the nitrous Oxyd of Ammonia, he says, has been beneficial in cases of Paralysis. He suggested the idea of employing Hydro-carbonate in strangulated Hernia, with a view to throw the patient into syncope; and of attempting the reduction of the intestine, while he remained in that state. The Muriate of Lime is, in his opinion, superior to all other remedies in scrophulous diseases. Angina pectoris does not always exist where the coronary arteries are ossified. Puriform mucus may, in regard to its chemical composition, not essentially differ from pus. The mineral water of the Hotwells near Bristol, really, now and then, cures Diabetes. These are the brief minutes that I have preserved of Doctor Beddoes's conversation. I now proceed to some observations on the spring called the Hotwell."

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"Independently of the Institutions already described, Bristol possesses many minor ones for the relief of the poor and the sick. But as I was generally informed that they did not possess any thing particularly worthy of observation, and as the time that I intended to stay was limited, and I wished to devote that time principally to Doctor Beddoes, I did not visit them."

Such is the account given by Doctor Frank of his interview with Doctor Beddoes. The manner in which he was compelled to introduce himself, will probably remind the reader of the mode adopted by the fictitious hero of the Sentimental Journey to make himself known to the Count de B. and will excite a smile in those who were personally acquainted with Doctor Beddoes.

It has been seen that, at the time when Doctor Frank visited the Institution, the pneumatic practice was almost abandoned. It has already been observed that, at the first commencement of the Institution, other remedies were frequently made use of. The proportion of cases treated by the gasses became daily more and more inconsiderable. Nor will this, upon reflection, appear so surprizing as it might upon the first mention of the circumstance. The accommodations for patients, in the house, were exceedingly confined; the administration of the gasses could scarcely be trusted to such patients beyond the walls of the Institution; nor indeed could the results have been relied on. In the mean time the crowd of applicants daily increased, and Doctor Beddoes's humanity, and his ardour for the improvement of his profession, alike restrained him from turning them back without assistance, or from foregoing the precious opportunities thus afforded for extensive medical investigation. In affording relief to the multitudes of poor patients who applied at the Institution at its first commencement, in whose cases the gasses did not seem suittable, he was assisted, as has been already seen, by Doctor Kinglake; but other avocations, and at length a change of residence deprived him of his services. The surgical cases were exclusively confined to the care of Mr. King; but, upon the departure of Doctor Kinglake, further assistance was wanted in the medical department. To supply this assistance, Doctor Scully, a young Graduate of the University of Edinburgh, accepted Doctor Beddoes's invitation, and removed to Bristol towards the close of this year. The abilities of Mr. Davy

had already procured him the respectable situation which he now occupies in the Royal Institution; but that chemical inquiries and experiments might not be abandoned amongst the variety of other objects, Mr. Sadler, a son of the gentleman who had accompanied Doctor Beddoes to Bristol upon his first removal thither, was engaged to conduct those inquiries in his room. The administration however of the pneumatic remedies, at length, ceased altogether; and the Institution changed both its name and its character. Previously however to an examination of the new objects to which it was directed, it may be proper to take a hasty glance at what appears to have been effected by the medical administration of Factitious Airs.

Upon the first discovery of oxygene gas, Doctor Priestley, observing that it prolonged the life of animals confined in a given portion of it, was induced to breathe it himself; and he fancied that he felt his chest peculiarly light and easy for some time afterwards. Other experimentalists remarked a similar result; and some were almost disposed to complain of the parsimony of nature, in having imparted to the atmosphere so scanty a portion of the principle of animation. Subsequent experience however, has shewn that the actually existing proportion of the gasses which constitute the atmosphere, is upon the whole, the most friendly to human life; and that a very small increase of this important principle, might consume the vital flame with a fatal rapidity.[41]

It is not surprizing that soon after its active properties had been observed, men of inquiry should be desirous of ascertaining its pow-

[41] The illustrious discoverer of this air had early anticipated this as a possible result, if it were habitually respired. "Though pure dephlogisticated air" says he, might be very useful as a *medicine*, it might not be so proper for us, in the usual healthy state of the body; for as a candle burns out much faster in dephlogisticated than in common air, so we might, as may be said, *live out too fast*, and the animal power be too soon exhausted, in this pure kind of air." *Priestley on Air, Vol.* II. *p.* 101.

ers as a medical agent. It appears to have been used with this view in France, some years before it had been tried in our Country: And it is remarkable, that the disorders in which it was supposed to have exerted a salutary effect, were precisely those, in which more accurate observation has proved it to be especially pernicious. "Mons. Caillens," says Chaptal, "caused persons affected with phthisical disorders to breathe oxygene gas, with the greatest success. I have myself been a witness to most wonderful effects of this air in a similar case." But this philosophical inquirer does not appear to have been perfectly satisfied with these trials. "I am very far," he subjoins "from being of opinion, that the respiration of vital air ought to be considered as a specific in cases of this nature. I am even in doubt, whether this powerful air is perfectly adapted to such circumstances; but it inspires cheerfulness; renders the patient happy; and in desperate cases, it is most certainly a precious remedy, which can spread flowers on the borders of the tomb, and prepare us in the gentlest manner for the last dreadful effort of nature."

Such were the speculations of Chaptal: the experience of Fourcroy (which has been already alluded to in the notice of Doctor Beddoes's first publication upon Consumption,[4m]) abundantly confirmed them. "Some flattering appearances, at first, took place, and the patients were animated with hopes of recovery; but even amid their self-gratulations, several signs admonished the attentive physician that these hopes were ill-founded." The deeper scarlet that dyed the cheeks, accompanied by a sensation of burning heat in the face and increased irritation in the whole system, called upon him to desist.

Attempts had been made subsequently to these trials to introduce the unrespirable gasses into the lungs, as a chemical experiment;

4m See page 84 of this Volume.

but with the exception of carbonic acid gas, no one appears to have entertained the idea of the medical exhibition of either. This was employed, as we have already seen, in two cases of pulmonary affection by Doctor Ewart.[4n] Its antiseptic powers, had been also discovered and applied to medical purposes. It had been administered, variously combined, in putrid fevers. Its anodyne properties had also been detected; and several communications upon this subject appeared in the fourth volume of Doctor Priestley's experiments on air; they bear date in 1778 and 1779. Hydrogene had been inhaled by the Swedish chemists and by the intrepid Pilatre de Rosier, who, by his experiments, clearly shewed that it had undergone little decomposition during the process. In one instance, he set it on fire during the expiration, and exhibited a very curious jet of flame; in another he ventured to mix atmospherical air with it previous to inspiration, and to set it on fire as before. The mixture of these two gasses, when inflamed, produces, as is well known, a detonation more or less considerable, according to the proportion in which they are mingled. In this case so violent an explosion took place, that he imagined, for a moment, that all his teeth had been blown out. Chaptal also, had found by experience, that several inspirations of hydrogene might be taken without injury, and that it was returned nearly unchanged in its properties; but Doctor Beddoes was the first who conceived the idea of using it as a medical agent.

The original outline of the plan for the employment of the gaseous remedies, seems to have consisted merely in varying the proportion of that constituent of atmospheric air which is essential to life. It was apprehended that its artificial increase would be productive of signal benefit, in diseases of a certain character, and that its diminution would be equally salutary in those of an opposite

4o See page 98 of this Volume.

description. It was not difficult to devise the means of effecting either of these changes; oxygene gas might be procured from a variety of substances for the former purpose, and unrespirable or vitiated air might easily be obtained for the latter.

From experiments extensively instituted upon animals, from the view of its effects given by Fourcroy and Chaptal; and from its mode of operation in the cases in which it was administered, it appears that oxygene gas belongs to the class of stimulants. By judicious management it may be so exhibited as to produce a tonic effect, but its more direct and palpable operation is certainly stimulating.

From the reports contained in the successive volumes of "Considerations on the medicinal use of factitious airs," it appears that the inhalation of air with an over proportion of this principle, was found advantageous in a variety of diseases. The general result of these testimonies seems to establish the following facts.

1. It was beneficial in various forms of scrophulous affection. The progress of white-swelling was, in some instances, arrested, and a cure obtained. Ulcers of long standing and of considerable extent, manifested favourable appearances soon after its use was commenced, and healed under its influence with a rapidity rarely met with under the more common plans of treatment.[20] In ophthalmia tarsi also, it was found beneficial.

2. It appeared to be a very efficacious remedy in chlorosis, dyspepsia, hypochondriasis, melancholia, and cephalalgia, pro-

[20] The efficacy of wood-sorrel in similar cases is recorded as an analogous fact, as its activity is supposed to depend upon the oxygene which it holds in combination. It must, however, be confessed that it is by no means decisively proved, that its powers depend upon its containing a portion of this principle. It appears that its application produces a very considerable degree of pain and inflammation; and that these effects often excited in the ulcer a disposition to heal; but similar effects are often produced by other stimulating applications, in which the presence of oxygene is neither so evident nor so abundant.

vided no throbbing of the carotid or temporal arteries, or other marks of excitement were present.

3. It was also beneficial in some forms of dropsy. In cases of hydrothorax it was repeatedly tried. In all, it appeared to relieve the nausea and difficulty of breathing, but it was not equally successful in all, in producing absorption. In this particular, the later seem to have been more successful than the earlier trials. Doctor Beddoes was inclined to believe that the relief of the difficulty of breathing which was so universally experienced, was owing to this circumstance; that by presenting a more highly oxygenated medium to those air-cells which were not obstructed, the systems of such persons received nearly an equal supply of this essential principle, with those of persons in ordinary health; who though they inhaled it in a form so much less concentrated, imbibed it by a more extended surface.

4. It was found advantageous in dyspnœa and asthma. In the latter disease, however, it was not uniformly successful.

5. Although it succeeded in many cases of asthma, it was not attended with results equally favourable in epilepsy; on the contrary, when administered in that disease, it appeared to be uniformly injurious.

6. It was found successful in relieving the system under the effects of excessive doses of opium; its use in such cases was suggested in consequence of the theory that opium disoxygenates the system. The results, in the instances recorded, appear to justify the theory.

7. It was found advantageous in many cases of paralysis. In amaurosis it was at least inert, if not absolutely injurious.

8. It appeared to be a valuable remedy in cases of simple exhaustion.

9. It was successful in removing leprosy and some other obstinate cutaneous diseases.

If this list be attentively considered, it will be found to confirm the ideas of the remedial powers of oxygene above suggested. In cases of diminished excitement, of languor or torpor of the system, whether general or partial, its effects were truly gratifying. But if any excessive action were going on, its use was strongly contra-indicated. Its exhibition, therefore, was in many cases judiciously suspended, whenever any accidental circumstance had excited inflammatory action in the system. The neglect of this caution was uniformly succeeded by injurious consequences.

It appeared evidently to produce determination to the head; hence probably arose the injurious effects which it produced in epilepsy. In paralysis, it succeeded only, when no morbid action, especially in that part, was present; and the accurate observer will scarcely be inclined to pronounce this a frequent condition in paralysis. To account for its relieving asthma and not epilepsy, Doctor Beddoes advances "as a conjecture to be determined by future more exact observation, that under certain circumstances, oxygene, by restoring the activity of a languid part, removes the sensation that occasions the convulsive efforts; and sometimes, by diminishing sensibility and giving general energy to the system, destroys habits of morbid action. But where it produces neither of these effects, it aggravates spasmodic and convulsive complaints, instead of relieving them,"

Asthma appears under such a variety of modifications, that it is not to be wondered at if oxygene should have often proved unequal to subdue it. It appears to have succeeded, precisely in those cases, where if the more usual remedies had been resorted to, the symptoms would have indicated a tonic or stimulating plan. In others, it either failed altogether, or did the same mischief that an injudicious application of other tonic remedies is found to do.

The small proportion of the modified atmosphere which the oxygene gas generally constituted, when compared with the striking

effects produced, will naturally excite surprize. In some cases the addition was only two, in others only one part in fifty. It might naturally have been expected that, in cases where an increased proportion of this principle was judged desirable, it should be added in a far greater proportion. But the philosophical accuracy of Mr. Watt had discovered in an early stage of the experiments, that when a highly oxygenated atmosphere was respired, much of it was returned unabsorbed. Accidental mention is made of one or two cases, where the air, after it was returned from the lungs, was sufficiently pure to increase considerably the brilliance of the flame of a candle.

In the administration of an oxygenated atmosphere, one important circumstance requires to be particularly noticed. Most of the complaints above specified are of a chronic nature, and any remedial process must, of course, be persisted in for a great length of time, in order to prove effectual. The experiments made upon animals shewed that, in many instances, the respiration of oxygene inflamed the lungs. As a certain degree of debility of these organs is often connected with these complaints, it appears that some risk must be incurred in such trials, lest so powerful a stimulus should excite inflammation there, and ultimately lay the foundation of phthisis.

The carbonic acid gas was not so frequently resorted to in these trials as the other gasses. In its undiluted state it is absolutely unrespirable. Mr. Davy found that the instant that he attempted to inhale it, the epiglottis was so painfully stimulated as to close spasmodically upon the glottis, and effectually prevent the introduction of a single particle into the lungs. In a diluted form it relieved phthisis. The effects assigned to yeast in typhus are generally known; and they obviously appear to depend upon the presence of this powerful agent. Its external application was found

highly useful as an anodyne, and, at one period, it appeared to promise results truly interesting to humanity; as it was hoped that it might prove a remedy for cancer. In every case of this kind it appears to have relieved pain, and corrected the unpleasant factor attendant upon these complaints; but a cure is yet to be desired.

The remedial effects of hydrogene gas appear to have depended partly upon its acting as a simple diluent in diminishing the quantity of oxygene present in a given volume of air, and partly, upon its power of producing a degree of vertigo; an effect which in all cases, is attended by a diminution either in the force or frequency of the pulse. The latter quality appeared to vary, according to the ingredients from which the gas was procured. Dr. Pearson suggested the idea of obtaining it in a very simple form by the volatilization of vitriolic æther. This is effected by a very moderate degree of heat, and the vapour may be easily inhaled. In general it produces transient vertigo, and is equally beneficial with hydrogene obtained by any other process, in cases where it is deemed advisable to respire it undiluted. With a view to increase its efficacy, a variety of ingredients were occasionally added to the æther.

This gas, combined in various proportions with atmospheric air, was found beneficial in catarrh, phthisis, and in certain forms of asthma. It was also found serviceable as an anodyne. The discovery of a remedy which should produce this effect, by the abstraction instead of the increase of stimulus, was long a desideratum. Venæsection, digitalis, and a modified atmosphere, are three agents truly important upon this account. It does not appear perfectly evident whether, in those instances, where an anodyne effect followed the exhibition of a reduced atmosphere, the hydrogene acted specifically, or only by simple dilution. One of the cases recorded renders the latter, at least, a probable supposition. A gentleman long accustomed to restless nights, was compelled to sleep in an

apartment which had been illuminated in honour of the victory of the first of June. The air was at once heated and contaminated; in other words its proportion of oxygene was diminished, by the combustion of a number of candles. He went to bed in the expectation of a more agitated night than usual; but was agreeably surprized to awake in the morning, after enjoying a degree of undisturbed repose to which he had been for years a stranger.

The pneumatic remedy, however, which appeared to produce the most striking effects in phthisis, was a compound of the two last-mentioned gasses, the hydro-carbonate. Its effects upon the system were powerful and decisive. It had been respired both by Mr. Watt and Mr. Davy in a state, comparatively speaking, but little diluted. The latter, however, pursued the experiment with an intrepidity bordering on rashness, and ventured to inhale it in its pure form. From its effects in this experiment, it appears to be a direct sedative of the most powerful kind; or, if the advocates of the Brunonian doctrine should object to this definition, it must be said in their language, to be a stimulant so highly diffusible, as to exhaust the nervous energy with the rapidity of lightning, and at once to prostrate the system below the point of reaction. "The first inspiration produced a sort of numbness and loss of feeling in the chest and about the pectoral muscles. After the second, he lost all power of perceiving external things, and had no distinct sensation, except a terrible oppression on the chest. During the third inspiration, he seemed to himself to be sinking into annihilation and had just power enough to drop the mouth-piece from his unclosed lips. A short interval passed during which he respired common air before the objects about him were distinguishable. On recollecting himself, he faintly articulated, "I do not think I shall die." The pulse was thread-like and beat with excessive quickness." In less than a minute he was able to walk; but nausea, vertigo, and an

excruciating head-ach returned at intervals during the remainder of the day; and he continued feeble and exhausted till the succeeding evening.

It will not appear extraordinary that an agent of so powerful a character, should have produced considerable effects in some diseases. It was highly efficacious in hæmoptysis. Its powers in phthisis have already been alluded to. The pulse was lowered; the breathing was relieved; the fœtor of the breath and expectoration were corrected; and several cures were performed. To account for its superior effects, Doctor Beddoes in an inquiry into its mode of operation, has offered a conjecture that the charcoal with which this air impregnates the blood, may exert upon the ulcers in the lungs, effects similar to those which it produces when applied to the surface of external ulcers. He supposes also that the action of hydro-carbonate cannot be explained upon the principle of excluding oxygene from the blood merely, but that the carbon combines with the small portion of oxygene already existing there, and forms fixed air.

Thus far, the sketch of what has been effected by pneumatic medicine has been extracted from the successive volumes of the Considerations. One circumstance should be mentioned which renders the detail of the cases above cited less decisive and satisfactory. From a commendable distrust of a new remedy, the practitioners who contributed the result of their experience, seldom relied upon the gasses alone. In general, however, there is sufficient evidence to convince an unprejudiced mind, that they might be classed amongst the most active instruments of medicine. Another circumstance in the considerations which it would be unjust not to remark, is the manner in which Doctor Beddoes has executed his task as editor. In this character, his candour is so singularly conspicuous, that it seems difficult to conceive the origin of the opposition

and misrepresentation that he had to encounter. He has occasionally added a few remarks upon the cases communicated to him. In the course of these, if any foreign circumstances could have modified the results, he is the first to point them out; if any inconclusive reasoning be made use of, however favourable to his own speculations, he is the first to detect it. It has been already mentioned, (*see page* 83,) that in an early stage of his pneumatic experiments, their results seemed opposed to his theory of hyper-oxygenation in consumption. These experiments, however, are related, as much in detail, and with the same simplicity, as if they had confirmed it beyond the shadow of a doubt. It should be remembered also that the history of all the cases above alluded to rests upon the testimony of others, not upon his own, as he had early professed and uniformly maintained the singular determination of relating no successful case upon his own authority.

The trials of these gasses which were made at the Pneumatic Institution, produced results perfectly similar. But another agent, superior in power to either, except the hydro-carbonate, was added to the list in nitrous oxyd. It produced some astonishing cures in palsy, but its administration in such affections required the same cautious regulation as the exhibition of oxygene. If there were any determination to the head it was strongly contra-indicated. In cases accompanied by a high degree of nervous sensibility, as for instance, in hysterical females, it was also manifestly injurious. In cases of simple exhaustion, where no topical inflammation existed, it appeared to have a specific effect; and no medicine ever exhibited more brilliant results, or triumphed more absolutely over disease. Many patients, under such circumstances, appeared to experience almost a renovation of existence.

Attention was particularly excited by the properties assigned to this gas, because although from its immediate effects, it appeared closely allied to those agents which Brown has classed among his

diffusible stimuli, it differed essentially from them, as has been before observed, in its subsequent operation; since the excitement which it caused was not succeeded by any subsequent depression. In cases of extreme debility, every medical practitioner knows the difficulty of applying stimuli in such due proportion, that the excitement produced may not be succeeded by a fatal degree of exhaustion. The value, therefore, of nitrous oxyd was considerably enhanced by its constituting so remarkable an exception, in this particular, to the general laws of stimulating powers.

The nitrous oxyd continued to be inhaled for some time after the other gasses had entirely given way to the use of the more common remedies: but even this was rarely resorted to during the latter years of the Doctor's life; and in other quarters, the interest at first excited by pneumatic medicine seems to have subsided so entirely, that we now scarcely hear it named; in fact it appears to have expired with its founder.

It should, however, be observed that, although Doctor Beddoes, apparently satisfied with having opened a mine which was left to the industry of others to explore, devoted the latter years of his life to other enquiries, he had not abandoned his original conviction of the importance of the gaseous remedies. It has been already seen that so late as the year 1803, he expressed himself strongly in their favour to Doctor Frank of Vienna. In truth, when we review the history of what they had effected in so short a time, and under so many obvious disadvantages, and see such respectable names affixed to the testimonies of their effects, we can scarcely forbear enquiring whether pneumatic medicine has not fallen into premature and unmerited oblivion. From the general view that has been given, it appears that remedies of this class act upon similar principles and obey the same general laws with other remedies; that those which are of a stimulating or sedative class, are injurious where the

more common ones belonging to either class would respectively be injurious also. It might therefore be apprehended that as we have a variety of substitutes in those respective classes, to add the gasses to the materia medica, would be an unnecessary multiplication of remedies. If indeed it be true that there is no specific difference in their properties, there would be a just ground of objection to swelling a list already sufficiently numerous; more especially, with articles expensive in their preparation, and requiring a degree of care and management in their administration, which is not to be expected from all ranks of patients. But however analogous the effects of these gasses may be to those of other stimulant or sedative remedies, it by no means follows that they are precisely similar. The seat of their application may give them, in a variety of instances, a specific operation; more particularly in diseases affecting the respiratory organs. The circulating medium is probably more powerfully affected by an agent applied immediately to the lungs than by any other means. Doctor Beddoes was fully satisfied that by the use of different factitious airs we might be enabled to change the constitution of the fluids and the solids, and that by their operation on so extensive a surface as the pulmonary organs, they might also produce motion by association in distant parts of the system. Many of the cases related in the Considerations appear to justify this opinion.

In the first sketch of his plan, Doctor Beddoes proposed that apartments should be fitted up so as to render them air tight, and that the patient should be shut up in such apartments, and be thus uniformly subjected to the operation of a modified atmosphere. If the temporary application of the gasses have been found capable of producing such powerful and salutary effects, we should naturally expect results much more important from a more permanent exhibition of them. It has been seen that such a very moderate increase

of the proportion of oxygene as one part in fifty, during a continued use of it for some months, produced changes at once unhoped for and surprizing. What effects then might not have been anticipated from its uniform application! especially as, in equivocal cases, where inflammation of the lungs might be apprehended from it in a concentrated form, it might be still further diluted and yet its remedial effects be secured, by gaining in duration what was lost in intensity.

It is scarcely possible to go through many of the cases in the "Considerations," without feeling this conviction strengthened, and it is still further confirmed by some of the Doctor's own observations. Carbonic acid gas is, according to Doctor Perceval, absorbed by the lacteals, and secreted from the blood by the kidnies, so as to impart its qualities to the fluid contained in the bladder, and hence it becomes capable of dissolving or altering the texture of calculi. From some experiments of Mr. Abernethy, it appears also capable of being absorbed by the skin. These facts led Doctor Beddoes to conjecture that the constitution might be saturated by the immersion of the body or limbs in vessels filled with this, and very probably with other airs. From some experiments related in an Inaugural Essay on Carbonic Acid by Doctor Johnson of South Carolina, it appears that an atmosphere of this gas acts as a powerful stimulus to the external surface of the body. I know of none that establish a similar fact with respect to other airs; but if they could be taken up by cutaneous absorption, this circumstance would furnish a strong recommendation of the air-tight apartment. Nor would those experiments of modern physiologists which render the existence of cutaneous absorption questionable, operate against this reasoning; since, if according to their doctrines, the skin, while entire, does not absorb, the remedies in question, must, in the air-tight apartment, be uniformly applied to that organ whose absorbent powers have not been questioned.

Two possible sources of fallacy in the inhalation of the gasses, were pointed out in an early period of the pneumatic trials by Doctor Darwin. "The patient," he observes, "may first draw in air through his nose at the same time, and thus deceive the operator. Or, secondly, he might draw the air into his mouth only, without taking it into his lungs, and give it out through his nose as in smoking tobacco." These inconveniences were in some degree remedied by closing the nostrils during inspiration. This, however, was found in some cases to be a laborious process, notwithstanding a mouth-piece contrived by Mr. Watt which very much diminished the necessary effort.

Although the air-tight apartment was never tried by the discoverer, it has appeared to some philosophical enquirers both in and out of the profession, so important a feature of the plan, that in consequence of that omission they have doubted whether the powers of pneumatic medicine can be said to have had a fair trial; and its founder has been complained of for relinquishing his investigations, till he had estimated their value by this test. Perhaps he felt conscious that life was too short to allow him to develope all his ideas relative to other improvements of his art, if he waited to stem with effect the tide of opposition which this particular branch of them had to encounter. It appears, however, by no means improbable that the gaseous remedies may one day undergo a revival. It is become a trite observation that in tracing the history of human inventions, we rarely find that the original projector derives either fame or profit from his discovery. How few are there who, like Jenner, are fortunate enough, not only to see their exertions in favour of humanity carried into full effect, but to receive applause from their contemporaries. In general, indeed, the history of medical

investigation abounds with examples of a contrary kind. Some of the most valuable instruments of the materia medica have undergone a variety of fortune. Extolled perhaps extravagantly upon their first discovery, we find them in a subsequent period proscribed by authority, or deserted by the caprice of fashion: but in some future and more fortunate æra, the obnoxious or forgotten article again attracts attention. Its merits are then more cautiously and patiently investigated in consequence of its previous failure. The envy and malevolence which are instinctively arrayed to obstruct the progress of a first discoverer, are but feebly interested in opposing the less offensive reviver of a remedy. In the mean time it gradually makes its way, and its claim upon public estimation is ascertained and established. Such has been the fate, in more remote periods, of antimony; in more recent ones, of the fox-glove; and such perhaps may yet be the fate of pneumatic medicine.

But it is time to return to the regular order of the narrative. From the commencement of the year 1803 we are to consider the Pneumatic Institution under a new aspect. We have already seen how, by almost insensible gradations it assumed the form of the more common establishments for the relief of the sick. Still however there were certain features by which it was essentially distinguished from such establishments, and of these it may be proper to take a view. It was not merely for the relief of those suffering under evils which are obvious to superficial observation, that this Institution was designed. Its object was, particularly, the prevention of diseases. To explain it with more precision, Doctor Beddoes published a little tract under the title of "Rules of the Institution for the sick and drooping Poor." Were this small volume estimated according to its intrinsic merit, it would take place, both for design and execution, of some of the proudest folios, with which the shelves of the physician are loaded. It abounds with examples of that energy which was particularly characteristic of his style, and of

that minute painting of diseases which places the object in full distinctness before the eyes of the reader. At the same time, we cannot but admire that simplicity which was so peculiarly calculated to render his book intelligible to the classes for whose use it was in the first instance particularly designed. Instead therefore of enlarging, myself, upon the particular views to which this Institution was directed, I shall state them in his own expressive language. In reply to the question in what the particular effect of this Institution consists, he observes "If I am to answer generally I should say it is, *in proposing to check the canker of disease as soon as it fastens on the frame and to root it out :—the moment any one seems, before his season, inclining towards the grave, to stretch out a helping hand, in order to raise him upright and set him firmly on his footing again.*—Do I speak plainly enough, or shall I add, that as numbers fancy themselves but a trifle out of sorts, though really pining under some deadly disorder, we purpose *to undeceive and rescue them; to fill the feeble with strength to discharge the duties of their station; to give him whom a weakly childhood marks out as likely to be cut off in youth, a fair chance for a long and healthy life; in fine, not only to stop short the fatal course of some maladies, but to render the constitution less accessible to them, and to stir up in fathers and mothers an universal spirit of watchfulness over the condition of their tender offspring.*" Having thus explained his plan, he proceeds to a particular examination of the history of certain diseases, with a view of determining how far such an Institution is wanting. As the first proof of its necessity he proceeds to speak of the frequency of Consumption, and of the sufferings which its victims undergo. He had already twice described this disease: first in his treatise upon it in 1799, and again in one of the numbers of Hygëia, but he here presents it under new lights, and arrayed in colours, if possible, still more terrific; yet notwithstanding the horrors of the scene, he still remarks that he can only paint it as

a spectator, and that to realize the depth of suffering endured by the victims of this cruel malady, would be as far beyond his powers as " to enter into the feelings of a mother who had just lost her only child."

After a most striking and appalling description, he proceeds to remark that, in this disease, it is of no avail to the patient that he has youth on his side. The young it is well known are its chosen victims ; " it comes like a blight over the spring of life." The reader will not have forgotten his remark on a former occasion, *(see p. 164)* upon the delusive analogy which has led to so mistaken an estimate of the suffering endured in Phthisis. The death-struck victim is a blighted flower. The image is poetical, and the imagination reposes upon the idea of an interesting languor which slowly steals upon the patient, and extinguishes life, almost without pain. With more simplicity, but not less force, the Author here recurs to the same illustration ; and after tracing the picture in all its horrors, concludes by observing how widely it differs from the image in the mind of one " who has only passed some poor female, basking like a withered lily in the sun, without being obliged to hold her head as she strains with coughing, or to watch all night by her reeking bed."

He apologizes for the ample details and minute descriptions into which he enters upon a subject calculated to harrow the feelings of the reader, by remarking that such horror is salutary, and that it will stimulate to exertion in order to escape an evil of such magnitude. To impress the idea of its wide extent and general diffusion, he calls upon the reader to ascend one of the high hills by which Bristol is surrounded ; to remark how closely the buildings are crowded together for an extent of some miles ; to descend from the eminence and walk through its populous streets ; to calculate the multitudes that are met on the walk, and the still greater multitudes who are at the same time within the houses ; and when the imagination has thus grasped

the idea of an immense assemblage of human beings, he is reminded that a number equal to this assemblage, perishes annually, in our island, from this devouring malady. Supineness or neglect in ascertaining the means of escaping or of lessening so wide-wasting a calamity as soon as its extent is known, appears to him no less extraordinary, than if a nation were to remain unmoved and uninterested, though the whole inhabitants of one of their largest cities were annually overwhelmed by a volcano, or engulphed by an earthquake.

The second example which he adduces in proof of the necessity of such an Institution, is the alarming extent of Scrophula. In considering this subject, he first exposes the absurd prejudices which have rendered a scrophulous disposition in a family, an object of so much greater disgrace than a phthisical one. The poor repel the idea of its existence among them, with scarcely less indignant earnestness than the rich. Yet the ravages inflicted upon the constitution by the one, though they are more concealed, are not less fatal or disgusting than those caused by the other. After pursuing the parallel between the two diseases, he concludes with remarking that " to settle which of these complaints is disgraceful, and which not, seems as idle as disputing which is the most comely beast, a Porcupine, or a Hedge-hog." From the prevalence of this mischievous prejudice, the medical attendant often shrinks from pronouncing the name of the complaint ; and the blind partiality of the parent refuses all assent to it if uttered, till the golden opportunity of effectually checking its ravages is irretrievably lost.

He employs some pains in correcting the confined ideas generally entertained on the subject of scrophula. By many, the appellation is confined to that form of disease only, which manifests itself in " indolent swellings, about the glands of the neck principally, which terminate in foul ulcers, healing slowly, or not at all, of themselves."

This is to take but a very superficial view of the subject; for this, although one of the most disgusting, is one of the least dangerous forms of scrophula. Its ravages are much more fatal when it works unseen. Of these ravages he now proceeds to sketch a faithful and almost equal melancholy picture, with that which he had before given of consumption. He traces its effects in blunting the senses, and bringing on, almost in infancy, some of the most painful privations to which old age is subjected; in attacking the vital organs; in deranging or destroying the functions of the stomach and bowels; in condemning the youthful victim to weakness terminating in various kinds of deformity; and in destroying the suppleness of the joints, and the firmness of the limbs, till the sufferer is reduced to the awful alternative of relinquishing an important member or parting with life.

"Were I a painter," says he, "or had I painters at command, there should be sets of pictures shewing *consumption* in all its stages, and the *evil* in all its shapes and consequences. Such appeals to the heart through the eye, would put it out of the enemy's power to hide his cloven foot, as he does at present. We should be all watchfulness to detect, and all alacrity to resist him. In consequence, he would be put to flight on his first approach. Then the young would be, as the young ought to be; and many more of us should *live* all the days of our lives; for does dragging on a miserable existence, with the evil daily undermining the frame, deserve to be esteemed as life?"

He next proceeds to form some calculations as to the number of persons who perish from scrophula, and the still greater number whose faculties of enjoyment it impairs or extinguishes for life. He admonishes parents not to wait till their children actually complain of suffering; for although acute pain will excite sufficiently evident expressions of distress, under the progress of a slow malady their torpid resignation is frequently astonishing; and in enforcing this

point, he delivers a variety of instructions calculated to assist them in determining when it would be expedient to seek for medical advice; particularly inculcating the obvious necessity of attention to those advancing towards maturity, when one of the family has already fallen a victim to consumption, and to those in the earlier stages of infancy and childhood, when "one lamb of the little flock" has been already tainted with scrophula. On these points he is particularly urgent; and complains of the frequent instances of families, where one member follows another to the grave, and yet, because no evident signs of impending mischief have yet developed themselves, each successive victim is blindly resigned to its fate, from the common prejudice of "letting well alone."

He now proceeds to point out the most striking signs of a predisposition to phthisis; as they appear in mal-conformation of the chest, frequent bleeding at the nose, and spitting of blood. The occurrence of the last symptom indeed, excites in general a salutary alarm, but the bleeding at the nose is often imprudently neglected; for although, in some constitutions, it is, perhaps, of trifling importance, it ought never, in consumptive habits, to pass without attention.

The caution which he next inculcates he had before laid down in his essay on consumption; but it is sufficiently interesting to humanity to bear repetition. It often happens that one of the first symptoms of phthisis manifests itself in an unusual disinclination to exertion, accompanied by an apparent torpor of the bodily, and not unfrequently, of the mental powers. This change of habits often occurs in those, who have been, before, the most active and industrious; the mistaken parent imputes it to indolence; and the sufferer is goaded on to exertions, which only wear the springs of life, and accelérate the fatal catastrophe. "Beware" says he apostrophizing his humble readers "beware particularly when girls formerly active, grow, as you think, lazy. Ten to one but you scold them when you ought

to get them cured. No! it is not lazy they are, but sick, sick at the very vitals." To the more opulent he lays it down as a general maxim, that want of activity in young people, particularly in young women who have been formerly active, "is want of health; and often the beginning of a dangerous complaint." He closes this division of his subject with some earnest cautions against the use of quack medicines in pulmonary complaints, which in consequence of having gained an undeserved reputation by curing some simple cough, are too often resorted to by the consumptive patient, and defraud him both of his money and his life.

After giving this general view of the signs of a predisposition to phthisis, he proceeds to describe those which are characteristic of a predisposition to scrophula. Many of these have already been anticipated in the review of Hygëia; but his catalogue of the graver forms of scrophula is, if possible, still more formidable than the one exhibited in that work. Amongst others, he speaks of psoas abscess, ulceration of the vertebræ and other similar affections; and the climax of horrors is wound up by the following appalling description of a disease, to whose attacks, it had been before observed in Hygëia, that children of the scrophulous temperament are particularly predisposed. "WATER IN THE BRAIN! Of all the spectacles in this world of wretchedness, have you ever beheld a child writhing and shrieking from violence of pain, as this disorder rages within the head! Its limbs stiff as iron at one time, and convulsed at another! Its eyes drawn into various kinds of distortion! The prescriptions of the Physician equally vain with the prayers of the Parent! Nature not interposing in its behalf!—Art unable to save! and tenderness to soothe! The disease armed as it were with a dagger, and thrusting it deliberately deeper and deeper into the little victim, till the point has got down to the innermost and tenderest part of the nervous marrow! and there furiously working it about till feeling is lost un-

der excess of agony." Even the sublimely sombre imagination of Dante has scarcely traced a more terrific picture of human suffering.

But although a faithful delineation of these melancholy diseases should have excited a salutary degree of alarm, the Author remarks that it remains yet to be ascertained, whether it will lead to a sufficient degree of exertion. To eradicate from the habit a scrophulous tendency is often a very gradual process;[4p] it will call for more patience, and more continued activity and care, than many, even opulent, parents will bestow; and the poor are still more deficient in a correct calculation of future consequences. They become wearied with the length of their attendance, and perhaps despair of a cure because some time elapses without amendment. On this head his cautions are particularly earnest.

After discussing some topics of more partial interest, principally relating to the internal management of the Institution, he proceeds to enlarge upon the importance of preventive medicine. And here, he justly complains that many persons, in other respects perfectly well informed, do not discriminate at all, or at least very insufficiently, between full-formed disorders and a disposition to them. Hence, although they may be sufficiently disposed to seek for medical aid, when they see a child actually sinking under disease, they refuse it to those in whom they cannot discover any menace of its being about to form, although the symptoms be sufficiently alarming to the observing medical attendant. They wish to avoid the administration of any preventive medicine, presuming that all medicine must injure the constitution, and, that any efficient one must necessarily act roughly. The Author has employed much pains in refuting an error pregnant with such mischievous consequences.

To illustrate that sort of prospective care which he wishes to

[4p] See what has been said on this subject, at p. 226 of this Volume.

see exercised by the parent in order to secure the future health of his child, he introduces the following remarks. "There is an ingenious person, *a landscape gardener*, as the phrase is, by profession. He goes about teaching the great how to make pretty prospects. In a late wonderful fine work he tells us, that he has a blank paper book with a red cover. On one leaf he draws the prospect as he finds it; on the next as he would have it. This book, he says, he calls the *red book* of the place. The rich pay him handsomely for his book, and often lay out immense sums to make their grounds look to his fancy. If they can amuse themselves with this gentleman and his red book, no one has a right to utter a syllable to the contrary. Only I would beg leave to recommend another blank book, red, or not red, as they like. Somebody who understands constitutions, as well as this artist does landscapes, should survey the children, and on one leaf set down how he finds each, and on the next how he would have him; and the improvement should be set about accordingly. It would be injurious not to suppose, that more satisfaction must be derived from the view of a healthy family, than from all our *landscape-gardener's* prospects. The only reason why this higher satisfaction is less sought by the proprietors of children than pleasure grounds, is this. They are unhappily not aware that the habit of human creatures is as susceptible of improvement as the surface of the earth."

The object of the section next in order is to instruct the reader how to act in a variety of situations in which health is at stake. This is a republication in an improved and enlarged form, of the precepts contained in the "Guide for self-preservation." The effects of the small-pox and cow-pox are next contrasted; and a section, written with uncommon energy and persuasiveness, is devoted to the removal of the prejudices so generally prevalent, especially among the lower classes, against the examination of the

bodies of the dead. The important articles of cloathing and diet are next discussed; and under the last head he has not disdained to instruct his humble reader in the preparation of a variety of cheap and nutritious dishes, the receipts for which conclude this valuable little manual.

Under the head of diet he has repeated, with additional energy, the cautions against the use of tea which he had laid down in Hygëia. Indeed the morbid effects which appeared to owe their origin to this grateful beverage, fully justified the caution. It was interesting to observe the variety of terms in which its injurious qualities were confessed by the patients of the Institution. In the forming state of a variety of those complaints which are generally called nervous, they, in general, seemed to shrink, when urged by their medical adviser to relinquish its use. Many would ask what could they do if deprived of their tea, which they often emphatically styled their only cordial and support. But in a more advanced stage of these affections, when the same caution was given, the reply often conveyed the fullest conviction of its noxious powers. Some would exclaim that they had long suspected that it had injured them. Others would confess that they had already been compelled by internal suffering, to abandon the use of it. Their language was often strikingly descriptive: more than one said that "it killed their stomach." These cases principally occurred amongst the abject poor, to whom tea was literally the only cordial, and in whom its effects were in no degree counteracted by the use of more nutritious aliment. The experience furnished with respect to this particular, was so multiplied and so unvarying, that it was impossible to question the injurious effects of this fascinating plant under a variety of conditions of the system.

In the outset of the Preventive Institution, there was one feature of it, to which it was impossible to refuse approbation. No letter of recommendation, no ticket of admission was necessary for the

patient's introduction; to be in want of medical aid was a sufficient passport. This indulgence, however, was, after a little time, found to be greatly abused. It was observed by a writer, who seems to have attentively contemplated the progress of medical charities, that there was but little probability that this, or any similar institution would ever produce the good effect of which it was capable, on account of the habitual thoughtlessness and improvidence of the poor, who are constantly deserting establishments designed for their relief, before they have a chance of reaping the benefit which they might derive from them; and this improvidence might especially be looked for in those labouring under chronic diseases. This prediction at one time bade fair to be fully verified. Some appeared to come from pure curiosity. Many finding relief after two or three visits, came no more. Others absented themselves because they were advised to apply a blister or a leech; restrained alike by fears of the remedy, and by the shame of owning that they had neglected the advice of the prescriber. Few would be induced to give credit without actual experience, to the apprehensions entertained by the poorer classes, of the effects of these simple applications.

By this negligence the object of the Institution was, in a great measure, defeated; and the medical attendants were deprived of the only recompence which they asked for their exertions, an opportunity of ascertaining the issue of the case. Disgusted by its continuance, after every other mode of enforcing regularity had in vain been resorted to, Doctor Beddoes made a rule that each patient, upon entering his name, should make a deposit of half-a-crown. Small as the sum was, it had a considerable effect in obviating the evil complained of. To render it as little felt as possible, one deposit was sufficient for all the members of any single family; and it was not unusual to have two or three children, and both the parents on the books at the same time. Indeed it seldom happened that in

a family where there were many children, "one only of the little flock was tainted." In cases where it appeared probable that the deposit required was beyond the ability of the applicant, a pledge was accepted, as a knife or any similar article. When the patient was regularly dismissed, whatever he had deposited was returned to him; but if he were irregular the money was forfeited, and was applied to some charitable purpose.

Although many patients were irregular in their attendance, even after the introduction of the rule requiring a deposit, the great majority became punctual. After some little time, habits of regularity both in attendance, and in the administration of the medicines ordered, appeared to be formed; and valuable opportunities were afforded of putting the powers of preventive medicine to such a test as could scarcely be generally hoped for in private practice. The use of the remedies was in some cases persisted in for twelve months, or for still longer periods; and although in the early stages of such inveterate complaints, appearances were often unfavourable, yet the perseverance of the patients was, in general, amply rewarded by the most essential benefit; and whole families that at their first attendance exhibited the languid and sickly appearance of disease, have left the Institution full of health and activity. In these cases, the medical attendant could recommend perseverance without the suspicion of any sinister design. The patient felt that the advice could not proceed from interested motives, and he followed it without scruple; but in private practice many a medical adviser would shrink from making a proposal in which his interest appeared so involved, and if he ventured to make it, it would still be doubtful whether he might meet with a patient endowed with sufficient comprehension of mind to enter thoroughly into his views. Yet it is not exaggeration to say with Doctor Beddoes, that "to many children, preventive medicines are not less necessary than food. If they are sure of perishing

without food, they are not less sure of perishing without such remedies; and it cannot be said that they gain by the alternative; since the sufferings caused by the slow wasting of pain and disease, are, in many cases scarcely less terrible, and they are evidently far more protracted than those attendant upon famine."

Advice was given to all who applied, and, in a great majority of instances, medicine also. As the more particular object of the Institution was the relief of scrophulous and pulmonary complaints, the medicines principally distributed, were such as have been recommended for those diseases. The muriate of lime was tried upon a most extensive scale, and it is not exaggeration to say that its efficacy in scrophula was established in thousands of instances. The fox-glove was also administered to a vast number of patients, under various forms of pulmonary affection; and in many instances with the most happy effects. As a tonic, a highly oxygenated preparation of iron was made use of with signal advantage.[4q] These were the three leading articles of the dispensary of the Institution; although other remedies were, of course, occasionally ordered, and an agreement was made with a druggist, that in consideration of supplying all those articles which it did not furnish, he should dispense, at a reduced price, whatever was ordered upon the papers which marked the applicant as an Institution patient. These papers contained the rules of attendance only; but at one period, a very large impression of the little work which has just been noticed, was distributed among the heads of families at six-pence each copy; a sum falling considerably short of the expence of publication. In this way, much valuable information was circulated among the ap-

4q This was prepared by slowly adding nitric acid to sulphate of iron as long as any decomposition took place, and then adding to the magma its weight of water. The dose was from five to eight drops three or four times a day, which was gradually increased, in some rare instances, to twenty drops; but in general it did not exceed half that quantity.

plicants for relief, and the object and design of the Institution were rendered more obvious to their comprehension.

The remainder of the history of this Institution may be given in a few words. In the spring of the year 1804 the Author of this Memoir offered his services in the medical department, which were accepted. In the latter end of that year other engagements induced Doctor Scully to relinquish his situation there. In the following year another recent graduate of Edinburgh, who was accidentally resident for a short time in Bristol, voluntarily afforded his assistance also; which he continued to render during his stay. Occasional attendance was also given by a gentleman, whom Doctor Beddoes had engaged to conduct his physiological experiments. The Doctor himself continued his services till the spring of 1807, at which period the number of applicants, independently of hundreds of patients who had been vaccinated by Mr. King and whose names were entered in a separate list, considerably exceeded ten thousand. The Doctor then finally relinquished it to the care of Mr. King and of the Author of this Memoir, by whom it is still continued.[4r]

It was in the year 1804 that Doctor Beddoes first procured the assistance of Mr. Alcock, the gentleman above alluded to. He was recommended by Mr. Ashley Cooper on account of his knowledge of

4r The curiosity of the medical public has been repeatedly excited by notices from Doctor Beddoes announcing his intention of publishing the reports of the Institution. When his papers were first put into the hands of the writer of this memoir, he flattered himself that the work was in considerable forwardness; as he found about two hundred pages of it printed. The conclusion was certainly natural, but further search has proved it to be fallacious. These pages were only a reprint, in an enlarged and improved form, of the "Rules of the Institution;" and not one page of manuscript existed in a complete form, extending beyond the printed copy. As, however, all the case-books are preserved, he is not without hopes that he shall be able, however imperfectly, to complete the volume; especially as in the surgical department, he may expect the co-operation of Mr. King.

anatomy, and his zeal in prosecuting physiological inquiries. A rapid increase of professional occupation had some years before compelled Mr. King to relinquish the superintendance of the experimental department. It was now consigned to Mr. Alcock; who fulfilled its arduous duties much to the satisfaction of the Doctor. In the beginning of the year 1805 he commenced, at his instigation, a popular course of Anatomical Lectures; the prospectus of which was drawn up by Doctor Beddoes. In this, he speaks with much respect of the talents of his young friend, and after mentioning the recommendation of the distinguished Anatomist who had first introduced him to his notice, concludes by predicting of him, that "he was destined to recommend himself to the world at large, by the fruits of his zealous labours in science."

In the delivery of these Lectures, which were numerously and respectably attended, and which, like the former ones delivered in Bristol, were divided into a more general and more select course, the Lecturer was liberally assisted by the loan of the valuable anatomical specimens belonging to the Gentlemen who had delivered lectures upon a similar plan in 1798. The course was also illustrated by several valuable preparations of his own, which he had made for Doctor Beddoes. The Doctor himself undertook the lectures of application, and the manner in which he partially fulfilled this pledge, for their number was comparatively few, left only room to regret that his other avocations did not permit him to redeem it more completely.

Much expectation was excited by a notice that he would certainly deliver the introductory lecture. Various circumstances of delay and interruption intervened; and when the day fixed for opening the course arrived, it was not only evident that his personal appearance was out of the question, but it was even doubted whether he would have time to prepare the promised introduction for another. The anxiety of Mr. Alcock under the expectation of addressing an

unknown audience, was much aggravated by this uncertainty; and it was not till nearly five o'clock that the manuscript arrived. He had therefore scarcely time to read it over before the company was assembled. A composition which, in many parts, bore the evident marks of haste, appeared to still greater disadvantage in consequence of its being delivered under such unfavourable circumstances; yet it was impossible not to feel the force of the arguments, and to admire the eloquence of the illustrations which it contained. Nor did it appear less surprizing that arguments and illustrations applied to a subject which he had so repeatedly treated before, should be presented under a garb of so much novelty and originality.

Several subsequent lectures were delivered by the Doctor in person. Two on the blood were particularly interesting and entertaining. He took an opportunity of including in them a complete history of all the experiments on transfusion; and some of them were repeated at the conclusion of the lecture, before such persons as chose to stay to witness them. Other subjects treated of were the temperaments, with the diseases to which some were particularly predisposed; the change which the system undergoes at various periods in its progress from infancy to old age; and an account of the mode in which nature appears to act in repairing injuries inflicted upon the system, illustrated by a view of the processes of uniting fractured bones, and the changes which take place during the healing of the wound caused by the amputation of a limb. This last lecture was illustrated by a vast number of drawings and engravings, of which his collection was particularly valuable.

A copy of the introductory lecture to this course, nearly in a complete form, has been found among his papers. Its leading topics may be anticipated from a review of that which he had previously published. Upon the present occasion I shall only notice those particulars in which he adopts any novelty of illustration or

argument. He commences it with pointing out the peculiar circumstances under which a lecturer on anatomy and physiology invites the attention of an audience. In other cases he may take for granted the value or importance of his subject; and if he enter into any preliminary disquisition upon it, it may be considered merely as a compliance with custom; but he who invites the attention of a promiscuous audience to the unfolding of the structure and laws of the human frame, feels that he has a host of prejudices arrayed against him, which his first attention must be directed to soothe. In proceeding to trace the history of these prejudices, he first casts a rapid glance over the various studies and pursuits which in successive ages, and in different states of society have occupied the attention of mankind. From the most remote periods of civilized antiquity to the present day, we shall scarcely find a period, in which the most important of all human sciences, the knowledge of our own nature, has not been proscribed. The origin of this prejudice may evidently be traced to the horror entertained of dissection, the acknowledged basis of physiological knowledge and inquiry. "There may," says our Author, "be some accessary and co-operating causes; but the principal, that which has heretofore more than balanced so many other considerations which I trust that you will find weighty, is obvious. It is misguided compassion; an unhappy confusion of feelings and ideas. It is, that anatomy is necessary to physiology. It is, that the intricate machinery of life cannot be brought to light, without making free with its ruins in the dead body."

The progress of this horror is next traced through successive ages. The antient Egyptians, it is well known, embalmed their dead, but the incision which was necessarily made, was not performed by the person to whom the office of embalming was assigned. He marked the line along which the dissector was to pass his knife, and the

latter, after performing his duty, was instantly obliged to fly, to avoid the fury of the spectators. The Grecian superstition connected ideas of peculiar horror with injuries or irreverence offered to the bodies of the dead. The Romans contemplated dissection with similar feelings. "Galen, who lived in the second century after Christ, congratulates himself upon having observed by chance, two skeletons in Alexandria; and advises all who would study anatomy to repair thither."

It is not to be wondered at if these superstitious prejudices were rather augmented than dispelled during the darkness of the middle ages. "The Emperor Frederic II. although a great promoter of science, only ventured to allow the dissection of a single human body in all Sicily, during a space of five years; and at this all the physicians and surgeons of the island were to be present. How," asks our author, "could the men even of that age fail to reflect, that either the opening of a single body was an inexpiable offence against the dead, or opening but one, was a fatal injury to the living."

Even in the present day, we are by no means exempt from the mischievous operation of similar prejudices. Physiology has never been received at either of our Universities "into the list of common studies, or made necessary to general graduation. In the Metropolis, we have seen a sort of university established, where grown people may repair the defects of their education, and keep pace with improvement; and yet no teacher of physiology has been heard within the walls of the Royal Institution."[45] Another modification of this prejudice to which the Author had before alluded upon another occasion, the unwillingness to permit the examination of bodies after

[45] A course of physiology, however, is announced this year (1800) at the Surry Institution, which may be considered as an omen of the diffusion of a more general interest upon this subject.

death, he combats in the following terms. "I shall not dwell upon the inconsistency of requiring the physician to know exactly what is amiss within the sick, and barring up all access to this knowledge. I shall not stop to demonstrate how much of the difference between the most discerning European physician and the tampering conjurors among the American Indians, depends upon the opportunities, reluctantly granted or obtained by stealth, of comparing the diseased with the sound structure of our internal organs. It is said that when Danton was carried to execution, he called out, "*I drag Robespierre after me.*" On many a coffin, where inspection of a child's body has been refused, there might be inscribed, "I drag my living brothers and sisters after me." In ten years, if free permission were allowed to open bodies and examine the diseased parts, I myself feel perfectly persuaded that medicine would acquire a power and a certainty, to which otherwise it will be long a stranger."

He proceeds to place in a variety of lights the great importance of a knowledge of the human structure and its functions, as tending to the prevention of many injuries from improper handling and other points of management in infancy, and as rendered peculiarly necessary, at present, by the alarming advances of two diseases, scrophula and phthisis, which threaten to become the joint scourges of our island. "The succession," he observes, "of child to parent has always appeared to me one great consolation for the shortness of individual life. I have often enough known parents expire placidly, with only a wish that *their* children may have children, to pay them the last attentions with as much affection as they themselves have experienced. And it is, I suppose, very common for parents to resign property and existence into the possession of children with equal tranquillity."

"I know not that I have a right to assert that there never was an age or country in which the natural order of succession was so

frequently inverted as in our's, and in which consequently so many were deprived of this great consolation in death. I suspect it however to be the case. We eternally behold fathers and grandfathers following children and grandchildren to their last home, till they remain quite alone and deserted in the world.

"To bring these premature, and if I may so speak, unnatural ravages of disease home to your conception, fancy a vast burying ground for those who have been thus cruelly cut off. On its margin suppose a number of parents engaged in pensive contemplation of the scene. On the other hand figure to yourselves a company of children, stretching forth their little hands and supplicating their parents to open their hearts and understandings to that instruction, which is necessary to prevent the grave from opening to receive them before their time, as it has such multitudes of their equals. In this representation, there is no other deviation from reality, besides bringing into one spot the dispersed calamities of families, and putting the dictates of humanity into the mouths of those, by whom indeed they cannot yet be conceived, but to whose preservation they are essential.

"I confess I see but one possible way of effectually staying this, which may be called *the chronic pestilence of the country*. Let the seniors learn how to take better care of the juniors, and how to have them better taken care of. Could the real state of things be fairly brought to the feelings of mothers, they would not merely find courage to brave those terrifying objects, which they mistakenly suppose essential to all anatomical instruction. But nothing—no sneers, no authority, no mistaken delicacy, no expectation of disgust would by any possibility keep them away from it."

He thus replies in a subsequent part of his Lecture to a common objection against the communication of a partial degree of information upon this, as well as upon other subjects. "The maxim that

'*a little learning is a dangerous thing*' stands ready, like a pistol primed, to be discharged in the face of him, who, with limited opportunities ventures upon an extensive pursuit. The pregnant brevity ofexpression in our poets, it is not to be denied has a powerful effect upon the understanding. But there is a clear distinction between neatness of phraseology and justness of sentiment. As a general rule, it is very certain that this maxim is good for nothing. Supposing a consistent adherent of it advising you not to learn the common rules of arithmetic, because you can never find time to rival Dr. Price in calculation, and much less to follow the scientific track of Newton through the heavens. You would laugh at such counsel. You know, that your baker and your butcher would cheat you weekly. It may not be your ambition to shine among the luminaries of science, but you need a little common information for common purposes. Now I say a little readiness at accounts is not of more use, in making you a match for your trades-people, than a few plain facts from physiology in guarding your family against the insidious attacks of disease, the incompetence of regular professors, the impositions of quacks, and the equally dangerous follies of gossips.

"The truth will turn out to be that it is a great deal of *ignorance* which is dangerous; since that is either accompanied by a great deal of conceit, or else will leave you without a guide, where you may one day fall yourself, or push another over a precipice."

"A *little* knowledge is of inestimable use, if it *be* knowledge; that is, if it rest upon clear impressions made on the senses. The quantity of physiological knowledge required, is no more than any person in moderate circumstances might acquire, if a sense of its importance had created a public demand for the method of instruction by which alone it can be advantageously begun.

"There is another argument by which the opposers of general

physiological instruction should always be pressed. The personal condition is a subject respecting which, the mind, nineteen times in twenty, cannot hang on the balance. Anxiety about one's own health, the interest taken in that of children, the sufferings of neighbours, of relations and friends; the possible fate of juniors, the necessary fate of seniors, private crimes, public calamities, all daily conspire to blend opinions relative to the living frame with the table-talk of life. Each speculates upon what comes home to all. How seldom to be expected that people should speculate without resting in some conclusion. How few minds therefore can be without some few fragments at least, if they have not an entire system, of medical faith. There are, in short, just two kinds of physiological doctrine in the world; that of the dining or drawing room, and that of the anatomical theatre. Since one or the other must be so universally adopted, let the prudent see to which they have to cleave."

After this ample vindication of physiological instruction, he concludes his Lecture with a view of the essential service which the cause of morality might derive from it, and the improvements which its diffusion must effect in medicine; but as his sentiments upon this topic have been already sufficiently explained to the reader by previous quotations, I shall not dwell upon them now.

In his lecture on the temperaments he traces the origin of the common doctrine with respect to constitutional peculiarities, from the Grecian school; and its gross division into the sanguine, the choleric, the phlegmatic, and the melancholic. He points out the fallacy of the principle upon which this doctrine was maintained by Galen and his followers; and proposes as the most satisfactory means of distinguishing temperaments, the examination of the liability of certain classes of persons to certain disorders.

In pursuing this enquiry he takes a view of the differences existing in the human frame, in different stages of civilization, and in

different ranks of the same community. His details on these subjects are remarkably interesting and amusing. He by no means however pretends to lay down a complete doctrine of temperaments although he feels disposed to hope that his lecture would give some insight into its fundamental principles. "Whenever completed," he observes, "it must be established upon a comparison of the modification of the functions of the principal organs, and their state with relation to health; thus we might have the temperament of weak lungs, of a weak stomach, and the like."

The great attribute of organized nature seems to be susceptibility of impression from without, and the nervous system appears to be the prime distinction of animals of the higher order. Now on the habitual state of this system, two leading distinctive characters or temperaments may be formed. One where the susceptibility is deficient, another where it is excessive. He appears to consider these two as the leading divisions, to one or the other of which, the various modifications of temperament are referable. In enlarging upon the latter head, he lays down a variety of important principles relative to its regulation, in children more especially, and corrects those popular impressions which assign to persons so constituted the almost exclusive possession of sensibility.

Those who were present at these lectures will long remember the familiarity of illustration with which he elucidated some difficult points of physiology, and the perspicuity with which he laid open to the uninstructed the principles of a new science. Those to whom its details were more familiar will be more competent to appreciate the extent and variety of information which he discovered, and more disposed to lament that he never completed his projected physiological work.

Several of the observations which he delivered during this course, those on the temperaments and susceptibility of impression, more especially, appeared in a publication which will be hereafter

noticed. I shall dismiss the subject of his lectures with the following quotation from one of his common place books; which appears to have been designed for a similar occasion, though it was not actually delivered in the present instance.

"You may have read, that in the second book of the Æneid, Venus, the fabulous mother of Æneas, in order effectually to deter her son from a fatal perseverance in his attempt to rescue Troy when its last hour was come, clears away from him that mist which prevents him from discerning supernatural objects. Immediately, he perceives one hostile Goddess in possession of the Citadel; another mistress of the Scæan Gate and calling up the Grecian Troops to pour through this inlet into the City; while Neptune was thundering against the walls, and shaking them from their foundations.

Neptunus muros magnoque emota tridenti
Fundamenta quatit totamque ab sedibus Urbem
Erait.

The vision, however terrific, was beneficial; it is stated to have determined the Hero to preserve himself, his father and his child. In like manner, that knowledge which the present course of lectures ought to convey, will bring into your distinct view, powers as formidable to the human frame, as the divinities of fable were to Troy; and, in the beginning, at least, of their operations, as invisible to the uninstructed eye. One perhaps, (if it may not be too fanciful to pursue such an analogy) like Minerva shall get possession of that commanding citadel the head, and carry on a work of ruin, which shall appear in the awful form of dropsy of the brain. Another like Neptune shall assail that portion of the vitals which is lodged in the chest, and bring the whole living edifice to the ground."

"Shall I startle any among you, if I assert, that it is impossible, that there should not be some here, whose most ardent wishes ought to be for this clearing of the sight; because the work of desolation

must be already begun within the objects of their fondest affection, although, for the present, the sap of the constitution is carried on unperceived by them. I have made observations among various classes of society, and in many districts; and I think it is highly improbable that there should be five parents of moderately numerous families assembled, where what I have just stated does not hold good. It is doubtful that there are three. It is perhaps an equal chance whether there are two."

"I go farther. I say that the detection of these powers of evil at their work will be followed by as happy effects as those fancied by Virgil. You will not, indeed, save yourselves exactly by flight, but you will be warned in time, and call friendly powers to your aid, and the machinations of those of an opposite character will be counteracted."

"What man is without certain maxims according to which he manages in his own case? But what foundation have these maxims? Has any one here a clear conviction that when he avoids a certain course because it may lead to ill health, and pursues a contrary course for the opposite reason that this has been traced by persons properly qualified? Is he certain that the rule he obeys has been derived from a careful examination of the structure and qualities of the living frame? The origin, if I may observe it by the way, of these medical opinions of the unprofessional, is not doubtful. They are scraps of superannuated hypotheses; the faded figures of ancient visions; the rags and tatters of pieces woven by the splendid fancy of Grecian theorists in medicine. A Lady Bountiful who is giving you sweeteners to remove certain foulnesses of the blood, of which no mortal has ever detected the faintest trace in that fluid, would be very much surprized if you produced a Greek text for her doctrine; yet this might be easily done."

From the tenor of these observations it is sufficiently evident

that they were intended to form part of a popular address. They would probably have been included in some future introductory lecture, had he lived to witness another similar course of anatomical instruction. The experiment of these lectures would indeed have been repeated in the following winter, had not Doctor Beddoes been, at that time, much employed in meditating upon, and making arrangements for a step of considerable importance. The solicitations of many persons of consequence, had gradually induced him to take into consideration the expediency of a removal to the Metropolis. The prospect of a greater scope for his exertions and of more extensive utility, excited in him an honourable ambition; and he at length determined to remove thither. It was not in his power, however, to remove hastily; and during the necessary delay which his preparations for such a step occasioned, circumstances occurred which at first retarded, and, at length, finally prevented his projected departure from Clifton. He was seized in the summer of 1806 with a severe illness, which, from the symptoms, there was every reason to conclude was of the same nature with that which finally proved fatal to him. Its more prominent features answered, with a degree of exactness not often met with in actual practice, to the nosological character of Hydrops Pericardii; with these, were complicated certain symptoms which marked an irregularity in the functions of the liver.[41] The writer of this memoir attended Doctor Beddoes in this illness, in conjunction with Doctor Craufuird; a gentleman to whom the patient could at once look up for all the benefit which could be hoped for from professional skill, and for the still more precious and soothing kindness of a friend. The attention of his physicians was naturally directed to the hydropic symptoms, as being the most important in their consequences. The

41 The complication of these symptoms was sufficiently accounted for by the phenomena that presented themselves upon the examination of his body after death.

patient, on the contrary, with a degree of self-delusion, which he would have been the first to have detected in another, or perhaps, something of a voluntary blindness, endeavoured to keep these symptoms out of view, and referred every uneasy sensation to the deranged state of the functions of the liver. Had less serious consequences been involved in the question, a bye stander could have scarcely witnessed, without a smile, the acuteness and dexterity with which he parried or anticipated every question, a direct answer to which might lead to the confirmation of their suspicions. The delusion was probably assisted by the following circumstance: Doctor Beddoes had for many years been subject to a degree of dyspnœa, which he was always accustomed to consider as the consequence of an ill-cured pleurisy by which he had been attacked in early life. It was, probably, owing to the inquietude and oppression caused by this circumstance, that he was observed to be often restless; particularly in warm weather; and frequently to move, while engaged in his studies, from one apartment to another. The existence of some habitual difficulty of breathing could scarcely fail to strike even the most superficial observer, who had ever been in the Doctor's company; and to this old complaint, he would fain have referred the more distressing symptoms of oppressed respiration, with which he was now afflicted. Such medicines, therefore, as appeared to be directed with a view to his dropsical symptoms were taken with reluctance; but he readily made use of such as appeared designed to act upon the hepatic system.[4u] This conflict of opinion between the Doctor and his medical friends continued for some time, nor

[4u] It ought not to be omitted here, that by his long abstinence from all fermented liquors, the sensibility of his stomach to that stimulus was so far accumulated, that he complained that the small quantity of the spirituous vehicle which accompanied the administration of tincture of squills and tincture of digitalis, produced, independently of the medicine, a distressing state of excitement; nor did this complaint appear wholly imaginary.

did he appear disposed to submit his opinion to their's, although he yielded a reluctant compliance with their plan of treatment, till his difficulty of respiration suddenly increased to an alarming degree, and was accompanied by a great diminution in the quantity of urine. These symptoms were too unequivocal to admit of further self-delusion; and he immediately appeared to contemplate his situation in a desponding and almost hopeless light. It was now proposed to him to submit to the application of a blister of boiling water to his chest; a remedy which had been employed the year before, with signal success, in a case which he had attended with the Author of this memoir, and which although administered under circumstances almost hopeless, appeared to have been the means of preserving a most valuable life. Although he did not absolutely refuse, he begged a suspension of the proposed application till the following visit. When his medical friends next saw him, he put into their hands a written paper. He had previously been accustomed to minute down brief memoranda of his symptoms, in order to spare himself the effort of speaking, which had for some time been painful. The present paper, however, was of a different kind; it bore the evident impression of that despondence with which he reviewed his present situation. It remarked, that, in his apprehension, there existed only a very distant analogy between his case and that in which the blister of hot water had been applied;[4x] and

[4x] This was a violent pleuritic seizure, attended with very alarming symptoms. It is the case the origin of which is recorded in the Manual of Health, *p.* 204. The blister was applied in the following manner. A napkin, well heated, in order that the water might be retained as nearly as possible at the boiling point, was rolled up and forced into a pint cup, which it completely filled, leaving a convex surface rising about half an inch above the top. Boiling water was then poured on the napkin till it was thoroughly wetted. It was then hastily inverted and held for exactly thirty seconds to the patient's side. The spot where the cup was to be applied was marked and the extent of the injury limited, by folds of linen laid

as he could not anticipate from it any beneficial result, he supplicated to be spared unnecessary suffering. By the time that they had perused the paper, he desired them, with an air of calmness, to witness the execution of a will, which he had hastily drawn up with his own hand. They complied with his request, and then addressed him in a style of hope and confidence; and at length, although he evidently appeared to consider their assurances as a *pious fraud*, he submitted to the application of the remedy. The effect was considerable: It was some time before the injured surface separated; and it appeared to be attended with the most beneficial consequences. A progressive amendment in his symptoms took place, which terminated in a gradual, but at length perfect, recovery. The slowness of his convalescence, however, so far abated his activity and depressed his exertions, that the immediate execution of his intended departure for the Metropolis was suspended; and he determined to wait the perfect restoration of his health and strength, before he would come to a final decision as to the propriety of encountering the necessary fatigue attendant upon medical practice in the capital.

In the course of this year a new work appeared from his indefatigable pen, under the title of the "Manual of Health; or the Invalid conducted safely through the Seasons." From a notice on

on the side, covered with oiled silk and leaving a small circular space. These precautions, however, appeared afterwards, to be unnecessary; for neither in this instance, nor in the case of Doctor Beddoes, was the napkin rendered so wet as to permit any of the water to escape. The application is no doubt a severe one, but the pain is momentary. Could prejudices be surmounted, it might, perhaps, be frequently resorted to with advantage in other diseases, where the system appears prostrated below the point of re-action, and where the common blistering applications produce no effect. And under such circumstances, even the affectionate solicitude of the dearest friend might be soothed with the assurance, that it could not be felt, without the probability of a good effect succeeding its application.

the title-page it appears that he intended this work as the first of a series to be continued occasionally. Although its object was, in effect, the same with that of many of his previous publications, the mode in which the subjects were treated was considerably different. In a "dialogue between a lady and a gentleman" which ushers in the work, there is, if I may be allowed the expression, a sort of Shandyism in his philosophy, which forcibly reminds the reader of the writings of Sterne. He begins by clearing away some errors which exert a pernicious and a perverting influence in the common reasonings of mankind upon the subject of health. His supposed companion suggests to him the question, whether he might not engage the attention of his reader with greater certainty, if he would undertake the task of proving health to be "somewhat of an accomplishment." He readily accepts the invitation, and cites, as a proof that (notwithstanding the attempts to laugh nature out of countenance) all other accomplishments are thought incomplete without this interesting finish, "the necessity of burying the features under a coating of inexorable rouge;" for, certainly, however fashion may have succeeded in laughing the ruddy cheek of nature to scorn, the custom of wearing rouge must have been originally adopted, and, in not a few instances, is still persevered in, with a view "to cheat the spectator into a belief that he was gazing upon the real roses of health. These never having been cultivated or prematurely withering, what remained but to implore the aid of art in behalf of the desolated living parterre. For of those who live but to amuse and be amused, who could brook carrying about from party to party a pair of eyes without one spark of fire, and a corresponding set of leaden features!"

He next argues against that abuse of terms which confounds sickliness with delicacy; an abuse to which he attributes much of that self neglect which has slowly undermined the health of many an

interesting female. He particularly attacks the very common error of considering delicacy of health as almost a necessary concomitant of tenderness of feeling, and proceeds to consider at large the nature, degrees, and combinations of sensibility. He has here recapitulated, in an improved form, many of the observations which have been alluded to, as constituting part of his lectures of application, and pursued a subject which he had already glanced at in his Hygëia. *(see p.* 251.*)* He compares, for instance, that susceptibility of impression which makes a highly nervous female start convulsively upon hearing a hair pin fall upon the floor, and shrink with disgust from scents which are not perceptible to the coarser organs of the more healthy, with the acuteness of hearing, of smell, and of sight, in the North American Indian. To whatever causes this susceptibility, in either case, may have been originally owing, it cannot be contended that it exists in the one, in a higher degree than in the other; yet in the one it is attended by the enviable accompaniments of bounding vigorous health, and communicates only pleasurable impressions; while, in the other, it is more frequently a source of suffering. This idea is pursued through a long train of reasoning, and is amply illustrated. The next parallel that he cites is of a more interesting description. He compares this morbid sensibility to impression, with that naturally possessed by healthy children: here too, as in the case of the savage, it is accompanied by pleasurable sensation. He now proceeds to trace some of the phenomena with which this excessive sensibility is occasionally combined, as for instance, sometimes with muscular inability, at others with muscular exaltation. In delineating the latter combination, "I confess" says the Author "that I do not know of any thing quite equal to this dreadful vivacity of the perceptive and sentient powers. But there is a condition in which the nerves seem to be, in the next degree, on edge, while the tone of the muscles is wound up to a force as much

exceeding that of health. Fits of furious madness shew this combination. Some slight impulse disturbs the system. A single glimpse in a looking glass will suffice, like the opening of a valve in a vast body of machinery, to set all the powers of the constitution in commotion; and the same lunatic shall exhibit, in quick succession, the flights of Pindar, the wit of Rabelais, the humour of Sterne, and the strength of Hercules. All the faculties, perception, sensibility, memory, and imagination press forward with rival rage as if contending which should play its part on the scene, while brute force stands by a delighted spectator, and ever and anon mixes in, to animate the fray. The past and the present huddled together, are now involved in deep gloom, and now illuminated as with the sudden glare of lightning. Thus, when a hurricane breaks in upon a perfidious calm; first, the atmosphere breathes in low murmurs; these swell into hollow threatening tones; the uproar deepens, till the irresistible fury of the gusts sweeps away together men and their habitations. The land and waters are confounded, and the sturdiest productions of nature, torn up from their foundations, are seen whirling in the fierce dark eddies of the excited element." The reader who, before reading this description, may have consulted his terrific painting of insanity in Hygëia, will admire that variety of eloquence with which he describes the most awful of human calamities, as well as those less appalling nervous affections of which he had already spoken in the same work.

Lest the fastidiousness of his readers should induce them to turn away, without conviction, from the instances furnished from savage life, he proceeds to adduce more interesting and familiar examples to prove that refinement of mind by no means, necessarily implies infirmity of body. "Italy," says he, among her sons, offers us Petrarch, the fine fibres of whose heart swung tremulous to the breath of every impression, like the branches of the weeping willow,

while his understanding covered districts like the banyan, and in principle he stood erect as the sturdy oak. Germany exhibits in the same Goethé, the painter of Werter and of the iron-handed Goetz. Burns, whose song could so unaffectedly sympathize with the daisy and the mouse, as his plough crushed the one, and turned up the nest of the other—whose letters breathe a tenderness, to me more engaging than his song—was he a reed, shivering at the chill of every blast? His life exhibits him as striding foremost among his comrades, with the scythe in his hand, at the severest of rural labours. Nor were the tutored Athletæ of disputation eager to cope with his native elasticity of mind. Howard, more alive to the cry of distress, than the pupil of the Cyrenaic school to the call of pleasure, displayed more than stoic fortitude, in resisting every allurement to turn aside from the high road of his mission of mercy. Shakspeare, whose entire spirit appears, in his Juliet, to animate the dove; the nightingale in Ophelia, and in the melancholy Jacques; soars with the eagle in Hotspur, and seems to inform the hyæna in Lady Macbeth, and the tyger, in that compound of craft and ferocity, Iago. What gentleness of nature breathes in the Il Penseroso, and in the mutual addresses of Adam and Eve? Yet was Milton a lion that took no delight in dandling the kid. So far is weakness from being by any settled law of nature indissolubly coupled with readiness to be affected, that of these and others, the most energetic among mankind, it may be affirmed that they could never have had such force, without such feelings. The more easily the animal springs yielded inwardly, with the stronger bound did they recoil.[4y]

After this animated effusion in proof of his position, he proceeds to consider, more in detail, the nervous temperament, and the diseases

[4y] To this happy combination of keen sensibility with physical tone, he attributes, as has been already seen, the formation of the energetic character of Alexander. *See p. 63.*

to which it is especially subject. Amongst others of less importance he particularizes Scrophula and Phthisis. He gives a sketch of the natural history of the nervous temperament, adverts to its increasing extent and the increasing frequency of its diseases, and attributes them to the increase of luxurious indulgence and passive enjoyment. As so much on these topics has been already quoted in reviewing Hygëia, I forbear to enlarge upon them here; although, notwithstanding the similarity of the subject, the mode of illustration is so various, that it will amply repay the labour of perusal.

After thus developing some leading principles and views, the Author proceeds to that part of his subject which may be properly styled the almanack of health; containing a review of our seasons; accompanied by appropriate cautions and directions suited both to the healthy and the invalid. He distributes them into the following general divisions. 1. The frosty season. 2. The early mild season. 3. The cold dry season. 4. The hot season. 5. The raw wet season. He notices the particular diseases of each, and enters into a full examination of the important questions of cloathing, diet, and exercise as adapted to these various revolutions. His observations upon these subjects, and the mode in which they are delivered, are in general, equally original; but the latter is uniformly the case. In considering the state of the system during the summer months, he is naturally led to advert to the excursions then made for change of air. He exposes some prejudices, and corrects some mistaken opinions upon the subject. He particularly adverts to that confusion of ideas which because sea bathing is supposed to brace, has assigned a similar quality to the sea air. "The wide world of waters," he observes, "the scenery of the shores, wooded, broken, with its lawns of sand in one place; in another its caverns scooped out of shining and variegated serpentine, as at *Kynance* Cove near the Lizard, which the imagination of the ancients would have peopled with

nymphs;[4z] the diversity of the surface of the ocean, now smooth and shining, anon rugged and foaming; the murmurs in a calm, the roar in a tempest, all this variety, which, as it gives the visiter moderate pure pleasure, may somewhat help to give health, perhaps renders the coast so far rather preferable to an inland situation. But what, in the name of common sense, is to be put to the score of air. The air of the sea, probably, is sometimes injurious, as to certain pulmonary invalids; the salt spray, being, even at some distance from the shore, too sharp for tender lungs." Pursuing these reflections, he allots a separate section to the subject of retreats for the consumptive. He first examines the propriety or necessity of sending away the sufferers in that complaint, to die; and next reviews the situations most commonly selected for such a purpose. The Bristol Hotwell is of course introduced, and he covertly intimates his scepticism as to the virtues both of the water, and of the air; but dismissing for an instant his own person, he has announced it with sufficient explicitness, in an elegy supposed to be written by a Hotwell Patient. This little composition exhibits genuine pathos both of description and sentiment, and as an additional proof of the versatility of talent which its Author possessed, I hope that I shall be excused for giving it a place in the Appendix.[5a]

From the topic last discussed, he naturally proceeds to the subjects of bathing, and water drinking; on both of these, his rules are precise and explicit. From the effect of the sea water and mineral waters he proceeds to the consideration of common spring waters, and points out the circumstances under which they may acquire a deleterious influence; particularly when they are contained in receptacles of lead. That water impregnated with this metal, even in minute portions, is capable of producing highly injurious effects is a fact sufficiently established. In a treatise, however, published in 1803, this principle is pursued to a length which appeared to the Doctor to border on extravagance; and he has indulged himself with a good-natured smile at the unreasonably apprehensive spirit of the Author. In a subsequent publication, to which this little volume alludes under the title of "Alarm the Second, or here's another as good as he," the same Author asserts that he has detected arsenic in spring water, and attributes many constitutional diseases to this poisonous impregnation. Against the effects of this alarm also, Doctor Beddoes fortifies the unprofessional reader by giving him a variety of comfortable assurances as to the general safety with which the beverage that the bounty of nature has provided may be made use of, and proceeds to shew that the formidable objections which have been raised against it may be applied with equal justice to the use of common salt.[5b]

4z Nympharumque domos. *Horace.* 5a Appendix—No. 9.

The volume concludes with a short appendix upon a variety of topics. In the concluding section a comparison is instituted between the routine and the experimental physician; which he concludes with an ironical anticipation of the havock which must necessarily ensue "if a tribe of Bergmans, Lavoisiers, Berthollets, and Cavendishes, were to break in among us under the guise of physicians."

This is the only one of Doctor Beddoes's numerous publications on the subject of medicine, that appeared without his name. As its plan, in this country at least, was perfectly novel, he was perhaps willing to ascertain the success of his experiment before he publickly owned it. Those who are well acquainted with his previous medical writings, and with his peculiar turns of thought and expression, will be surprized to find that he had flattered himself that

5b In one of his common place books he has remarked that "it is evident, if the speculations of Dr. Lambe had been founded in fact, that the human race must, long since, have been extirpated."

his concern in the work in question would escape detection; since almost every second page betrays the Author. In some instances, however, the suppression of the name answered a good end; for the Manual of Health found its way into some houses where the avowed writings of Doctor Beddoes were absolutely proscribed; and its value was recognised and its precepts adopted, by some who would never have appreciated the one or listened to the other, had they been aware of the source from which they proceeded.

The extracts which have been made from this work will, I apprehend, sufficiently shew that it is ably and eloquently written. It is not however entirely free from the defect pointed out in Hygëia. With a view probably to render his work more popular, the Author has here also indulged in a variety of allusion, illustration, and analogy which sometimes renders it difficult to pursue the thread of his reasoning. This is an obvious imperfection in a work, which from its manner of execution appears to have been designed for the parlour window, or even for the toilet. The mental exertion, however, necessary to trace it completely, will be amply compensated by the variety of salutary precepts applicable to the common concerns of life which may be derived from its perusal.

In the year 1807, Doctor Beddoes published a treatise "on fever as connected with inflammation" which he modestly termed "an exercise." It will be remembered that a short time previous to its appearance, Doctor Clutterbuck had published a treatise on the subject, which he dedicated to Doctor Beddoes, and in which he advanced the doctrine "that fever consists essentially in topical inflammation of the brain or its membranes." Great part of the Essay under notice is devoted to the examination of this principle, and the deduction of the Author is, that it is not sufficiently founded. He sanctions his opinion by a multitude of authorities rarely accessible in this country, and abounding with valuable pathological information. He commences his work with a rapid

sketch of the doctrines which have prevailed in successive ages and schools on the subject of fever. He complains of the inutility of these hypotheses, and of the neglect or imperfect pursuit of the only means from which just ideas can be obtained; a careful examination of the appearances after death. From hence he proceeds to trace the connexion of fever with inflammation, and states in a few words, but with much distinctness, their various reciprocal combinations. The question of idiopathic fever next passes under review, and this is succeeded by a summary of those facts which have led many physiologists to doubt of its existence. The disturbance in the sensorial functions manifested in fever connected with inflammation, appears long since to have suggested a suspicion that this inflammation was seated in the brain, and Doctor Beddoes has given a brief sketch of two epidemics in which the symptoms rendered such a presumption highly probable, although the fact does not appear to have been ascertained by dissection. The presumptive evidence however furnished by these epidemics is strengthened by the phenomena observed in a subsequent one, which occurred at Geneva, where this decisive mode of ascertaining the seat of the disease was not neglected. Like many other opinions it appears to have been successively entertained and abandoned; but it has of late received an accession of evidence not only from the publication of Doctor Clutterbuck, already alluded to[5c] but also from the writings of Doctor

[5c] Doctor Clutterbuck has observed in his preface that "physicians neither agree among themselves as to what fever is, nor in what it essentially consists; nor have they assigned to it any certain and determinate seat." He is here under a mistake. The first physician of America, Doctor Rush, has long since proposed a theory of fever more simple and determinate than that of any of his predecessors. He contends that fever whether it appears in the head under the form of phrenitis, in the lungs under the form of pneumonia, in the liver under the form of hepatitis &c. is still an unit; that these various local affections are all symptoms only of an

Ploucquet, a professor at Tubingen, between whose opinions and those of our countryman there exists a degree of coincidence which has been traced with much minuteness and accuracy in the Essay under notice. The principal doctrines maintained by both are, that however great the variety of appearances in fever, the fundamental affection is uniform: that the seat of fever is in the head, or rather in the brain; that the extensive disturbance produced in the system could not originate from any other cause except the affection of so important an organ, and that this affection is inflammatory: that there exists a complete analogy between fever and inflammation, and that phrenitis and fever are essentially the same. They both appeal to dissections; both contend that the debility in typhus consists in appearance only, and not in reality; and that the cure must be sought for in such means as restore the brain to a healthy state; and these are stated, by both, to be depletion and counter-irritation. These arguments are now canvassed with much freedom by Doctor Beddoes. He complains that some are inconclusive, and that in estimating the supposed confirmations of them furnished by appearances after death, too great a latitude has been assumed; since both writers have almost contended that "every sort of alteration indicates febrile inflammation or somewhat akin to it; while the absence of alteration affords no proof to the contrary." He here quotes the histories of a variety of epidemics, accompanied by records of dissections. Many of the phenomena observed in these are calculated to support the general position for which they contend, but there are also striking exceptions. In one important particular however, these dissections appear all to coincide; and that is, the stomach, and adjoining

original and primary disease in the arterial system; and in the irregular or convulsive action of that system, he contends that fever consists.

viscera, were constantly inflamed; and from these numerous authorities, the Doctor thinks himself justified in simply drawing one inference; that "in idiopathic fever, the stomach and contiguous parts have been found more constantly and more deeply affected with inflammation, than the brain and its membranes."

It would be impossible to give any abstract of the multiplied and interesting evidence which the Author has accumulated in support of this position. It is already condensed and concentrated by himself; to give a view of it therefore, it would be necessary to transcribe the volume. Some parts of it strikingly illustrate the propagation of inflammation; its rapid translation from one organ to another, and its tendency to fix upon a predisposed organ. From a comparison of multiplied cases and dissections, the Author at length thinks himself warranted in drawing this conclusion respecting the connexion of inflammation with fever, that "in whatever organ this process may be detected, its symptoms appear at all stages of the disease alike; nor does the head offer the smallest peculiarity in this respect." Dr. Ploucquet and Doctor Clutterbuck, he further observes, have truly maintained that no line of distinction can be drawn between typhus or idiopathic fever, and that fever consequent upon injuries of the head. But the rule applies equally to the fever excited by other injuries by wounds, and by poisons.[5d] The wounded French soldiers at the last siege of

5d Cases of this kind were observed as anciently as the time of Hippocrates. He relates the history of a certain Antiphyllus, in whom a putrid bilious fever as he calls it, was excited by the application of a caustic to a wound.

Doctor Despontes takes notice, that a fish which he calls a sucker, affected the system nearly in the same manner as the miasmata of yellow fever. A distressing vomiting, a coldness of the extremities and an absence of pulse, were some of the symptoms produced by it; and an inflammation and mortification of the stomach and bowels were discovered after death to be the effects of its violent operation. Doctor Physick, a favourite pupil of John Hunter's, saw an instance in St. George's Hospital in 1789, where an acute pain in the eye produced a fever which terminated fatally in five days.—*See Dr. Rush's Works Edit.* 1805. *Vol.* 3. *p.* 44.

Cairo, as we learn from the testimony of Mr. Larrey, surgeon in chief to the French army in Egypt, were attacked with a genuine yellow fever; yet this fever "was not epidemic, nor simply the effect of climate on persons arriving from colder regions; being absolutely confined to the wounded men."

He proceeds next to give an account of several dissections, both human and comparative, where death had been produced by hydrophobia. In these, as in other instances, a variety of appearances had been noticed. The brain in a majority of instances shewed no signs of inflammation, and in some, all the organs were perfectly free from it. And yet, he observes, "whether hydrophobia affect the sensorial functions, will hardly be made a question; when it at once reverses the character of the physiognomy: when we recognise alienation of mind under every form of hurried manner, concentration of thought, terrifying dreams, waking illusions, delirium of all degrees short perhaps of violent frenzy: when the eye at one time cannot bear the light, at another grows dim, or loses its power; when a breath of the softest air is intolerable and the skin shrinks even under the footsteps of a fly; and when consciousness of this high susceptibility of suffering, keeps the soul incessantly stretched upon the rack of panic apprehension."

But a disturbance of the sensorial functions might exist in a high degree, without any morbid change taking place that the knife of the anatomist could discover. It is no more to be admitted as an absolute proof of inflammation in the brain, than pain in a given organ is a proof that inflammation exists in that organ; or the want of it, that inflammation is wanting. "Without rendering the language of pathology still more confused, we cannot employ pain and inflammation as convertible terms. Typhoid acute inflammation often partakes with scrophulous and some other chronic inflammations in this remarkable character; that it proceeds without pain or with very little, in proportion to the devastations which it occasions."

Of this, one of the most familiar instances is furnished by the putrid sore-throat; where difficulty, or pain in swallowing are often absent, notwithstanding the existence of a high degree of morbid action. This doctrine the Author applies to the pain in the head which so generally accompanies fever, and with still more confidence to the delirium which often attends it. He considers neither as proofs of inflammation. "The mode of action in which delirium consists, lies hid in the unfathomed abyss of nervous influence. In its excitation and disappearance it often seems very unlike the process of inflammation." In support of this doctrine he has adduced among other instances equally striking and conclusive, the following extraordinary case.

"An apprentice boy, between 13 and 14, on the morning of June 14, 1788, began on a sudden to talk in a very strange and wild way. His parents at first supposed him in jest. As however he not only went on, but grew worse and worse, they tried to stop him first by threats and afterwards by blows. But all was in vain. By noon he was in a complete phrenzy and I was hastily called. On hearing my name, he rushed out of the hands of those who held him, with an intention to thrust me out at the door with much abusive language. He was soon seized again, but would not bear me to be present; he cried, foamed, stamped and tore till I went away. As little could he endure his father in the room. I enquired to no purpose into the cause of this sudden seizure. There was no recollection of his having taken a poisonous herb or any thing suspicious—neither was he supposed to have been bitten by a mad dog or to have met with any particular shock. I therefore provisionally ordered an anodyne and an antispasmodic worm medicine, of which, at the instance of his sister, whom alone he could bear, he took several doses."

"Upon this, the attack appeared almost totally to leave him.

Nor was it necessary to confine him in the arm-chair. He looked exhausted and it was therefore proposed to put him to bed. But hardly had he got upon his feet when he began to rave afresh. He was nevertheless forced into bed and more of the medicine administered. He now soon grew composed, spoke rationally and slept perfectly well the whole of the night."

"In the morning, scarce had he moved from the side of the bed, when it became necessary, on account of the recommencing phrenzy, to put him into it again. I arrived and he was now not violent against me. As the seizure, according to the account, seemed only to come on when he stood up, I asked, whether any thing had happened to his feet. They only knew that the day but one before, he had complained of being pinched by tight shoes. Four years ago indeed, he had trod a piece of glass into the right foot, but immediately took it out, and had never since complained of that foot. I mentioned it as very possible that some glass might have been left in the foot, and by receiving another position from the pinching of the shoe, it might have irritated a nerve and produced the seizure. I desired to see the foot; and there actually was, near the ball of the great toe, a small, reddish elevation. The moment I made pressure upon it, the seizure returned with violence, and to appease the phrenzy in some degree, I was obliged to retire. Meanwhile I sent for a surgeon and put the patient into the hands of four stout men. An incision being made upon the elevated place, a very trifling portion of glass presented itself, and was taken out with a small forceps. Much as the patient had raved during the operation, with equal suddenness did all the symptoms vanish: and he was surprized on being told of all the senseless things he had uttered and begged pardon." (*Dr. Joerdens ap. Hufeland. Journal.* iv. 227.)

The above though the most striking of the instances adduced, is not a solitary one. "Such facts, and the speedy subsidence of

symptomatic fever upon the removal of a diseased limb, as also of epilepsy and of irritations under a different form, upon cutting a partially divided nerve completely through, above the injury, or taking out a little tumour that presses upon a nerve, are to me probable proofs" says our Author, "that these symptoms all depend upon some more subtle, sudden, and variable movements than are observed in inflammation."

But further, it appears that the sensorial functions may be variously disturbed even without increase of the animal heat, much more, without complete inflammation. This fact has been ascertained by various thermometrical observations made upon patients in a deranged state. And the sudden changes in the state of the intellect, or to use the Author's own words "the return of recollection for a short space, the breaking out of the perfect mind in the intervals of delirium like that of the full sun amid a succession of thunder-storms, which is a striking appearance in fever, seem to oppose the idea of inflammations in the brain."

He next proceeds to offer a few brief remarks upon hydrocephalus internus. It is to be wished that he had been called upon to speak more fully of a complaint so frequently fatal, and the treatment of which he so well understood. It appears from an appendix to the second volume of Zoonomia, that he had, as far back as the year 1796, by minute observation at the side of the sick-bed, been convinced of the inefficiency of half measures, and developed the just principle of cure. The celebrated Rush had taught his American brethren the safety and propriety of the plan before. It consists in copious depletion, persevered in till the desired effect be produced —till the head be relieved and the inflammatory action subdued. Upon this topic our Author takes the opportunity of insisting in this place; although the nature of his subject led him only to the consideration of that apparent identity of hydrocephalus internus

with fever, which necessarily results from the doctrine which he is discussing. Before dismissing the subject he cites examples where hydrocephalus internus had been mistaken for typhus, and treated accordingly upon the stimulating plan. The consequences may be easily anticipated.

He proceeds next to give a sketch of the fluctuations of practice in fever; tracing their progress from depletion to the adoption of universal stimulation; the injudicious use of which has been to the full as fatal, as any ancient error. Experience and observation are now gradually correcting the extreme into which the practitioners of our own country had rushed from their apprehensions of debility, which became the "watch-word of medicine." While the French practitioners on the other hand, although the Doctor imagines that their treatment was right in the early stage of febrile diseases, persevered in their plans till they became wrong. To account for this change of practice, and for the necessary abandonment of the system of unceasing stimulation, an opinion has been advanced by some writers that fevers have, of late years, undergone a revolution, in consequence of some unknown revolution in the human system,[5e] which has rendered them again inflammatory, instead of nervous, or putrid. Our Author considers this a mistaken idea. He conceives that febrile diseases "preserve one uniform character, or that if they vary, they do not fluctuate in the supposed manner." He next adverts to the points of difference between Dr. Currie and Dr. Jackson in their view of the treatment of fever, and attempts, and

5e The Author has not quoted his authorities, and I confess that the writers here referred to are unknown to me. Some foreign physicians, the trans-atlantic ones in particular, have indeed supposed that there exist at certain periods certain epidemic constitutions of the atmosphere, which essentially modify the type of diseases during the period of their continuance: And for this opinion the history of epidemic diseases seems to afford considerable foundation.

apparently with success, to reconcile them. In the course of his reasonings in this and the preceding section, he prepares his reader for a much freer use of the lancet than the ordinary routine of practice allows. He observes that bleeding sometimes raises and sometimes lowers sensibility; nay, that "it will be often useful in the same patient at the same time, by raising and depressing the sensibility of different organs and even of different parts of the same organ." This fact he illustrates from some phenomena in a case which he attended with the Writer of this memoir. He particularly insists upon the advantages of local bleeding by leeches, and recommends their free and extensive application.[5f] "The time," says he, "within which a given quantity of blood flows out, every one now understands to be of almost as much importance as the quantity itself. But in respect to *place* we still keep too strongly in view the common undivided circulating mass of fluid. Had the human animal been constructed with several hearts and independent sets of vessels, it would, I dare say, have been delivered as a precept from physiology to medicine, that blood should be drawn from the vascular system most irritated." He lays down some valuable hints for detecting latent inflammation, or local congestion, even when the

5f A mechanical contrivance simple in its application and not requiring the superintendance of a medical practitioner, which should answer the purpose of a leech, is become a desideratum. It is in vain to recommend to a poor patient the application of leeches, when from the want of management and the waste and destruction of this valuable insect, they are become so costly as to be an object of serious expence even to persons in moderate circumstances. Their history is too little understood to enable us to prevent the frequent recurrence of a very considerable mortality, and the persons who catch them seem guilty of a blameable error in not returning to the water those which are too small to be of present use. We are not sufficiently acquainted with their habits or their food to give them a chance of increasing in their growth. The Author has now some leeches which have been in his possession for more than a year; and those that were too small for use when first taken, he feels confident have not increased in size.

patient may be unconscious, or at least may not complain of its existence. "The pulsation of the arteries about the head," says he, "can always be felt; when the patient is roused, the condition of the chest can be ascertained; and pressure upon the viscera not fenced round by bone may bring to light latent inflammation.... When from the bed in which he is laid, the invalid suddenly beholds spread out before him in luminous prospect the scene of his early years up almost to the very cradle on which he was rocked as an infant; when he recovers forgotten languages; when he suddenly converses with rational vivacity, the heat and pulsations about the head should be examined with a view to cutaneous bleeding, cooling the part, and darkening the room. For an action has probably commenced which, unless checked, will reduce the brain to a fatal state of exhaustion."[5]

From blood-letting he proceeds to the consideration of other means against inflammation. One of these is the circular swing, as proposed by Doctor Darwin; and the powerful influence of which, in diminishing even maniacal excitement, has been sufficiently established by the experiments recorded in Doctor Cox's practical observations on insanity. Gestation might probably operate, in some cases, as an infinitely lower degree of the same power. Another is digitalis, in the recommendation of which remedy with this indication, he seems to have taken a different practical view of its effects from that which he entertained when he wrote his treatise upon it. He particularly inculcates the necessity of soothing attentions "even to *prevent inflammation*." The operation of the passions upon the viscera is," he remarks, "a common-place theme. A blow on the mind will produce contusion as much as a blow on the body. In

[5] Phenomena of this kind are sometimes observed immediately to precede dissolution, from the retreat of the last remains of excitement to the brain; of which an instance has been already recorded. *See page* 263.

fever, where sense is often so acute and the tendency to inflammation always so strong, there is more than double danger from unwelcome impressions."

His next section treats of temperature, in which he bestows high praise upon Doctor Currie, for his excellent rules for its regulation by cold applications. He pauses to ask why, when the national liberality was so properly extended to some other fortunate discoveries in medicine, its munificence was not also extended to the valuable practical discovery of Currie. "For theoretical writers, however ingenious, even although like Darwin or Hunter they had poured light on every branch of medical science, he would claim no such recompence; for it might perhaps hereafter be perverted to the fostering specious and seductive generalizations, as well as those which were the fruit of the justest and happiest conceptions. But for every immediately practical and extensive improvement in medicine, there should be a proportionate levy upon the public." "Is there one among us," says he, "who, when he is discharging the exacted share of the produce of his ingenuity, labour, or industry into the public purse, would feel regret if the guardians of that purse had frequently to reward a Jenner or a Currie? Is it feared that claimants like these should multiply too fast for our resources? Perhaps I may be influenced by a professional partiality; but I confess myself unable to discover how the great medical preservers of mankind deserve less from society, than those retainers of law and diplomacy, those court-parasites, buffoons, and ballad-makers to a minister, who gather like plant-lice upon the spreading branches of national industry, and suck the sweets at their ease."

The reduction of heat is of the highest importance in continued fever. We possess, under this head, an extensive range of agents from sponging with tepid water to cold ablution, affusion, and long continued immersion in a cold bath. Some degrees of inflammation

will yield to the first of these applications, while others will require the concentrated force of the last.

Upon the same principles that cold water may be used to extinguish fever, it may be applied to burns, to the bite of venomous insects, and to erysipelas. In the latter instance, however, the Author inculcates the propriety of supporting the stomach by some cordial, or aromatic, (ginger is preferred by himself) during the use of the cold applications.

In order to prevent the transfer of susceptibility to vital parts, he recommends the use of blisters. "When the occasion for counter-irritation is urgent," he remarks, "that it is not the best plan to raise them by cantharides. Boiling water is much better, and I suppose its superior efficacy to be somewhat in proportion to its quicker action." . . "I suspect," he adds, "but without experience, that extreme cold would be yet more beneficial in this way. A blister is speedily produced by frozen mercury."[5b] The cause is, I suppose, increase of susceptibility acted upon by the ordinary stimuli, whereas acrid substances act from excessive stimulation on ordinary susceptibility .... Muriate of lime dissolved in acid, I suppose, would act sufficiently through thin glass." From this digression, he returns to the subject of the application of cold, on which he has accumulated many valuable facts. On its effect in restoring excitability, even under the most desperate circumstances, he mentions two cases

[5b] This effect of extreme degrees of cold is well known. In Nova Zembla cold produces blisters on the face and ears.—*Boyle on Cold.* In the other regions of eternal frost which lie under the same latitudes, metallic substances blister the skin like red-hot iron.

"I have this day seen mercury frozen, by cooling nitrous acid down to 30° in a mixture of snow and vitriolic acid, and snow down to 10° and so mixing them. Half an ounce of mercury was seven minutes in thawing in a temperature of 37°, and a globe three quarters of an inch in diameter was more malleable than zinc. Its structure when solid is radiated from a centre. A person present who took up a solid piece, had his hand burned by the cold, and blistered with a red appearance around, exactly as by heat."—*Letter from Dr. Beddoes to Mr. Reynolds. March 7, 1789.*

in his own practice, where he adopted "the momentary but repeated application of a cloth wet with ice-cold water, to the pit of the stomach and to the head, administering stimulants between whiles." In both he was successful. But care is also necessary to prevent the heat of the body from sinking too low as well as from rising too high. And he contends that there will sometimes be occasion for adopting this practice even in the beginning of continued fever. Aromatics, with a few drops of laudanum, will, in such a state produce signal relief, and prevent the morbid train of chill and violent re-action. To this he adds another practical precept which merits attention on account of its importance. It is, that cordials and tonics should be administered at intervals much shorter than is in general the case. The grateful and restorative virtue of wine sometimes hardly lasts beyond a single second; a striking proof of the necessity of watchfulness in repeating and varying the stimulant.

With some observations on the effect of artificial and accidental phlegmasiæ in modifying the temperature of the body, communicated by Mr. Richard Smith, one of the surgeons of the Bristol Infirmary, he closes this very important dissertation on fever. It must be confessed that there is great reason to wish that more arrangement had been bestowed upon the mass of valuable materials which he has here collected. A want of this arrangement has not a little impaired their practical value. But an attentive examination will discover these gems amidst the incrustations by which they are clouded, and the labour of the search will be amply repaid. That individual must be familiar, in no common degree, with the phenomena and treatment of fever, whose practical views would not be extended and improved by an attentive perusal of this volume. By way of appendix he has added three wishes, which probably from the solemnity with which he felt them, he has denominated *Pia Vota*. The first is for the establishment of a separate institution for the

study of morbid anatomy, where this very important branch of medical instruction should be pursued with undivided assiduity. The second for a pocket-book on fever, framed after the model of Hoyle's treatise on whist; in which the various symptoms should be concisely detailed, and practical rules laid down for the proceedings of the medical practitioner, in every combination of them at present known; in the same manner as the mode of playing the various combinations of cards is taught in the treatise alluded to. This pocket-book he wishes to act, "somewhat like a sliding scale to a mathematical instrument, upon a larger, which should be called Pyreticus, and which should contain a collection of original observations on fever. These observations should be totally disencumbered of the trappings of any theory whatsoever." Such a deposit would unquestionably be valuable: But such is the tendency of every mind that exercises its powers upon the phenomena which pass before it, to generalize those phenomena according to some system or other, that we seldom fail to detect it in books of the most purely practical kind; and the theory of fever which the observer had imbibed would, in all probability, present a medium by which the appearance of symptoms would be modified, and his description of them imperceptibly influenced. Nor is it unlikely that the contributions to such a work would present a mass of facts and opinions utterly irreconcileable and contradictory, and yet supported by evidence of nearly equal authority. Under such circumstances to whom could we assign with safety the task of selection? and if this were not performed, is there not reason to apprehend that the practitioner, instead of deriving information, would find himself bewildered and distracted by his intended practical guide?

Early in the year 1808, Doctor Beddoes addressed a letter to Sir Joseph Banks on the causes and removal of the prevailing discontents, imperfections and abuses in medicine. To this letter

he has affixed a quaint parody by way of motto, "Take physic, PHYSIC!" The subject of this letter was suggested by the following circumstances. In January 1806, it was publickly announced "that a medical society in Lincolnshire had deputed Doctor Harrison their chairman to confer with the Right Honorable Sir Joseph Banks their patron, concerning the means proper to be pursued for securing the co-operation of the faculty and the legislature towards suppressing, or at least restricting empirical practice, and rendering the medical profession more respectable; that at Sir Joseph's suggestion, Dr. Harrison had visited the Metropolis, and that several well-attended meetings of the faculty were held at Sir Joseph's house, where only one sentiment prevailed concerning the existence and magnitude of the evil."

Soon after these meetings were organized, an extensive correspondence took place with members of the profession in all parts of the kingdom, and some of the most respectable and opulent readily offered their assistance to the undertaking. "Some," the Doctor satirically observes, "have been observed to commence reformers for want of other employment. But when the correspondence supplies names of the most occupied physicians in the kingdom, and on the Committee we see Sir J. M. Hayes, Sir Walter Farquhar, Doctors Blackburn, Clutterbuck, Harrison, Garthshore, George Pearson, Stanger, and Willan, it is impossible to suspect that they should have taken up the case of physic itself for want of other patients." The result of their deliberations was a proposal "that no person should practice as physician unless he were a graduate of some university in the united kingdom, and had attained the age of twenty-four years; that he should have studied the different branches of physic in an university, or respectable school or schools of physic during the space of five years at least, two of which he should have passed in the university where he took his degree."

In reviewing these proceedings and pursuing the reflections suggested by them, the Author manifests his usual acuteness of reasoning, much humour, and much zeal for what he supposed to be the real interests of the profession.[51] The plan then in agitation he considered as very inadequate to the removal of the evil, although he himself admitted its existence in all its extent. He remarks, first, that the complaint of unauthorized intruders, though commencing as far back as the time of Hippocrates and continuing through all the succeeding generations of medical men, is not confined to that profession. The hardships to which it is subjected from this source are not peculiar. "Is there really" he asks "no complaint among politicians, against those who set up without going through their studies, and receiving regular admission into the fraternity? Are not the clergy themselves, according to members of their own body, reduced by irregular rivals to a state of "utter insignificancy?" Is it necessary to live here close beside the nursery and hot-bed of English fanaticism to perceive that this profession is overrun with quacks? From what point cannot the vast cauldron of religious opinion be seen steaming in the midst of society, while uncouth forms, just escaped from the awl, the anvil, and the loom, stalk furiously round it, heaping new fuel upon the fires beneath, and throwing in foul and venomous ingredients, that it may bubble and heave, and pour its consuming deluges once more over the land. "Whereas" say Mr. James M'Donald and Mr. William Whitehead, by authority, "whereas the trade of frame-work-knitters has been

[51] The Writer of this memoir had an opportunity of knowing Doctor Beddoes's opinion in a very early period of the agitation of the subject. He had received one of the circular letters sent round to different members of the faculty, and being asked what he thought of it, he made the following reply. "I am sure that it will never succeed: they aim at one of the most impracticable things in the world. Supposing they get an act; what interference of the legislature can command confidence in this or that description of medical men?"

long subject to deceit and abuses, by the intrusion of strangers and others, who unskilled in our art by time and servitude, have long brought the trade into bad credit: in order to establish the business on a more permanent foundation, and restore it to its original purity for the general advantages of ourselves, our employers, the merchant and consumer"—*(Glocester Journal of Nov.* 30, 1807.) and what have the orators of medicine been able to say more pathetic?"

The leading feature of the reform suggested by the Committee of the associated physicians, a five years period of study, was strongly opposed by the College of Edinburgh. The Senatus Academicus observed, that a period of three years, employed in the study of all the branches of medicine, had been considered by their predecessors as sufficient, according to the average of human abilities, to qualify the student for entering upon the practice of physic. They contended that "the propriety of fixing upon this period had been proved from ample experience. For the graduates of their University had acquired as high a degree of respectability, had shewn themselves as deserving of the confidence of the public, and had contributed as much to the advancement of the science of medicine, as the graduates of other universities, in which the duration of study is much longer."

It is against this part of the report of the Edinburgh College that the Doctor principally directs his attack. The allusion to graduates of other universities in which the duration of study is much longer, was supposed by him (and it will I presume scarcely be questioned that it was so) to be directed against Oxford and Cambridge, "for one may swear" he observes "that Salamanca was not in contemplation." He therefore feels himself called upon to notice such a challenge. The ancient shyness between him and his venerable *Alma Mater* appears now to have been forgotten. The effervescence of political opinion had long since subsided, and he probably, at this time, felt towards her a revival of those sentiments of respect, and

gratitude, and affection, which few I believe, who have enjoyed the privilege of imbibing her instructions, can ever entirely cease to feel, and the absence of which would be equally discreditable to the head and to the heart.

After observing that the power of a former French King, or a present French Emperor would be found equally unavailing to *rehabilitate* by statute, an individual or a body, which had once lost the opinion of the public in a matter dependent upon skill, he observes that it is necessary that " some change which should strike mankind should take place in those, who, on the plea of superior qualification claim the rewards allotted to the care of human health. Improvement in education is not, in truth, the only imaginable means of effecting such a change; nor does it seem exactly to suit a case, in which urgency is so loudly proclaimed. But it is gentle, gradual, and perhaps the sole practicable. And the whole wisdom and power of society ought to be exerted in seconding such a design, even though there existed not the smallest shadow of the reasons assigned ; no one abuse ; but only the rational prospect of amendment in the education of physicians. That a difference in the state of our medical seminaries may eventually make the difference between life and death, suffering and enjoyment, to the first individual you meet, or to his child ; and that it must daily make such a difference to thousands, is a reflection which no one can require to have forced into his heart." Pursuing these reflections, he cautions the public against too hastily adopting the opinion of the Senatus Academicus ; —that their plan of education requires no radical change. Their interest may perhaps influence their opposition. " One presumption against their opinion is furnished" he observes " by the circumstance that no small proportion of the association are themselves Edinburgh graduates, and must therefore be presumed peculiarly well qualified from present experience to decide upon the question." He claims

for himself a similar capability of judging, upon the same grounds. He had resided the accustomed period, though a graduate of another university, and after comparing upon the spot the means with the end, he certainly did conceive that a more deliberate process would be preferable, and that a method of instruction in some other respects materially different, would form physicians far more trust-worthy." So much was crowded into the period assigned for study, that both mind and body were kept in perpetual hurry. But he observes that the Senate appeal to the confidence of the public in the graduates of their school, and to their advancement of medical science. Of public confidence he observes, that it is a matter of daily experience that the public are subject to the grossest delusion, and he asks " if we are to judge by the usual signs of public confidence in medicine, whether a fellow who orders British gin from Bristol to Liverpool, and colours and christens it *balm*, has not as much of this confidence as almost all the fellows of the three royal colleges put together ?" With respect to the advancement, for which medical science is said to be indebted to Edinburgh graduates, he expresses strong doubts whether it bears any adequate proportion to the immense number of labourers which are annually sent forth from that University into the field of Medicine. " For when certain fevers of which the character is to be traced in the records of medicine, from Hippocrates downwards, became, as is too well known, epidemic in various regions of the earth, during the last twenty years, he does not know that any men were more confounded or more helpless than the pupils of Edinburgh."

He contends that, greatly as their number exceeds that of the graduates of the English universities " this last and smallest body may safely be opposed to them." They have not been inattentive to the means of gaining medical information from every scource. " When knowledge revived in Italy" he remarks " our predecessors

repaired to Italy : we have since gone elsewhere in search of knowledge, to Holland for example, or to Scotland. If any peculiar lights were to spring up in America, I do not believe that our successors would be deterred from approaching them by the distance.[5k] And I will venture, in opposition to the Senate, to deliver it as my idea that the effect is in medical education also as the cause; that is, the minds of the medical members of Oxford and Cambridge being more maturely cultivated, because they have so long to wait for a degree, do bring forth valuable fruits in proportion."

He proceeds to make some facetious remarks upon the fraternity of *grinders* who are found such valuable assistants in preparing for an Edinburgh examination. From the great share which these gentlemen have in fitting the candidate for academical honours, he is induced to question the superiority of an Edinburgh degree to one from St. Andrew's or Aberdeen. He compares the time allotted for instruction in Edinburgh, and their examinations, with those of Paris, and manifestly gives the preference to the latter. As far as the opportunities of dissection are taken into view, this preference seems well-founded.

Another objection offered by the Academical Senate to the proposed plan of reform was, that a longer term of residence must necessarily increase the expence of medical education; and this increased expence, it was objected, would exclude many whose talents fit them for adding to the dignity and to the improvement of medicine. It would tend therefore to diminish the number of well-educated young men, of the medical profession." The whole of this

5k That it has not had this effect, may be proved by facts. One of the physicians to Bartholomew's Hospital, (Doctor Haworth) an Oxford graduate, passed some years on that Continent in the acquisition of medical knowledge; and the enterprize of Doctor Vaughan, the author of the interesting narrative of the Siege of Saragossa, has led him into the distant regions of Asia on the same pursuit.

assertion Doctor Beddoes considers as very questionable. "Are we," he asks, "to take for our standard the circumstances of every parent who may be ambitious of having a doctor in his family? This would be an indefeasible plea for two in preference to three years." The cheapness of medical education he considers as rather an evil than a good. It has, he conceives, diminished the respectability of the profession, by rendering persons of family unwilling to enter into it. Hence also has arisen the marked distinction between the three liberal professions; so that while honours and distinctions await eminence or influence in the other two, the votary of medicine is considered as, of necessity, excluded from every public honour. The justice or propriety of this general opinion he proceeds to examine with much acuteness, and vindicates as he had before done in his Essay on Fever, *p.* 365, the dignity of his own profession. "Statesmen," says he, "who really serve, and warriors who guard whole communities, are entitled doubtless to the first honours from the whole. But what in the order of natural justice follows more closely than the claims of those who confer upon society, individual by individual, blessings which a great author of antiquity justly represents, as approaching near to divine? If life precede property in value, the guardians of life ought surely to stand upon an equality, as to public honours, with the guardians of property. . . . I cannot persuade myself but that the introducer of the cow-pock inoculation, if he deserve any thing at all, deserves a title with a pension to support it, full as well as many a contemporary jurist and diplomatist." These ideas may perhaps excite a smile, and a proposition so contrary to established habits of thinking, may at first view appear eminently absurd. It would however be difficult to demonstrate its absurdity, and if the Doctor's remarks should be accused of being dictated by an overweening sense of the dignity of his own profession, he might surely claim an equal right with the Satirist, to say

without the imputation of prophaneness, "*Magnificabo apostolatum meum.*"[51]

He proceeds next to lay down a plan of medical education extending to six years, for every portion of which he finds ample employment; and it would seem scarcely possible to question that, under such a system of instruction, the candidate for medical honors would stand a chance at least, of being better acquainted with his profession, than he could expect to be in a shorter time, or upon a plan less comprehensive. Some parts of his plan are elucidated from the system now actually established in the Parisian school, to the regulations of which he alludes in various parts of his letter with evident approbation.

The last objection of the Edinburgh Senate which he notices refers to a proposition of the Medical Committee, that certificates of attendance in respectable schools of physic, should reckon as parts of the term required for medical instruction." This plan they observe "may prevent the possibility of ascertaining a regular education." The reference of the Committee was probably to the London school; upon the advantages of which he largely insists; and indeed they cannot be justly questioned. Penetrated with a deep conviction of these advantages, he proposes the establishment of a Medical College with the power of conferring degrees, in the Metropolis. From such a plan he anticipates the highest benefits to medicine, and a generous competition might then exist between the Edinburgh and London schools. Dismissing for a while the consideration of the specific plan of reform proposed, and the opposition made to it by the Edinburgh faculty, he proceeds next to suggest a variety of means for the improvement of the profession. He repeats the wish which he had expressed in a former publication, that the whole body of

51 See the preface to the "Pursuits of Literature."

medical experience throughout the nation should be collected and embodied: That a central board should be instituted to which reports should be transmitted at fixed periods from every medical charity, and that this central board should combine with its other functions an office for proving popular as well as secret remedies. If found valuable, the discoverer might be recompensed, and the discovery should be made known to the public. As a further improvement he suggests the general establishment of preventive medical institutions, and proposes the erection of a "GENERAL EXPERIMENTAL HOSPITAL; not merely for the trial of secret or popular remedies, but for the exercise of humane ingenuity upon cases deemed incurable in other hospitals, or in private practice. The cancer institution offers a partial example of such an establishment, and no earthly reason, I presume, can be assigned why the same chance should not be extended to other complaints equally fatal though not equally cruel."

He proceeds next to the consideration of quackery, which he traces through a variety of departments. He strenuously contends that the sale of secret medicines should be instantly prohibited; and that uneducated practitioners should be compelled to desist from their murderous labours. But there are other modifications of quackery more delicate to detect and more difficult to prevent. He classes under this head much of the Hotwell and Bath routine of practice; the drenching the patients with unnecessary medicines; the measure of dignity by fees; the influence of gossips, who, like the fates distribute the fortune of so many medical men, for which they are repaid by a degrading servility which leads to a weak compliance with their wishes, and ideas; and artifices of a still less honourable kind.

His great and favorite remedy for these evils is now brought forward, the more general diffusion of a knowledge of the human

frame, and " the excitement of a serious and well-directed interest in the condition of medicine." He expresses hopes that individuals might in time arise, who, from pure and generous devotion to the interests of their species, "endowed with the more than heroic courage and constancy of a De la Condamine, and richly gifted by nature and fortune as Lavoisier," would be induced " to exert in behalf of the sick, that liberal spirit of investigation which seeks only truth and utility." " You must acknowledge," he adds, " that the contemplation of organic and intellectual nature is a flower that blooms aloft in the purest fields of æther, though it drive its root so deep into the sordid soil of pecuniary interest. But who shall say that this root is incapable of being transplanted into the unpolluted fountains of social affection? There is no career in which benevolent genius would meet with so rich a reward. Without going to Cherson, such a man might relieve more human wretchedness than even he who fell a martyr there." He proceeds to trace with an animated and glowing pencil the probable career of such a man, and the blessings that he might diffuse in society. In an Appendix, are inserted the outline of a bill for the regulation of medicine circulated by the College of Physicians, and a republication of the third of the *pia vota* at the end of his researches on fever, both being connected with the important subjects which have passed under notice in this Letter.

It may fairly be presumed that the freedom of his observations in the former parts of this letter gave much offence to the Edinburgh faculty.[5m] In their allusion to other universities where longer resi-

[5m] To the influence of some irritation of this nature I cannot but attribute a remark which I was sorry to see in a work so truly respectable and ingenious as the Edinburgh Medical and Physical Journal. An allusion is made to Gil Blas and the Archbishop of Grenada, and the letter to Sir Joseph Banks, like the Prelate's sermon, is said *à sentir l'apoplexie.*" Whether the attack on the Edinburgh faculty be just or not, the remarks of the Author are certainly not deficient in acuteness, nor his style in energy.

dence was required they certainly appear to have cast the first stone; but the chastisement must be pronounced at least equal to the offence. One important feature in the system of education at Edinburgh has, however, been entirely passed over by the Doctor, to which, without meaning to disparage the talents or abilities of the professors, the celebrity of the medical school there, is perhaps as much due, as to any other cause. I allude to the zeal and industry which exist among the students themselves. It is honorable to Edinburgh that mental industry and activity are there fashionable.[5n] They are the only passports to fame; and to that species of fame which lays the strongest hold upon the youthful mind, the applause and consideration of our contemporaries. The influence of this salutary stimulus upon the mind it is scarcely possible to appreciate. From deference to the opinions of equals in age and situation, many have plunged into extravagance and excess, idleness and vice, even where very opposite propensities originally existed. But eminence and distinction are not attainable in Edinburgh by such means. Perhaps the respect paid a young man there, is less connected with the adventitious circumstance of fortune, than in almost any other situation whatever. I have heard similar praise bestowed upon Glasgow; but I know, from personal experience, that Edinburgh deserves it, and I therefore cheerfully pay her this tribute of respectful recollection.

The main subject of this letter, the question of medical reform, is involved in very considerable difficulty. On this, as well as on many other occasions, it is much easier to point out defects than to suggest the means of obviating them. It will not be contended that a residence of three years at Oxford will enable the student to

[5n] This circumstance has not been passed over without remark or without praise by the Doctor upon a former occasion. *(See his introductory remarks to his republication of Brown's Elements.)* But this would have been a peculiarly appropriate situation for some praise to counterbalance the severity of his censure.

acquire more, or even as much medical science, as a residence for the same period in Edinburgh. But the Edinburgh faculty themselves would scarcely hesitate to recommend a residence extending to four years, wherever such an arrangement was practicable. They would think, and they would think justly, that another year would be well employed; and those who have it in their power, often realize this idea. Why then should not a plan, of which they cannot question the general advantage, be made the legal road to the attainment of medical honours? Nor is it contended that an examination at Oxford will prevent the intrusion of the ignorant, more effectually, than that at Edinburgh. Persons very ill qualified to be entrusted with the life of any individual may have passed both. It would be difficult for human ingenuity to devise a mode of examination by question and answer, which a very imperfectly informed person may not be prepared to meet. Perhaps, the most unexceptionable criterion, as is elsewhere suggested in the work under review, would be to conduct the candidate to a sick bed, and then demand of him to investigate the phenomena of the disease, and to lay down a plan of cure. If no collusion were practised, this would be, to a certain extent, a real test of ability; yet it might not be difficult to shew that even this would not be a complete one. Upon the whole, therefore, it appears probable that no method of education combines so many chances of success, as one which should put the means of improvement into the hands of the student, but should carefully keep him back from any medical honours, till the revolution of years and the abatement of the volatility of youth, shall have given him every chance of being well-grounded in the science that he professes. This is all that can be done, when the period of coercion is passed, for it must depend upon his own industry whether or no he will make an adequate use of his advantages. Nor is it unnatural to suppose that, generally speaking, the greatest liberality of thought and action, and the strictest observance of those ethics

which render the practice of the profession honorable and respectable, will exist among those, whose previous situation and rank in life have enabled them to encounter the more heavy expences of a lengthened system of education, and the consequent delay which restrains them from commencing practice.

It has always appeared to me that in comparing an Edinburgh with an Aberdeen or St. Andrew's degree, Doctor Beddoes offends against his own principles. If three years of fair study be deemed by him an insufficient period for the attainment of the highest medical honours, he certainly ought to have spoken with double severity of academical institutions, whose "vile rapacity," as he has elsewhere himself termed it, induces them to sell such honors, to those who have never gone through any regular period of study at all. If it be an object to preserve the dignity of the profession, there is surely a better chance of its being maintained by those who have, only for three years, pursued a liberal science in a liberal way, than by those who are not debarred from claiming its highest distinctions, although they should be among the most illiterate and ignorant of mankind? In one place he appears to treat the purchase of these degrees in no light more serious than as affording to a practitioner in an inferior line of the profession, "a means of gratifying a harmless vanity, and raising himself to a fancied level with his superiors." He appears to forget that a similar distinction is by this means, placed within the grasp of the lowest of quacks, a truth of which almost every newspaper will remind us; nor, although it would be unjust and illiberal to deny that there are instances where these distinctions have been conferred by such universities upon real merit and eminent talent, are the exceptions sufficiently numerous to render the utmost severity of censure upon such a shameless prostitution of academical honours unjust or improper.

With respect to the other plans here suggested for the improvement of medicine, some appear easily practicable; and it were to be wished that they could be generally adopted. The remedy for some of the more delicate modifications of quackery may be more difficult. Many who may appear to participate in them, in reality, contemplate its evils in the same light, as the Author has done; but they find these evils interwoven with the constitution of human nature, and they are compelled to yield to them a reluctant submission. Nor is it probable that one individual, even though he were as prodigally gifted by nature and fortune, as in the case which he has supposed, would be able to stem the torrent of mistaken opinions. His time would most probably be consumed and his talents wasted, in efforts at once ungrateful and unavailing.

In the summer of the same year, he published a series of papers in the Bristol Gazette, designed to warn those engaged in agriculture against the pernicious effects of the debauch in which they indulge during the harvest. These papers contained a vast fund of interesting information which he had been at much pains to procure. They attracted a good deal of attention, and at the earnest solicitation of some of his friends, he collected them into a small pamphlet and published them with additional matter, under the title of "Good advice for the husbandman in harvest, and for all those who labour hard in hot births, as also for others who will take it in warm weather." In this little tract he gives a history of some of those scenes of brutal excess, which too often accompany the severe labours of mowing and reaping, and of the almost incredible quantities of strong ale and cyder that are poured into the stomach upon these occasions. On the latter of these liquors he particularly enlarges, both on account of its being the favorite beverage in the neighbourhood where these observations were first published, and of its being especially deceiving and seductive from the sense of coolness which

it imparts at the instant of taking it; a coolness which is only momentary, and which renders the heat subsequently excited by its spirituous qualities, more urgent and intolerable. He proves from a comparison of the customs prevailing in various parts of the united kingdom, and from the happy results of some trials of more temperate plans made in certain manufactories, particularly in iron founderies, where strong liquors, according to general prejudice, are particularly requisite, that it is by no means necessary to spur the system to exertion by these pernicious stimuli, in consequence of exposure either to the heat of a summer sun, or to that of a forge or furnace. He does more; he proves that these fancied supports of the system under severe labour, in fact, undermine the constitution and bring on premature decrepitude, disease, and death. He has presented, in a more familiar form, some of those arguments against fermented liquors which had before appeared in Hygëia, and by the simplicity of his language and the occasional introduction of little anecdotes, he has rendered it particularly interesting to that class to whom his benevolent labours on this occasion, are addressed. It wants, however, that interest which is found in Isaac Jenkins, and which nothing can impart equally with a connected story.[50]

When this little tract was published, there was no reason to apprehend that it would prove the last of his literary labours; but, alas! the period was now fast approaching when the powers of an active mind were about to be suspended by the slumber of the

[50] Two fragments have been found among his papers, from which it appears that he had intended to continue his plan of conveying instruction to the humbler classes of his readers through the medium of a story. One is entitled, The history of simple Stephen and his friend the double-faced cook; of which the object seems to have been to give useful cautions to servants; the other is a continuation of the Shepherd of Salisbury Plain; in which he appears to have designed to make this interesting example of humble piety the medium of communicating information upon some familiar points connected with the preservation of health. Both, however are in too unfinished a state to meet the public eye.

grave, and a benevolent heart "compressed into a clod of the valley."

Before I proceed, however, to speak of his last illness, it ought to be observed that the year which was unfortunately destined to close his earthly career was distinguished by other proofs of his mental activity. The vicinity of the French prison and the politeness of the gentleman at the head of the medical department there, afforded him an uncommon number of precious opportunities of witnessing recent dissections. Of these he availed himself with all the enthusiasm of youth. He transmitted from time to time an account of some of the most important phenomena that he had witnessed to the Medical and Physical Journal. At the close of one of these papers he has offered a minute philological criticism upon the propriety of the epithet, morbid, when applied to anatomical histories of the appearances of diseased parts after death. Some persons seemed to consider this objection as trivial, and that he stepped unnecessarily out of his way to make it. It had, however, for some time occupied his mind; and upon a former occasion, in contrasting the knowledge of a good morbid anatomist with that of a man who had scarcely ever seen a body opened, he has printed the word morbid in italics, evidently implying a doubt of its exact propriety.

This disquisition, however, is of little consequence, when compared with a most important subject for pathological investigation, suggested in the course of these communications, of which he thus speaks in a letter written to one of the first philosophers of the age, only two days before his death.[5p] "Quietly and stilly have I put forth a bit of solid pathological doctrine drawn from no superficial sources. What I refer to is in the Medical and Physical Journal in the two last

[5p] *See the Medical and Physical Journal, Vol. 20, pp. 407, 540, and Vol. 21, p. 91.*

months; it is briefly this, that in some circumstances, a man shall die apoplectic, or with inflamed head, and shall have an inflammation in his stomach, sometimes of standing, at others arising in a few hours; and which ever the duration, no pain be felt in the stomach, and indeed the head will go on long too." It is interesting and gratifying to behold a man in the zenith of reputation and amply employed, pursue the path of science with a zeal and animation equal to that of the youngest or most dependent student.

From the spring of the year 1807 to the autumn of 1808, Doctor Beddoes had enjoyed unusually good health; but, in the course of this latter season, he was seized with an illness which bore some resemblance to that of 1806, but in which the bilious symptoms were, at first, better marked and more predominant. A professional friend, with whom he had long been intimate and in whose judgment and sagacity he placed much reliance, gratified him in a very sensible degree by falling in with his own view of his complaint, and considering the symptoms which denoted an affection of the liver as the most important features of his disease. At this period indeed, they appeared to be so. There were evidences of irregular action in that organ amply sufficient to demand the immediate adoption of measures calculated for its relief. He was accordingly leeched, and mercurial friction was made use of till his mouth became affected, which was succeeded by temporary benefit.

The medical assistance of his friend Dr. Craufurd was rendered to him, during this seizure, with the same zeal and assiduity as in his former illness; and his exertions were seconded by Mr. King, who united with his professional services the attention of a nurse. About the 8th of November some inflammatory symptoms of the chest came on, which were relieved by the usual means. From the middle to the end of this month he, upon the whole, gradually improved, and on the 29th he took a journey into the Principality. He

was absent about a week or nine days from Bristol. Shortly after his return from this excursion, the Writer of this memoir, upon paying him a casual visit, heard him express with some degree of triumph, his conviction that his hepatic system only was now in fault, and that his organs of respiration were capable of a vigorous performance of their functions; adding that he had been able while on his excursion, upon more than one occasion, to mount a steep Welch hill with much less inconvenience than usual. He had, at this time, requested his medical friends to spare themselves the trouble of further attendance upon him, as he considered himself, comparatively, well.

This idea, however, appeared to every observing spectator, too evidently fallacious; his features were contracted, his countenance pale, and the powers of his constitution were evidently undermined. From time to time he rallied, and appeared willing to believe that he was free from indisposition; but his intervals of ease extended to a few days only.

On the 10th of December he visited a patient at a considerable distance from his own house, and on the 11th, quitted it, for the last time, to see one in his more immediate neighbourhood. He still, however, continued to receive visits from his patients, at home, and appeared to possess every faculty in its full perfection, except that on some rare occasions his memory appeared to be slightly impaired.

From the 14th of this month, till the closing scene, it was evident that, at intervals, he suffered considerably. The habitual recurrence of uneasy sensation rendered him restless. He frequently rose suddenly from his seat, complaining of a feeling of oppression, and went into another apartment, which, after no long interval, he would quit for a similar reason. The intestinal canal was also frequently disordered, and he was obliged to resort to various combinations of medicine in order to procure temporary relief. But it was

more from watching those symptoms of internal distress which could not escape the observant eye of friendship and affection, than from his own mouth, that this state of frequent suffering could be detected. His patience and fortitude were truly exemplary, though the evidences of a kind and affectionate heart were frequently breaking out in a manner that strongly impressed his medical attendants and the few other friends, who were permitted to see him in the bosom of his family. The expression of complaint seemed strange to him, and he still spoke of his malady as comparatively unimportant.

In the mean time Dr. Craufuird, anticipating a far more serious issue than his patient seemed to expect, and anxious to divide the responsibility of a life so important, frequently proposed that some other medical friend should be consulted. This proposal, however, was uniformly negatived by Doctor Beddoes; who appeared too apprehensive that he usurped too large a portion of Dr. Craufuird's attention, to consent, readily, to occupy the time of another.

On the 21st he felt himself considerably better; so much so that he again requested his medical friends to forbear the trouble of a regular attendance. He appeared, indeed, not only much more comfortable in his own sensations, but his friends also thought more favorably of his state. Yet, to one of them, Mr. King, with a sort of prophetic anticipation, he observed, "If this be not one of the lightings up before death, I certainly am better."

On the evening of the 22d he superintended the erection of a stove in his hall. The pipe was conducted up the centre of the staircase, and he ascended to the top of the house in order to see it properly conveyed through the roof. The evening was remarkably cold, and he remained for some time exposed to the chilling blasts that rushed down the aperture through which the pipe was to pass. His servants remarked that while thus engaged, his debility appeared extreme. The next day he was not so well, and the succeeding night was restless and uneasy: his respiration was alarmingly affected, and the symptoms became so urgent as to induce him, at an early hour

of the morning of the 24th, to request Dr. Craufuird's assistance. The difficulty of respiration rapidly increased. Squills and digitalis were administered in repeated doses, and some relief was obtained. At eight o'clock his medical friends left him; but in about two hours they were again summoned. Every unfavorable symptom was now aggravated. The hot-water blister was proposed, and assented to without hesitation; but its application was succeeded by temporary benefit only. In the attentions which the urgency of the case demanded, a considerable time was consumed. The morning was far advanced before Dr.Craufuird quitted his patient. At parting he told him that he would see him again upon his return to his dinner. Doctor Beddoes expressed his regret at this interruption to his necessary avocations, and attempted also to express his gratitude for his kindness; but his frame was too feeble to allow him to give vent to his feelings in words, and the tears trickled down his cheek, as he made the effort. About half past three Doctor Craufuird returned. Upon entering the room he found his patient sitting up, but a great and alarming change had taken place in his countenance. He advanced to feel his pulse, but the hand of death was already on him, and the stroke of the artery at the wrist was scarcely perceptible. Doctor Beddoes then turning to his wife and sister-in-law, who were sitting near him, motioned them to retire. As soon as they had quitted the room, he looked up, and in a calm but expressive voice, said "I suppose Doctor that you are fully aware that this cannot hold long—tell me, do not you think so?" Dr. Craufuird, though waving a direct reply, could not contradict him; he told him however that he appeared exhausted by sitting up, and advised him to lie down on the bed, with which he complied. Doctor Beddoes then directed the conversation to a medical topic which had been the subject of discussion between them some time before, and upon which he spoke with as much calmness and precision as usual.

As the symptoms seemed to become, hourly, more serious, Dr.

Craufuird now took an opportunity of expressing to the family his wish that the inclinations of the patient should no longer be silently acquiesced in; but that some others of his medical friends should be instantly sent for. Dr. Bernard and the writer of this memoir were accordingly summoned: but so rapid was the change, that they arrived only in time to witness the last struggles of mortality and to hear the groan that is repeated no more. He expired between five and six o'clock in the evening.

Thus died, before he had completed his forty-ninth year, a man, whose memory will long be respected as one of the most assiduous votaries of science and philosophy. It remains now for his biographer to attempt such a sketch of his character, as, though it may appear to be traced by the hand of friendship, shall not be suspected of being indebted for its colouring, to the pencil of flattery. Something of its outline may be collected from detached passages in the former part of this volume, but it will be scarcely deemed improper or superfluous to collect it here under one view. To obtain a just idea of it, it will be necessary to consider it in a variety of lights: Its moral and literary features will each of them require a separate analysis.

Those who had but a transient personal acquaintance with Doctor Beddoes, will be more surprized than those who have formed their estimate of his character from his writings only, to be informed that a considerable degree of enthusiasm was a distinguishing characteristic of his mind. In his writings, this feature frequently developes itself; but it much more rarely penetrated through the reserve which he manifested in his intercourse with general society. Under an apparent coldness of manner, however, which, towards those for whom he neither felt sympathy nor respect, was almost repulsive, he concealed warm feeling and often vivid interest. His early habits of life tended to generate a shyness in his intercourse

with strangers, which has already been alluded to in a former part of this memoir; and the superiority of his mental attainments had, almost from his earliest years, insulated him from his family; who, though they could admire, could not comprehend his acquisitions. He was therefore reduced to the necessity of placing his resources within himself and holding communion with his own mind. It must not, however, be concluded from this, that he ever acted as if he had imagined that the superiority to which his talents had elevated him, exempted him from the discharge of the duties of a son or a brother. On the contrary, he was exemplary in both relations, to the close of his life. I have before me a letter, in which it is remarked that he never appeared to greater advantage than when in company with his mother; towards whom he uniformly conducted himself with mingled respect and affection. In his own domestic circle the softer features of his mind were still more conspicuous. His conduct towards children, even before he was himself a father, manifested that kindness of heart and that affectionate solicitude for the welfare of these interesting little beings, which frequently breaks forth in his writings. These feelings became concentrated and exalted, when awakened for children of his own.

During the first four or five years after his marriage there was no prospect of any increase of his family. At this circumstance he never expressed the smallest disappointment; on the contrary, he appeared so perfectly contented, that those who had an opportunity of observing him the most nearly, could not witness, without surprize, the unusual tenderness and affection with which he watched the progress of his infant daughter, from the first moment of her birth. Were he absent only for an hour, he visited her nursery immediately upon his return. If he saw her in the least disturbed, heated or restless, he had her brought into the drawing-room, and carried backwards and forwards, till the coolness of a larger and

more ventilated apartment lulled her to sleep; and after she was in bed he habitually visited her from time to time to examine her temperature. In short no father was ever more affectionate. Perhaps, indeed, a by-stander might have been tempted to observe, that his parental tenderness sometimes effaced too completely from his mind, those philosophical principles which he had so well inculcated in his writings, as essential in forming the infant character. His conduct in that nearest of all relations which constituted so much of the felicity of his life, was equally demonstrative of his kind affections. He never secluded himself for the purposes of study, but, whether engaged in reading or in composition, it was uniformly his wish that his wife and children should be in the same apartment. Though he had a disrelish for general society, or perhaps, to speak more accurately, for general visiting, he sought the acquaintance, or readily favored the advances of any person, of whatever rank or sex, who was in any way distinguished for talents or attainments; and when he had discovered such a person, he was, perhaps, ready to give him credit for estimable qualities, or for an extent of ability beyond what he really possessed. His moral taste was just and delicate, and any trait of goodness which he accidentally discovered in a new acquaintance would diffuse over his features an air of placid satisfaction. He was particularly fond of the company of young persons, and evinced the most friendly interest in their welfare. He was partial to the society of well-educated women, and uniformly expressed an opinion that their mental powers were only inferior to those of men, in consequence of the inferior pains bestowed upon their cultivation. Nor, on the other hand, were his company and conversation unacceptable to some of the most elegant and sprightly of that sex, who had been accidentally placed in circumstances which had enabled them to penetrate through the husk that concealed his merits, and to become acquainted with his

real character. In such society he would unbend, and amidst much playfulness of fancy and allusion, frequently communicate valuable information, or inculcate important truth. Characters of this description were not unfrequently the inmates of his roof; occasionally as patients, but more often as friends. The addition of such a guest never drove him to the retirement of his study; yet it never appeared to have abated the ardour or to have interrupted the course of his literary pursuits. He would continue to write while conversation was going forward, and although his pen scarcely appeared to rest, would occasionally introduce a remark which shewed that nothing of its tenor was lost upon him. Nor was he more disturbed by the playful sallies of his children, upon whose sportive gambols his presence or occupation imposed no restraint. In this respect he resembled the illustrious Priestley; who was accustomed to compose his works and to pursue many of his philosophical researches in the same apartment with his wife and family.

If traced beyond the limit of his domestic circle, and estimated by the criterion which ancient wisdom has laid down, "*Noscitur a socio*," Doctor Beddoes's character will lose nothing of its claim on our estimation. He could number among his friends and correspondents, some of the most respected names in the kingdom, for virtue and for talents. By such men he was hailed as a congenial spirit, and however prejudice might undervalue his worth while living, or calumny assail his reputation now he is dead, it would, I apprehend, be difficult to find the individual who would not feel gratified to have been his friend.

Few men have ever appeared more perfectly free from vanity. He never made an obtrusive display of his knowledge or his opinions. In societies where his abilities gave him a right to take the lead, he was almost habitually silent. His thirst for information was so unextinguishable, that he chose always rather to hear than to speak.

In mixed society, if any characters were present from whom he hoped to derive information, he would eagerly enter into conversation with them; if that could be called conversation, which consisted almost entirely of questions on the one side and answers on the other. It was only with some chosen friends, or when he had met by accident with a congenial spirit, that he entered into free colloquial intercourse. His mind would then kindle and its latent enthusiasm would gradually develope itself; and his language, upon such occasions, would not unfrequently assume that figurative and poetical cast, which sometimes appears in his writings.

Enthusiasm in pursuit is generally allied to quick and ardent emotions of every kind. It is not often that we find it accompanied by such gentleness of temper as was combined with it in the mind of Doctor Beddoes.[5q] The letter of his preceptor Mr. Dickenson

[5q] The following anecdote I have extracted from a letter addressed to me by one who had the most favorable and ample opportunities of becoming acquainted with his character.

"Doctor Beddoes sometimes appeared equally enthusiastic upon the veriest trifle that pleased him, as upon things of importance. Some years ago, I remember that he had a little tortoise-shell cat, that he was very fond of. He had taught it a variety of little tricks, such as fetching a paper ball, jumping to catch it from a height, and returning it to her master &c. This playful creature was so great a favorite, that when the Doctor was busily engaged, even when writing for the press, she would jump upon the very paper his pen was tracing; there she would sit purring, watching the motion of his nimble fingers, and when the page was ended he was so unwilling to disturb her, that he frequently waited her pleasure; and sometimes took up a book till she left the place. At other times, if she was accidentally shut out, and he heard her making a noise at the door, (which she did with the impatience of a spoiled child) he would instantly get up and let her in. At dinner she was so indulged as to be extremely troublesome. It was remarkable that this little animal appeared to mark with much accuracy the approach of the dinner hour: for she in general left the Drawing-room about half an hour before that meal; and sat at the foot of the stairs waiting the time of her Master's return. She at last became so troublesome that it was necessary to give her away; and the Doctor observed in a letter to Mrs. Beddoes, who was absent from home at the time, that he found it quite melancholy upon his return from his visits, not to find his little favorite in the hall to welcome him."

bears ample testimony to his wonderful equanimity in youth; and this quality of mind he appeared to cultivate upon principle in advancing life; for upon an occasion, in which he had unintentionally given offence to a person of much mechanical ingenuity, who resented, too hastily, an inconsiderate expression which an irritable mind only could have misunderstood, he shortly afterwards readily availed himself of an accidental opportunity of serving him. "I will do what I can for him" he observes in a letter to a friend, "being determined never to be offended at the soreness of ingenuity in narrow circumstances, or to feel sore myself on slight provocations." This equanimity however, although it might generally be esteemed constitutional, was not so in reality; it was the result of habit and reflection. Circumstances comparatively trifling would sometimes affect him deeply. Yet he so far restrained the expression of his feelings, that no indifferent spectator could possibly have discovered it. But those who knew him well, have seen his face suddenly flush upon such occasions; and if his efforts to resume his calmness were insufficient, he would suddenly leave the room. Though his opinions and his practice were often calumniated and misrepresented, he seldom appeared to feel sufficient interest upon the occasion to induce him to repel the attack, even when it could have been effected with little effort. Instances have frequently occurred, when he was pleased with his patients, (in which case he universally succeeded in exciting a reciprocal feeling) of his having playfully enquired of them how they could possibly be so bold as to send for a man who laboured under such an ill reputation as himself: and he has often successfully rallied the spirits of a drooping invalid by representing in the most vivid colours and placing in the most ludicrous lights the various tales which were circulated respecting him. To this philosophical indifference to general opinion may be referred much of the prejudice which, in some minds, existed against

him. There are those who are not disinclined to become "the heralds of their own merits;" and the world, in general, acquiesces in any pre-eminence which is claimed with sufficient presumption. Doctor Beddoes was contented with the esteem of a smaller circle; and it is honorable to him to record that those who knew him best loved him most.

In the very few instances in which, during frequent personal intercourse, I ever heard him speak of any individual with severity, I do not recollect its being, upon a single occasion, excited by any personal feeling. His published writings, with an exception hereafter to be noticed, manifest a similar spirit. In examining his common-place-books, I have occasionally met with some severe remarks upon certain fashionable members of the medical profession. They are characterized by his usual acuteness: but they in no instance manifest any personal hostility. He complains "more in sorrow than in anger" of their want of zeal for the improvement of medicine, of their placid acquiescence in a neutral system of practice, and their undeviating perseverance in the beaten track, instead of giving the influence of their example to introduce such an improved and correct tone of thinking upon medical subjects, as should reciprocally stimulate the mind both of patient and physician.

Whenever he had submitted any of his publications to the awful tribunal of the public, he was observed to manifest some degree of anxiety to learn the opinions of the reviewers. But this anxiety appeared to result merely from his wish for further light upon the subject of his inquiries; for, where his opinions were not confirmed or contested by argument and reasoning, he appeared equally indifferent to their praise or their censure. There were however a few characters of whose approbation he was desirous. He was not insensible to the "*Laus a laudato viro.*"

To the uniform mildness of temper manifested both in his

writings and his character, the vehement asperity, with which he assailed the character and administration of the late Mr. Pitt, constituted almost the only exception. Perhaps however, when the peculiar cast of Doctor Beddoes's opinions is taken into the account, this particular instance is rather in appearance, than in reality, a deviation from his general principle. In the early stage of Mr. Pitt's political career, he had hoped to meet in him the friend and advocate of constitutional reform, and his disappointment was proportionably severe upon finding that he had abandoned a cause of such importance. He considered the alarm that had been excited for the safety of those political institutions which constitute the glory and the happiness of Englishmen, as a mere state trick; at first devised by him to keep the reins of power in his grasp, but afterwards wielded as a tremendous engine to arrest all improvement and to perpetuate abuses. Nor did he consider the evils attendant upon his administration as confined to his own country alone: He contemplated it as the source of the greater part of those calamities, which since the year 1793 have so awfully agitated Europe. It is, therefore, not surprizing if the vehemence of his opposition to an individual whose influence he considered as so pernicious to his native country and to society at large, should be commensurate with the ardour of his general philanthropy. This is not the place to examine the justice of his estimate of the character in question. I mean only to assign the probable cause, which in this particular, and almost solitary, instance, mingled the milk of human kindness in a character eminently benevolent, with gall and bitterness.

In delineating the moral character of Doctor Beddoes, it will be necessary to advert to one feature of it, which his friends will remember with regret, and his enemies comment upon with eager malevolence. He has been charged with avarice and with an eager

and undistinguishing rapacity for fees. If it be admitted that this charge was partially founded, it is due to him to say that its extent has been greatly exaggerated. Numerous instances have occurred, in which he has paid a long and assiduous attendance, without the expectation of a fee; and where he has refused it when offered. But, it is obvious that cases of this nature will be far less generally known and extensively circulated, than those of an opposite description. For however we may lament the existence of such a principle, it too often happens that malevolence has a memory more retentive, and a louder tongue than gratitude.

But another apology for this shade in his character, will, I apprehend, readily present itself to those who have investigated its more minute traits. He thought and felt, much more emphatically than the world in general, however commonly the proverb may be uttered, that "Health is the first of blessings;" and the idea that medical services ought to be highly remunerated, appears to have been a modification of this prevailing sentiment. Nor have I any hesitation in believing, that if Doctor Beddoes had only so far acquired the elements of his profession as to feel its immense importance, and afterwards directed his attention to other pursuits, he would, from the influence of this impression, have been equally ready to bestow, as he thought it just to claim an ample remuneration for medical service. It is, however, but justice to his memory to enquire to what purposes the wealth thus acquired, was applied. A comprehensive view of the value of money, and an uniform liberality in employing it, equally remote from avarice in trifles, as in matters more important, is a quality of mind, much more rarely possessed than is generally apprehended. I will not contend that he wholly escaped the contagion of parsimonious habits, to which his situation in early life particularly exposed him. They appeared however principally, I believe I may venture, with truth, to add

solely, in avoiding trifling and minute expences, of which he did not recognize the utility. On the other hand it would be difficult to produce any instance where the influence of such unfavorable habits has been so far corrected, by the joint operations of a sound judgment and a benevolent heart. Let the reader turn back to the account of the first formation of the Pneumatic Institution, and judge whether such an effort was not characteristic of a truly benevolent spirit; especially when it is recollected that it was made at a time when he was struggling to emerge from a cloud which had cast a gloom over his future prospects, and broken up and dissevered many of his most valued connexions. When his professional prospects began to brighten, except when restrained by momentary fears of running in debt, which was in his early career a frequent source of apprehension, he shewed himself rather imprudently careless of money. He kept no accounts and frequently even left considerable sums, of the amount of which he was ignorant, about his apartments. When his reputation was fully established, and his income became proportionably considerable, its superfluity was not retained for the purpose of accumulation, but was, on any occasion which he thought worth the cost, liberally and even profusely employed. His library consisted of many thousand volumes. He spared neither pains nor expence in procuring from the Continent, as long as the communication was open, every publication, whether periodical or otherwise, on the subject of medicine. His mineralogical cabinet contained an extensive and truly valuable collection. In his laboratory, he had accumulated every article requisite for his researches to an almost extravagant extent.[5r] His tastes and pursuits differed so widely from

[5r] Of this, the following is a striking instance. At his death, a most delicate hydrostatical balance, which, with its apparatus, must have cost a considerable sum, was found in his stable, rusted and useless. It had been procured, in all probability, for some specific purpose; and after this was answered, had been thrown by and forgotten. He had been engaged as has been already seen, for some months previous to his dissolution, in very extensive anatomical researches, probably with reference to his intended physiological publication. With a view, as it appeared, to enquiries still more extensive, he had provided a vast number of vessels for maceration and other purposes relating to dissection, made of queen's-ware. It is an affecting circumstance to record, that the first use which was made of any of these vessels was upon the occasion of the examination of his own body, after his decease.

those of the world in general, that it was not wonderful that the motives of his conduct were misunderstood. He hated shew and loved utility. To the former he would make no sacrifice; but he grudged none that was required by the latter.

As a medical practitioner Doctor Beddoes was eminently successful. His address was, in the first instance, far from prepossessing: but any prejudices arising from this source, were soon effaced by the evident interest which he shewed in the investigation of the disease. He never appeared in a hurry; and no symptom however trifling or minute was treated by him with inattention. This habit of minute investigation rendered him uncommonly successful in the treatment of nervous diseases; in which he was still further assisted, by having combined a variety of anomalous and apparently unimportant phenomena into some sort of system. His prescriptions were in general very simple, and the remedies ordered small in bulk. His writings evince his hostility to the system of drenching, and his practice was conformed in this particular to his precepts. In cases however which baffled the more simple forms of treatment, he often ventured upon combinations of the most complicated, and at the same time, the most original kind. He varied these in every possible mode, and by this means frequently succeeded, in cases where life had almost become a burden and every hope of relief had long been abandoned. He explained his ideas or wishes to his patient with great plainness and simplicity of manner; and so far was he from

affecting to conceal ignorance by obscurity of language, that with equal simplicity, a simplicity of which, if I mistake not, a great mind only would be capable, he would, when perplexed by the symptoms of the disorder, candidly state the fact to the friends of his patient, and avow his ignorance. The most ardent votary of medical science will occasionally be forced to confess a similar deficiency, and to feel that there are many mysteries in the operations of nature, in disease as well as in health, which elude the grasp of any finite comprehension. This however was with Doctor Beddoes, a rare occurrence. For the most part, when any new symptom occurred, he appeared to have at hand such a variety of resources, that he at once calmed the apprehensions of his patient, and inspired him with hope and confidence.

Doctor Beddoes was very generally supposed to be an experimental practioner, and as such was often held up as the object of dread or of censure. If the term be used to designate a man perpetually trying new remedies without sufficient calculation of circumstances, no physician ever less deserved the appellation. I will venture to affirm, from having been an eye witness of much of his practice, that Doctor Beddoes was a cautious practitioner; that he never proposed a plan of cure without a most deliberate and circumspect review of the case, nor adopted a new remedy, except in cases where the more common ones had been found inefficacious. Indeed he has, himself, given his medical creed upon this subject, in his researches on Fever; (*p.* 196.) "I think it" he observes "perfectly just, that he who, *from the love of experiment*, quits an approved for an uncertain practice, should suffer the full penalty of the Egyptian law against medical innovation; as I would consign to the pillory, the wretch, who out of regard to his character, that is, to his fees, should follow the routine, when, from constant experience he is

sure that his patient will die under it, provided any, not inhuman, deviation would give his patient a chance." It should be recollected also, that if he ever was compelled to resort to such novelties, or to try the "*anceps-remedium*, he was far less likely to be reduced to that necessity, than the mass of his professional brethren, from the more comprehensive grasp of his mind, and the greater multiplication of his resources.

The vague ideas and popular prejudices which prevail on the subject of medical experiment, extend, by an easy transition, to medical theory also: and nothing is more common than to hear it condemned as dangerous.[5] It is forgotten, that without theory to arrange them, a multiplication of facts, or extensive experience will only perplex and confound the observer. It is not an uncommon thing even in medical writings, such at least as record cases, to extol facts at the expence of theory. "Were I disposed" says Doctor Rush, "to consider the comparative merit of each of them, I should derive most of the evils of medicine from supposed facts, and ascribe all the remedies which have been uniformly and extensively useful, to such theories as are true. Facts are combined and rendered useful only by means of theories, and the more disposed men are to reason, the more minute and extensive they become in their observations." All practice which is not modified by the perpetual exercise of the reasoning faculty, or in other words, which is not controuled by theory, is necessarily empirical. The association of certain diseases with their common remedies is often too firmly fixed in the mind of the physician to yield to the influence of reason; and it is, not unfrequently, cherished because it favours indolence. But this asso-

5 "To think is to theorize" says Doctor Darwin, "and happy is it for that patient whose physician has the best theory." Doctor Beddoes quotes this remark in one of his common place books with the following addition. One may affirm that no man practices medicine

ciation does not exist in nature. With whatever accuracy the disease may have been at first discriminated, and its nosological name and situation ascertained, the various circumstances of constitution, temperament and previous habits, so essentially modify its phenomena, that it would be sometimes highly injurious to treat the same disease, in two individuals, precisely in the same way.

If the epithet experimental should continue to be made use of in a reproachful sense, that practitioner best deserves it who, from ignorance or want of activity, contentedly pursues plans of the failure of which he is certain, or applies inert remedies to diseases which he has neither the faculties nor the industry to make himself master of. Such an one is indeed an experimental practitioner, of the boldest kind. But such conduct would be more earnestly deprecated by the philosophical theorist than by the most apprehensive patient; for the former alone could trace its pernicious consequences in their full extent, and discover all its latent deformity.

It must be acknowledged that the enthusiasm of Doctor Beddoes's character led him, occasionally, to entertain hopes and expectations with regard to the effects of certain medicines, which subsequent trials have not fully justified. It is, however, a striking feature in this part of his character, that this ardour of expectation was more frequently excited by the discoveries of others, than by that allowable partiality which he might have naturally felt for his own. If his writings be examined, it will be found that of his own conceptions he speaks with much modesty, or indeed scarcely speaks at all. The application of the gasses was, perhaps, his most original speculation; yet, even on this subject, he chuses rather to detail

without theory, "nor woman neither,"—unless any one should go to work by writing the names of various drugs upon cards and drawing them, like lottery tickets, blindfold out of a wheel; and certainly those who decry thinking, or think against their will, cannot be supposed to think to better purpose.

the experience of others. But he gives way to the expression of the most sanguine anticipations, when speaking of the effects which digitalis has produced under the care of Doctors Drake and Fowler; his hopes are exalted to a high pitch when he brings forward the discovery of a supposed medicine for the gout, and he gives the reins to all the fervour of his genius in describing the effects of the gaseous oxyd of Davy. In almost the only instance in which he has wielded the keener weapons of controversy, his indignation is excited by what he deemed an unfair opposition to a medicine, (nitrous acid) to the discovery of which he had no pretensions, and which it would be difficult to accuse him of any sinister motive in patronizing. It has been said of him that his opinions with respect to the virtues of medicines were forever changing, and that his favorable opinion was as hastily rejected as it had been adopted. On this point, however, distant observers of his character were much mistaken; though a medicine might no longer be eulogized in his writings, it was not, therefore, abandoned. But had every plan which Doctor Beddoes ever proposed for the advancement of medicine, been proved by his subsequent enquiries to be impracticable, and every remedy that he had been the means of making known been found ineffica cious, he would still have a claim upon the gratitude of society in general, and of his fellow-labourers in medicine, in particular. He who puts to the test of actual experiment the powers of any new agent, and ascertains its real value, renders essential service to mankind. It is for want of the more general diffusion of a similar spirit of investigation, that so large a proportion of the medical profession content themselves with certain vague ideas of the virtues of medicines, often as remote as possible from philosophical accuracy, and scarcely in any instance precisely conformable to it. Hence it is so common for the half-instructed practitioner to commence his career with a groundless confidence, and to termi-

nate it in an equally unreasonable scepticism ; and hence medicines possessed of no claim but antiquity, retain their places in the pharmacopœia, while the pretensions of a new remedy are set aside without examination.

In the families where Doctor Beddoes was habitually employed, he in general inspired a degree of respect and confidence almost amounting to enthusiasm ; but he cannot be affirmed, with truth, to have been ever generally popular. A mind, however, capable of taking a comprehensive view of disease and contemplating it in all its relations, a minute and assiduous attention to symptoms, and a conscientious devotion of the best faculties with which his Maker has endowed him, to the discharge of his duty, might surely atone in any medical practitioner, for the want of superficial polish and external address. I believe that no individual ever felt a prouder indifference for popularity than the subject of this memoir. I am fully sensible that this feeling may easily be carried too far. Upon those minor points where principle is not concerned, the opinion of the world should be conciliated, and popularity courted, were it only sought as a means of extending the capability of being useful. But this ought not to be the primary aim of the physician ; he should have more exalted ends in view. It is certainly possible to practice medicine in a way which shall neither hazard reputation nor popularity ; which shall in fact endanger nothing but the life of the patient. The practitioner who will not abandon hope or exertion while life remains, and who, when the common resources of his art fail, is not afraid to recommend or to apply those of a bolder or less common description, must often incur the risk of censure and the loss of fame. In some instances it may perhaps serve as a beacon to warn men from the path of medical investigation, as in others, it may operate as an incentive to a fearless disregard of popular opinion, or even the opinion of the mass of the profession, where

truth and duty are at stake, to cite the example of the illustrious Harvey. " It was remarked" says Hume, " that no physician in Europe who had reached forty years of age, ever, to the end of his life, adopted Harvey's doctrine of the circulation of the blood ; and that his practice in London diminished extremely, from the reproach drawn upon him by that great and signal discovery."

In person, Doctor Beddoes was rather below the middle size, and somewhat inclined to corpulence. He scarcely ever used a carriage, but for the most part, even though the state of the weather was very unfavorable, he visited his patients on foot. In these walks his mind and body appeared equally active. His countenance and manner bore the habitual impress of thought and reflection ; and this co-operated with his habitual shyness in rendering the access of a stranger, at first, apparently difficult. But when his features relaxed into a smile, the character of benevolence was so strongly impressed upon his countenance, that the most careless observer of the human physiognomy felt himself irresistably attracted by it.

On the subject of Doctor Beddoes's literary character it will not here be necessary to be very diffuse. It has been attempted in the preceding pages of this memoir, to give at once some idea of the number and of the importance of his various productions. His political writings were in general of too fugitive a nature to constitute a permanent basis for any portion of his literary reputation ; although a minute analysis of their merits as compositions could scarcely fail to extend it. If I am not deceived, the fragments of the Expedition of Alexander, and the Elegy written in the character of a Hotwell Patient,[51] shew, that if he had applied his mind to poetry, he would have attained no inconsiderable rank among the cultivators of that art in the present day. But he had no wish to be known as a votary

[51] See Appendix, No. 9.

of the Muses, although he sometimes amused an hour of leisure, by the composition of a poetical trifle. His medical writings constitute his grand claim to reputation, and when their number is recollected, and the haste with which they are often evidently written is considered, we cannot but be surprized at their value.

The great and distinguishing excellence of these writings is the strong and accurate description which they contain of the phenomena of diseases. It may be said of Doctor Beddoes without exaggeration, that "he paints in characters of light." The minute attention which, as has been formerly observed, he manifested in a sick chamber, to the most trifling symptoms, impressed upon his mind those distinct conceptions, which enabled him to present the picture so vividly before the eyes of his reader. Of the eloquence and even sublimity to which he often rises, apparently without effort and almost without consciousness, some specimens have been given, while his various works were passing under consideration.

The varied excellence of his literary productions is the more remarkable, as I believe that he seldom, if ever, completed a work before the earlier part of it was sent to the press. He thus debarred himself from the advantage of taking a collected view of his arguments, and of condensing or expanding them as circumstances might require. In one of his letters to Doctor Darwin, he apologizes for the general carelessness with which he writes, and mentions the custom here alluded to; at the same time censuring it as blameable, and promising future amendment. But I have every reason to believe that long habit and multiplied avocations conspired to prevent the intended reformation.

Doctor Beddoes has been censured for the hasty adoption and as hasty change or renunciation of his medical opinions. The charge has been much exaggerated. His mind was in perpetual progress. He was contented with nothing that he had acquired, while any thing

yet remained unattained. Ardent in the pursuit of knowledge, it was no wonder if his views of any subject that he was investigating were daily extended, and that new lights were constantly pouring in upon his mind. These new lights, of course, modified or improved his previous conceptions. I will not here quote the ancient proverbial observation upon the greater facility with which the wise man changes his opinions than the fool. I would rather sanction his variations of opinion, where any such existed, by the authority of the acute medical philosopher of America, Dr. Rush. "To be unchangeable in opinion" says he "belongs only to that Being who sees things in their order and relation to each other by a single act of intuition."

In like manner, he has been sometimes censured for hastily publishing opinions to the world, before he had sufficiently ascertained their value by the test of experience. His defence upon this head is certainly easy. When new ideas upon the treatment of diseases, generally esteemed hopeless, presented themselves, he considered it as an imperious duty to submit them to the examination and inquiry of the profession at large. If one of our most justly celebrated reviews applauds Mr. Davy for presenting to the public discoveries not yet perfected, surely no blame will be affixed to the conduct of Doctor Beddoes, for laying before the world, in an incomplete state, speculations of far greater practical importance; in as much as the interests of science must yield to those of humanity.

In the preceding part of this volume, mention has been more than once made of the annunciation of intended works which never appeared. If however in so busy a life, occupied by objects so multifarious, some projects occasionally failed, and some literary and scientific undertakings, which in the first ardour of conception were promised, were never afterwards completed, it may be affirmed that they failed only because they were beyond the grasp of human

power to accomplish, of human industry and human activity to execute: and let it be remembered that it was by familiarizing his mind to schemes of almost boundless utility and impracticable extent, that his powers and faculties acquired that expansion which enabled him to effect so much.

The enthusiasm of his character may perhaps have sometimes led him to adopt, too hastily, theories which had only novelty and plausibility to recommend them; but it has always appeared to me that those were mistaken in his character who supposed him deficient in perseverance. On the contrary, when any object had arrested his attention, he directed towards it the full impulse of his mind, nor did he abandon it, till he had contemplated it in all its relations, and fully ascertained its value. Objects of various relative importance successively occupied his attention; but, amid-t all, we find certain ideas habitually impressed upon it,and recurring upon every occasion. The importance of preventive medicine; the more general diffusion of the knowledge of the human frame as a means of perfecting that branch of science, and the awful ravages of consumption and its almost equally terrific relation, scrophula, seem to constitute those leading topics of primary interest, to the elucidation of which he occasionally made every other acquisition subservient.

An account of Doctor Beddoes's chemical researches has been given in its proper place. When we contemplate the brilliant discoveries of the Professor at the Royal Institution, we shall perhaps be tempted to apply a remark which the Doctor has himself quoted in the preface to Scheele's Chemical Essays. "It was observed to me" says he "by a near relation of Bergman's, that the greatest of his discoveries was the discovery of Scheele." In citing this observation he does not mean to detract from the acknowledged merits of Bergman, nor would I be understood to undervalue Doctor Beddoes's services to chemical science, were I in turn to observe,

that the greatest of these services was the discovery of Davy." The honour however of this he cannot claim undividedly: a portion of it is justly due to the friend who first introduced him to his notice.

As mineralogical researches were among the earliest, so were they among the latest objects of his pursuit. In the last year of his life he was engaged in an extensive investigation of the different materials made use of in the construction or repair of the public roads. Large parcels of unopened specimens, which had been collected from various parts of England, were found in his laboratory. To what purpose he had intended to apply the information thus collected does not appear, as he has not left a single note upon the subject.

Doctor Beddoes was an accomplished scholar. His early classical acquisitions have been spoken of in a former part of this volume: and to the latest period of his life he read the Latin and Greek languages, with a facility which preserved unabated his relish for classical literature. In his hours of leisure therefore, he frequently refreshed his mind by "distilling the sweetness of the Greek and Roman spring." He was master of the French, Italian, Spanish and German languages; with the polite and the scientific authors in the last, in particular, he was equally conversant, and his library contained a rich collection of works of both descriptions. Doctor Frank has borne testimony to his intimate acquaintance with the medical writings of his countrymen, nor was he less familiar with their works of imagination. Indeed, deeply as he was smitten with the love of science, he never turned fastidiously from any work of that description, which was recommended to his perusal; and such works, when well executed, excited in him a more vivid interest than might have been anticipated from the general complexion of his tastes and occupations.[5u] He had a quick perception of humour

[5u] See his effusion on the subject of Madame de Stael's Delphine, *p.* 295.

and a keen relish for it; and upon some subjects shewed that he was himself possessed of the power of ludicrous description in no small degree. Sterne was one of his favorite English Authors, and he had, at one period of his life, collected some materials with a view to give to the world an Essay on his life and character. In his pursuits of every kind, whether literary or scientific, he exhibited an example of the rare union of great genius with indefatigable industry. His mind never reposed. To the torpor of indolence he was a perfect stranger. Even during his last illness, while his body was enfeebled by disease and his vital powers were fast declining, his mind retained all its accustomed activity.[5v]

Such was Doctor Beddoes. When we consider the variety of his knowledge and the extent of his mental powers, it is impossible not to lament their premature extinction; or to contemplate, without a sigh of despondence, the void which he has left in the circle of his scientific countrymen; a void which, however envy may affect to undervalue his services, will not soon be supplied.

In estimating the extent of this loss, it will be necessary not only to take into consideration what he has really effected, but to cast a prospective glance at those yet greater designs, which he would in all probability have executed, if his sun had not set so soon. Admitting, as appears to have been the fact, that his intellectual powers

5v The week preceding his dissolution, he addressed a letter to the chairman of a meeting convened to take into consideration the propriety of erecting a building for literary and philosophical purposes; in which he expressed the highest satisfaction at the prospect of an Institution being about to be founded in Bristol, upon so liberal a scale; and promised his hearty co-operation as far as his means would allow. Another letter, the address of which seems to have been arrested by the hand of death, has been found among his papers, designed to recommend to the notice of a friend and patron of the arts a young painter of Bristol, (Mr. Bird,) who has since rendered himself sufficiently known by the uncommon truth and felicity with which he has delineated scenes of rural life and rural manners; and to whose skill the Author is indebted for the likeness prefixed to this volume.

attained maturity at the same time with his bodily frame, there remains scarcely more than a period of twenty-seven years for the exercise of all that mental activity, of the fruits of which, however imperfectly the task may have been executed, it has been the object of this volume to give some idea. The memorials that are left us of his genius and talents have not indeed been framed into system, for his literary life was too short; but they are pregnant with good sense, with acuteness and information; and, by the liberal medical inquirer, they will be received as a valuable legacy, and cherished as the treasures of a bold and original understanding. Had his life been prolonged till he had realized those conceptions with which his mind was teeming, and maturely digested his system of physiology, I doubt not that he would have produced a work, which, to adopt the prophetic anticipation of Milton, "after times would not willingly have let die"; and that he would have erected a memorial to his own fame, which would, at once have defied the assaults of malevolence, and have rendered the present tribute to his talents and character unnecessary.

The body of Doctor Beddoes was examined twenty-seven hours after his death, by Mr. John Estlin, Surgeon, of Bristol, in the presence of Doctor Craufuird, Doctor Stock, Mr. Baynton,[5x] and Mr. King. Though the examination was undertaken in obedience to a

5x The well-known Author of one of the most valuable improvements in modern surgery.

wish often expressed by the deceased to Mr. King, it was thought right, in the absence of Mr. Giddy his executor, to request Mrs. Beddoes's consent. It was readily obtained; but the knowledge of what was passing in the house, which she could not be prevailed upon to leave, so evidently increased her mental suffering, that it became necessary to complete the operation in the shortest possible space of time. For this reason, the examination of the head was unfortunately omitted; and in addition to this, the feelings of the gentlemen present, who had all been the personal friends of the deceased, unfitted them, in a great measure, for a minute inspection of those morbid changes which presented themselves. These circumstances must apologise for any imperfection in the following account.

Though Doctor Beddoes had lost a considerable portion of fat during his last illness, there remained a more than common quantity between the skin and muscles; his stature was short, but the whole of the trunk remarkably capacious. The removal of the sternum was attended with some difficulty, in consequence of the morbid state of the pericardium, which was greatly enlarged, thickened, and to a great extent firmly connected with the costal pleura of the left side. The right lung was of an extraordinary magnitude; it was very soft, but free from any perceptible morbid changes in its structure; its surface, in several places, adhered slightly to the costal pleura, and in this side of the thorax there was a trifling quantity of coagulable lymph. The left cavity was chiefly occupied by the diseased pericardium; the left lung was almost entirely obliterated; the only remains that could be discovered of it consisted in a small, hard and irregular substance, in which it was difficult to trace a vestige of its former organization. What remained of the costal pleura in this cavity was thickened, and a few ounces of a turbid fluid were contained in it. When the pericardium was opened, it appeared to

have been nearly filled with a similar fluid, somewhat tinged with cruor. The inner surface of this membrane was not discoloured, when the coagulated lymph which adhered to it was scraped off. The heart was of a proper size, very flaccid in its muscularas well as in its membranous parts; no ossifications could be discovered in any part of it; but the coronary arteries near their origins seemed to be somewhat thickened. The foramen ovale was perfectly open, and the left pulmonary veins and arteries were wholly obliterated. The diaphragm, except where it was connected with the pericardium, was healthy. The liver which adhered slightly to the abdominal muscles, was rather small, of a florid colour over the whole convex, and of a deep purple over the concave part of its surface; when divided in several parts no deviation from a healthy state was observed in its texture. The lobulus Spigelii was very large and of a florid colour. The ductus hepaticus and communis presented one single tube of the same diameter in its whole length, and somewhat wider than usual. The gall bladder and its duct were so completely disorganized by some very early change, that the impervious remains of the latter could scarcely be traced to a small bunch of a thick and corrugated membrane in the situation of the cyst. This substance was divided and in its centre was found a very small empty cavity of an irregular form. The stomach was very large and considerably inflamed from the cardia towards the middle; but the other portion, on the side of the pylorus, was quite healthy. The pancreas was perfect; the spleen very large and full of blood. The kidneys were both above the common size, particularly the right, both perfect in their structure and free from any morbid appearance. The rest of the abdominal viscera appeared healthy.

A List of Doctor Beddoes's Publications.

[*The figures shew the page of the preceding volume in which each work is noticed.*]

LIST OF DOCTOR BEDDOES'S PUBLICATIONS.

In this List are not included a variety of communications to the Medical Facts and Observations, the Monthly Magazine, the Medical and Physical Journal, Nicholson's Journal, &c.

APPENDIX—No. 1.

ON THE

Sexual System of Vegetables.

Read before the Natural History Society of Edinburgh, April 7th, 1785.

THE Sexual System of Vegetables, as it is exhibited in the writings of Linnæus, affords two very different subjects of inquiry. The merit of the Nomenclature, and the truth of the Principles upon which the Classes and Orders are founded, and from which they have been denominated, may be separately considered. Under the second head, the question, concerning the generation of Plants, will be necessarily involved. Any formal attempt, to shew how highly both these topics deserve the attention of persons, who assemble to discuss subjects of Natural History, would be an abuse of your patience, and of words.

The Vegetable Kingdom, consists of such a multiplicity of individuals, many of which resemble one another so nearly, in the several circumstances, constituting what is called the external habit; that no one can call in question, not only the expediency, but the necessity of searching for marks, by which they may, easily and certainly, be distinguished. By these two tests (Accuracy and Facility) I should think that all definitions might safely be tried.

That *exactness* is indispensibly necessary, appears from the nature of the thing; since the use of Definitions, is to enable different persons to collate their ideas upon the same subject. Whence, ambiguous definitions will give rise to that kind of perplexity and confusion, which takes place, when disputants employ the same term in a different sense; and what is a much worse evil, and has actually happened, much of the knowledge of one generation, will be lost to others.

To supply marks, by which the object defined may be readily compared with the definition, may, perhaps, be thought only a secondary requisite; yet, without it, accuracy would be of no avail. The study of names, is always irksome: nor is it any otherwise profitable, than as it leads to further advances. He, therefore, who shall neglect to allure the student by the prospect of an easy and speedy initiation, may justly be censured as an unskilful Nomenclator. If this suggestion of common sense, needed the sanction of authority, that may easily be added. "Notæ," observes one of the first among Naturalists, [*Ray*] "obviæ sint, manifestæ, et cuilibet facilé observabiles. Nam cum methodi usus præcipuus sit rudes et tyrones in stirpium cognitionem compendio absque tædio et difficultate inducere, non oportet ejusmodi notas proponere, quæ attentum et sollicitum requirunt spectatorem."

Conciseness contributes so much to perspicuity, that it deserves to be mentioned apart. How much the necessary evil of bestowing such attention upon the grammar of science, would be alleviated, if the *essential character* of every object could be clearly pointed out, will be readily conceived. And if any one should doubt, let him compare the obvious and simple characteristic mark of some of the Linnæan Genera, such as the Crowfoot, with the tedious Nomenclature of Adanson's Families. The Definition of the Leguminous Plants, which constitute the 43d Family,[a] of this writer, is spread through eleven pages; nor does it seem possible, notwithstanding the natural loquacity of a Frenchman, to contract the character much, without departing altogether from the principles upon which he proceeds.

If were further to be wished, that in all scientific arrangement, the Order of Nature could be preserved, and that we might be led from the Cedar of the mountain, through the shrubby and herbaceous Plants to the remotest limits of vegetable life. Or, to speak in what I consider as more proper terms, that those Individuals which resemble each other in their general nature, and most striking qualities, should be placed together. I prefer this mode of expression, because I am very far from believing in what has been so strongly asserted, and so feebly attempted to be proved, in a Chain of Beings, descending in regular gradation, either from Infinite Perfection; or from the highest and noblest of terrestrial Beings, down to nothing.[b] However this may be, *Linnæus* has made no approach to a Natural Order; for I cannot consider his Fragments in this light; in which I do not find that he has given any definitions of the Divisions which he considered as natural, or offered any thing but a vague and indeterminate list of Names. In his System, like Plants are separated, and unlike put together. I believe, that in most of the Classes and Orders, we may find an

a Lamarck.

b This speculation being foreign to the present question, I refer to *De Luc*'s Letters, though I cannot quote the passage; and more especially, to Dr. *Johnson's* Criticism on Jenyns's "Origin of Evil;" which is inserted among his *Fugitive Pieces*.

individual of mighty structure and long duration, joined with a neighbour too small perhaps to be discerned but by the inquisitive eye of the Botanist, and which a few months or weeks shall see resolved into its elementary particles. This objection has been urged with great vehemence, by the most eloquent Writer of the present age.[c] But his aversion to Linnæus, will not raise much astonishment, when we regard the strong contrast, formed by the genius of the Frenchman, and that of the Swede.—A very little search, would discover others equally displeased with this Treatise of the Linnæan System. *Lamarck*, a very recent author, and one whose opinion may claim the more attention, as he has enlisted himself among its admirers, nevertheless acknowledges "that it is much to be regretted that this able Botanist paid so little regard to the natural relations of Plants, and that he sacrificed every thing to his System; which, however ingenious, ought by no means to be considered as a regular or defensible System of Vegetables."[d] —That this palpable defect is to be found in the System which I am considering, cannot be doubted; yet some apology may be made for the Author. He has himself confessed that the larger Sections are not natural; and it seems hard to cast reproach upon a writer for not having executed what he never intended. And if he had ever justly incurred this censure, in its fullest force, he at least shares it with every one of his Predecessors, and every one of his Successors; when, therefore, an equal deduction has been made from each, their remaining respective merit must still continue the same.

The two other requisites of every good Nomenclature, the *Classes* and *Orders* of *Linnæus*, possess in eminent degree. I suppose every one present to be acquainted with the characters of these divisions; and, therefore, have not copied them into this Paper. They will be allowed to be so accurate, as to be pretty generally applicable to the subordinate divisions which they comprehend, and so simple as to be easily learned, and easily remembered.

The smallest Sections were intended by the Author to be natural, and this merit must be allowed them. If, indeed, those who have confined their attention to the Plants of a single country, have made some proper corrections, by transferring now and then a *Species* to a new *Genus;* and, if the discovery of new Species, has, in any instances rendered it necessary to reform the generic character, such petty and inevitable failures, can detract little from the merit of so comprehensive a work. It would be amusing to compare what Linnæus has done in this respect with the performances of others, especially of Tournefort and Haller.—His superiority is acknowledged with some, but not many, dissenting voices; and I, who have never examined the question, have no right to depart from the decision of Botanists. I am, indeed, aware of the blind and undistinguishing admiration of many of his followers; but, I presume, that if their commendations are ever to be trusted, it is in the present instance.

If it be allowed that nature has been happily followed, in the adjustment

c Buffon. d New F. Encyclop. 1783.

of the Genera, Species, and Varieties; neither can the praise of *accuracy* be withheld from the Definitions, under limitations like those just stated. No Nomenclator has excelled, or, perhaps, ever equalled *Linnæus* in this department of Natural History. His close attention to the *parts of Fructification*, as they are said to be by him and his followers, principally enable him to attain to so much excellence. And it would have been fortunate for his reputation, if he had always delivered his opinion after the same mature and careful examination. He would then have avoided those general and unqualified assertions, and that dogmatical tone, which disgrace his writings. The world had never seen a Systema Naturæ; and Linnæus might have escaped the mortification of being obliged to own, that he did not understand, what he yet attempted to teach!

But, are the characters of the inferior divisions, easy of investigation? Has sufficient attention been paid to the great point of *practical utility?* Or, must the Student wait long with impatience, before he is allowed to pass beyond the antichamber of science? The convenience of *essential characters*, by which we are enabled to distinguish a Genus by a single mark, is sufficiently obvious. And Linnæus has contributed very much to the ease of the Botanical Student, by those which he has given in his Systema Naturæ. However, many more must be assigned, before the Nomenclature of Botany can be made tolerably easy, and of general access. For I am afraid that that of Linnæus, whether from his own fault, or the nature of the subject, is very difficult and obscure. Not to mention the inextricable confusion of the XXIVth Class, many of the others, will daunt the courage of the most determined Student, unless he is fortunate enough to obtain some better assistance than Linnæus holds out to him.—The Class, Syngenesia, the family of Grasses, the Umbelliferous Tribe: many particular genera, as the Carex, are so darkly described, that I doubt much whether any man ever has, or ever can, make himself acquainted with them by the help of his writings. What happened to myself, I shall not easily forget. I had what I suppose is common to all whose attention is not chained down to the necessities of life, a strong desire to become acquainted with objects on which nature has bestowed so much elegance. What I had heard and read of the merits of Linnæus, led me to suppose that he had rendered this attainable to a moderate share of industry and labour. But, when I took his works into my hands, and made the experiment, I found my progress little, and loss of time great; and, I soon perceived, that it was better not to know Plants, than to learn them in this manner. That I might be informed, whether the experience of others agreed with mine, I have asked several eminent Botanists, whether the writings of Linnæus had been sufficient for their information. The answer I received was uniform. They confessed, that without plates, which he so foolishly despised, dried specimens, and helps of this kind, they never could have made any proficiency. The insufficiency of his nomenclature cannot be more fully evinced, than by the conduct of his transcribers and translators. Hudson, Lightfoot, and Withering, not to go beyond the limits of our own country, sensible, no doubt, from experience, of the absolute impracticability

of acquiring a knowledge of vegetables from Linnæus, have added to almost every page, descriptions of the colour, stature, &c. But even if unwearied perseverance, could, at last, find its way by the twilight of these descriptions, little could be concluded in their favour. Few would consent to waste their lives, in the pursuit of such low, and in themselves, insignificant attainments. Linnæus, unquestionably, did much; but he left more to be done. The plan of his system is unnatural, the principles false. What then remains but practical utility? And, may we not conclude, that, in as far as it is not good for this, it is good for nothing?

But, it may be asked, why insist upon the evil unless the remedy can be found? If Nature supplies no simple and evident characteristicks, can Man create them? It is, indeed, but just, that the faults of the subject should be separated from those of the writer. Yet it is of importance to form a proper estimate of the value of a system, especially when that system is adopted as the classical one. What is highly praised, will always be imitated with emulation. Much has been said of the wrong direction, which the example of Linnæus has given to the pursuits of Naturalists. It is perhaps true, that this influence has sometimes turned aside those who were capable of better things, to trifling studies; but the use of Nomenclature, is undeniable: If it be a rugged, unpleasant road, it is notwithstanding the only one which leads to the palace of Nature. Still, however, indiscriminate praise will have a baneful effect; for, this powerful allurement will induce the Disciples to follow their Master, alike when he pursued the right path, and where he missed it. It is, moreover, always of use to point out defects, lest we should acquiesce in what is bad, before we are certain that nothing better can be attained.

There is another inconvenience in the present Nomenclature, which it may be easier to lament than remedy. Such are the principles upon which it is founded, that a plant can only be investigated at one particular period. Of individuals which preserve their foliage through the fine season of the year, not to mention ever-greens, we shall not be able to ascertain the names, unless we detect them in a certain state, which shall perhaps continue but for a few days. It were, therefore, to be wished, that either more permanent or else successive marks could be discovered. The latter may be undoubtedly done in some, perhaps if proper observations were made, in many instances. Thus the peculiar form which the umbel of the wild carrot assumes, after flowering, affords a more simple, striking, and permanent character, than that given by Linnæus, and might at least be added with advantage as an appendix. This remark belongs to Mr. *Barrington*, whose Essay on the Systema Naturæ, contains many pertinent strictures, which I do not think it necessary to repeat here.

I wish it were possible to discover a language by which the Habit[e] of Plants might be accurately described. This would answer every purpose of certainty

[e] "Facies plantarum magni facienda."—*Ph. Bot.*

and duration, and would greatly contribute to facility. That the Linnæan genera comprehend species agreeing in habit, is one of their chief merits. This, then, is the great principle upon which the better part of his system is founded; as is further evident from the following case, stated by himself. After a Genus, comprehending only a single species, has been constituted, set another plant differing little from the former, except in having the generic character not very distinctly marked, we are not, on this account, to make a new Genus, but to reform the Definition in such a manner that it shall be applicable to both; otherwise violence would be done to nature, an inconvenience which Linnæus certainly intended to avoid in his subordinate sections.

If, therefore, what this author has himself asserted, be true, and it will scarce be disputed, that provided a knowledge of plants be acquired, the mode of acquisition is of small consequence, it will surely be allowed that the habit ought to be carefully studied, that we may attempt easier and more permanent descriptions where they are wanting. Hence good plates, would form the best Botanical Nomenclature, if it were not for the great expence with which they are attended. The followers of Linnæus have deserted their leader, in his contempt of engravings: nor has any thing so much contributed to spread the knowledge of the names of plants, as those which are daily published throughout Europe.

Here the common objections, will, I doubt not, be at hand. It will be contended, that the Color, Form, Stature, and other qualities which constitute the external habit, are exceedingly variable; that the mouse-ear and lamb's lettuce, for instance, of one soil, are not those of another. This cannot, indeed, be questioned. But I doubt whether the number or degree of deviations is so great as has been represented. Few deviations so total as to lose all vestiges of the ordinary appearance, can be mentioned; and, at least, an equal number of exceptions to Linnæus's Definitions might be opposed to them. In how many places of the Genera and Species Plantarum are we warned by notes at the bottom of the page, that such and such species, want such a proportion of the parts of Fructification, and that they are not properly comprehended under the Ordinal, nor even the classical character. I have never had curiosity enough to count these instances; but they are certainly very numerous.

For the obscurity and confusion of the Cryptogamous Plants, in which the disciples differ equally from their master, and from one another, the difficulty of the subject will be accepted as an apology. I shall only observe, that the *Mosses* have been illustrated by a late Writer *(Hedwig)* with a degree of success that could scarce be expected in so minute an order of Beings, and after so much labour had been bestowed on them to little purpose. In consequence of these Researches, it was found necessary to cast aside the Linnæan Arrangement and Definitions altogether. That they might not be lost, without an effort to save them, the younger Linnæus, in 1781, actuated by the two powerful motives, of filial affection and attachment to a System, endeavoured to conciliate the new discoveries with his Father's Nomenclature. His success, however, was so small, that he has been said not to understand the observations in question.[f]

I ventured, above, to call in question the Philosophy of the Sexual System, and the truth of those principles, which, says Wahlbom, "tantâ commonstravit certitudine (Linnæus nempe) ut nullus hæsitavit iis superstruere vastissimum, plantarum systema."

It is now time to consider the arguments adduced in support of the Sexes of Plants, and the necessity of their concurrence in order to fecundate the seeds, and afterwards to look out for such reasons as may be sufficient to evince that the conclusion of Linnæus is *illogical* and *false*. If they shall appear to be satisfactory, one great argument for the preservation of the classical and ordinal Definitions and Denominations will be removed; and tho' it may be uncertain, whether expediency will soon require an abolition of the one, it may at least be concluded that propriety requires an immediate change of the other. The same consideration will also render Botanists less rigid in adhering, scrupulously to Generic characters, deduced solely from the parts of fructification, as they are styled, whenever it shall seem convenient to depart from them.

Those parts of vegetables, which are so eminently distinguished by delicacy of structure, splendor, elegance, and variety of colour, or intensity of odour, must have engaged the notice of the first men. But, although nature had nothing more grateful to offer to the senses, or more attractive to curiosity, yet it could not be expected that they should enter into much investigation, concerning the uses or effects of what they beheld. If knowledge was always acquired by slow and gradual transmission through the senses, simple perception, must have long been the chief exercise of the intellectual powers. To see and to note the variety and succession of the more obvious natural appearances, (for many of the more complicated phenomena have not been observed) would require no short period. Combination, speculation, and inquiries into causes, must have been of later growth. It is, therefore, reasonable to suppose, that accident or hunger, not regular research, taught the inhabitants of the East, that the elaborate structure of flowers, was designed for something more than to display external beauty. They were acquainted, at least in one species, as we learn from the most ancient of prophane historians, with some connexion between the flowers and fruit. It may be wondered, that the refining and acute genius of the Grecian philosopher, did not carry on the analogy. Perhaps, indeed, as their writings were the chief stores from which the Natural History of Pliny was drawn, he may speak of some of them when he says, "Arboribus imo potius omnibus, quas terra gignit, herbisque etiam suum sexum esse, diligentissimi Naturæ tradunt. [Lib. xiii. cap. 4.]

During those ages of darkness and misery, which began not long after the days of Pliny, and continued with little intermission, no progress was made in this inquiry. Nor was it 'till towards the beginning of the last century, that it

[f] By Hedwig himself.

was at last renewed by *Sennertus* and *Jungius*. It was not 'till a later period, [1676] that Sir *Thomas Millington*, Savilian Professor of Astronomy at Oxford, took the first rational steps towards the elucidation of the Sexes of Plants, and thus prepared the way for *Grew*; who, ten years afterwards, [in 1695] was followed by *Camerarius*, whose experiments are imagined to have first distinctly shewn the Sexes and Generation of Plants, though he himself, with admirable prudence and reserve, abstained from drawing a certain conclusion. Microscopical observations on the powder of the antheræ, were made soon afterwards [1750] and the notions which prevail at present were clearly evolved by *Vaillant*, in his discourse on the structure of flowers [1718]. These successive observations, afforded the means of distinguishing the accessory from the essential parts of flowers: and Linnæus digested the whole doctrine into the form of Aphorisms; assuming it as the foundation of his system.

In these Aphorisms, the sum of the arguments is concentrated. And, that there may be no suspicion of misrepresentation, I shall transcribe his own words.

88. Essentia Floris, in anthera & stigmate consistit.
138. Ovum non fecundatum germinare, negat omnis experientia; adeoque et ova vegetabilium.
143. Antheras esse plantarum genitalia masculina & eorum pollen veram genituram docet Essentia, Præcedentia, Situs, Tempus, Loculamenta, Castratio, Pollinis structura.
145. Generationem vegetabilium fieri mediante pollinis antherarum illapsu supra stigmata nuda, quo rumpitur pollen efflatque auram seminalem quæ absorbetur ab humore stigmatis; quod confirmat oculus, proportio, locus, tempus, pluviæ, palmicolæ, flores nutantes, submersi, syngenesia, imo omnium florum genuina consideratio.

And the whole of this part of the *Vegetable Physiology* is summed up in the next paragraph.

146. Calyx ergo est Thalamus, Corolla auleum. Filamenta vasa spermatica, Antheræ testes, Pollen genitura, stigma vulva, stylus vagina, Germen Ovarium, Pericarpium Ovarium fecundatum, Semen Ovum.

In these propositions are condensed a multitude of considerations favourable to the Sexual doctrine, some of them sufficiently vague, and others more forcible. It would be injustice to its advocates not to state them a little more distinctly.

1. The first argument is deduced from analogy. The resemblance between plants and animals holds in so many respects, that it is probable the seeds of plants must be fecundated by the accession of some substance analogous to that which is prepared in the male organs of generation in animals. If any one can imagine such a consideration to have any force, we shall presently see how far it is favourable to the notions of *Linnæus*.

2. The Antheræ always precede the fruit, and the Pollen is always emitted during the vigorous state of the flower, after which the anthera having answered the purpose for which it was designed in the vegetable economy, falls into decay.

3. The *situation* of the anthera is always so contrived, as to secure the transmission of the pollen to the female genital organs. The structure by which this is provided for, varies in various plants. We see, in most cases, the pistil surrounded. When it inclines to either side, the filaments take the same direction; and, when the pistil exceeds them in length, it bends downwards.

4. The season of maturity of both antheræ and pistils, exactly coincides, whether they are in the same flower or not.

5. If the access of the pollen be carefully prevented, the seeds will not be prolific.

6. The regular structure of the antheræ, and the determinate figure of the pollen, render it probable, that these parts are designed for no mean office. Dissections of the antheræ, before they discharge their contents, have shewn that they vary greatly in different species, while they are uniform in the same. And it appears from microscopical observations, that the particles of the powder, though perfectly alike in any given plant, differ as widely in different individuals, as the seeds themselves.

That the generation of vegetables takes place in consequence of the aspersion of the pollen upon the bare stigmata, in which situation the seminal vapour is effused, appears, as it is supposed, with incontrovertible evidence, from the following considerations.

1. The aspersion of the pollen is apparent to the senses. In what various ways this happens, in various individuals, is shewn by several interesting observations, which I should willingly insert here, were I not apprehensive that they would detain the Society too long; nor is it at all necessary, as they are related in books which may be found by very little search.[s]

2. The proportion between the stamina and pistils, indicates the same design. They either attain the same height, or else the difference is compensated by circumstances that in many cases are observable only at the time of flowering.

3. The situation and season have been already noticed.

4. The influence of dew and rain, is thought to point to the same conclusion. Most flowers are expanded while the sun shines; but, in wet weather and while the dew falls, they gather their petals together, to protect the pollen. And, what is one of the most curious appearances in the whole economy of vegetables, after the stigma has received the impregnating powder, flowers do not connive on the coming on of evening, or the approach of rain.

Experience has taught gardeners to dread a fall of rain, during the inflorescence of the pear and cherry trees. The pollen of the latter is oftener in-

[s] Amæn. Acad. Vol. I.

tercepted than that of the former, because all the antheræ ripen at the same time. Neither are the cerealia exempt from this accident.

5. The culture of the palm, cannot be unknown to any one, after it has been so often described.

6. The ingenuity of the Sexualists, has deduced other arguments from the nodding flowers, the plants which grow under water, and the structure of the compound flowers.

a. Those vegetables in which the pistil exceeds the filaments in length, are so constructed that the flowers assume a nodding direction, and thus the stigma falls to a level with the antheræ, or below them. This nutation cannot be attributed to the weight of the flowers; for the fruit which is many times heavier, sometimes grows erect in the very same plants which turned their blossoms downwards.

b. The stem of many plants is immersed in water, but the flowers always rise above the surface. Of others which are completely covered, the spike emerges at the time of flowering, and sinks again after that is past.

c. The structure of the compound flowers is various. In one order, all the florets have stamina and pistils; in another, the florets of the radius are pistilliferous only, and receive their impregnation from the powder of the stamina, which are lodged in the disk. In the third, the pistilliferous florets of the radius, are destitute of stigmata. And in the fourth, the pistils of the disk have the same imperfection, and the sterility which otherwise would be the consequence of this, is prevented by the perfect pistils of the radius.

7. The *genuine consideration of all Flowers*, is the last, and indeed a most comprehensive argument. To consider it in its full extent, would be impracticable at present. But, that its tendency may appear, it will be proper to mention a few instances. To this head belong the successive connivance of two opposite stamina in the saxifrage, the approach of the filaments of the parnassia, each in its turn, to the stigma; the erect posture of procumbent plants at the time of flowering; the earlier flowering of the lower florets in spikes, and the various experiments in which hybrid plants have been produced. If the male hemp, says Linnæus, be drawn before the pistilliferous flowers of the other sort are disclosed, the produce of seed will be little or none at all. Wahlbom condemns the practice of those Gardeners, who pluck off the sterile flowers of the Cucumber, Melon, &c. lest they should rob the others of nourishment. He thinks that the falling off of the fruit, does not proceed from want of nutriment, but from some failure in the process of generation. And he is of opinion that unless the glasses of hot-houses be opened, that the winds may assist in this business, the fruit will be abortive.

Such are the reasons which led Linnæus to draw this conclusion, "that the influence of the pollen is essentially necessary to give fertility to the seeds." They are so plausible, that it is scarce a matter of surprize, how the doctrine came to be so favourably received.—There have not, however, been wanting

some, who, in former times, combated the several proofs as they successively arose: And, in the present age, others who refuse to admit the conclusion, notwithstanding the premises have been so ably stated, and, as it is supposed, established by satisfactory experiments. If, however, the merits of the two parties be considered, the balance of authority, will not appear to turn in favour of the Sexualists. And if the arguments of their opponents be heard with impartiality, it will no longer be doubted that the force of proof is against them. It has already been observed that Camerarius, with reserve truly philosophical, remained in suspense. It may now be added, that, among former Naturalists, *Bauhin*, *Morison*, *Malpighi*, *Pontedera*, *Tournefort*, *Siegesbeck*, and *Alston*; and among the present, *Neckar*, *Bonnet*, and *Spallanzani*, have rejected the doctrine; the experiments of the last are abundantly sufficient to shew its falsehood.

To these experiments I shall therefore proceed. I might, indeed, first observe, that the analogy of animals, though it is adduced in favour of the Sexual System, is directly against it; since it has been clearly shewn that some animals produce young for many generations without the concurrence of any influence which can reasonably be supposed to resemble that of the male. I might contend that many other of the arguments, such as those deduced from season and situation, however plausible, are inconclusive. But I avoid these objections, from which nothing certain can be deduced; besause it is my opinion that clear and decisive proofs lose much of their force, by being joined with remote and indirect considerations; as a respectable character is injured by being seen in company with persons of ill-fame.

When the use of any part in an organized body is required to be known, the most satisfactory method of solving the problem, is to remove the part. If the individual be not destroyed, and still continue to enjoy the function in question, it may be safely concluded that the part did not exercise the office which was attributed to it. And a different result affords an opposite conclusion, when the experiments are sufficiently numerous and made with proper care. Thus, I believe castration is allowed to shew the use of the testicles in animals, and the removal of the antheræ equally shews that they prepare a matter necessary to generation in some plants. But this is far from being the case in all. *Spallanzani* planted two seeds of the Cucurbita Melopepo fructu Clypeiforme, in a place where he was sure no other grew in the neighbourhood. The barren flowers, as they are called, were all carefully removed at their first appearance, as also were the females except two. The fruit of these grew and ripened in due time. The seeds which they yielded were in great number, and when examined appeared to be perfect, both in their external shape, and internal structure. The next step was to plant them. Of 150, upon which the experiment was made, 133 germinated; the remaining 17, were either empty, or the lobes and plantules vitiated in their organization. But, before fructification can be said to be complete, it is necessary not only that seeds should germinate, but that they should yield other productive seeds, or be capable of perpetuating the

species The next spring, therefore, some of the remaining seeds were planted; and, when they were grown up, all the flowers, except one female, were stripped off every individual. In this experiment, as in the former, the fruit ripened and yielded seed, which grew just as well as that which is obtained from plants left to nature. Thus it appears that the seeds of this gourd, propagate the species, without being impregnated by the pollen. It is impossible to suspect that the powder of the male flowers, growing upon the same plant with the female, had any share in producing this effect, because they were destroyed long before the pollen was ripe. Nor is it reasonable to presume, that it was conveyed from places at a distance, because the spot fixed upon for the experiment, was known to be many miles distant from any individual of this or a neighbouring species.

To obviate, however, even this cavil, the experiment was repeated upon the Cucurbita Citrullus, in the manner already described, and likewise under different circumstances. The precaution which was superadded on this occasion, was to enclose the branches in bottles before the female flowers had opened, to close the mouths of the bottles, by a thick stratum of cement, and to retain them in this situation till the time of deflorescence. This expedient prevented the access of pollen, whether it be supposed to be conveyed to a distance by the wind or by insects. The experiments made upon the seeds of the other species of Cucurbita, were repeated on those of the present, and they were attended with exactly the same result. It is therefore reasonable to conclude, that fructification in this plant, does not, in the smallest degree, depend on the powder of the antheræ.

It was the *Hemp*, which ever since the rise of the investigations, has continually threatened the sexual doctrine. It was this plant which obliged *Camerarius* to doubt. It was this which led *Fougeroux*, and, if I remember right, *Dr. Alston* to reject it; and some accidental observations on it, also led *Spallanzani* to bring the question to the test of experiment. In 1767, he observed a female plant spring by accident in his garden, in the vicinity of which, he knew there was no male growing. Curiosity led him to examine, and to plant the seeds; and he found them perfect in appearance and in reality. Being strongly prejudiced in favour of the sexual distinction, a few slight suspicions arose in his mind at the time; but they were soon forgotten. In the course of the same year, however, they were revived with additional strength. He observed that in the Modenese, it is the custom to eradicate all the male plants from the hop yards about the 2d or 3d of August. In a season favourable to vegetation, the females, after this period, produce new branches, and upon these, flowers which expand and bear seeds. Of such late branches, Spallanzani observed great numbers for the first time in 1767, 36 days after the male plants had been plucked up. Upon sowing the seeds of these branches, he found, to his surprize, that they grew just as well as the others. He saw, at the same time, that the Sexualists had still subterfuges. They might say, that male plants are sometimes found upon the females of the Dioicious Class. It was

in this manner that they endeavoured to explain away the experiments of Camerarius: or they could suppose that the pollen which had been shed in great abundance from the males above a month before, might still float in the atmosphere, and be applied to the late female flowers. He was well aware, that it was more conformable to the spirit of the partizans of a system, as had actually happened in this particular instance, to catch at such improbable possibilities, than either to yield to the force of evidence, or to try their opinions by the test of experiment. It, of course, became necessary to obviate these objections. The first trials were made so nearly in the same manner with some of those already related, that it would be tedious to describe them particularly. It is sufficient to say that the branches were confined in glass bottles, and the access of the external air prevented by cement. And lest any ambiguity should arise from a suspicion of the presence of male flowers, all the branches, except those confined, were stript off, and these were carefully inspected every day. In ascertaining the exclusion of the external air, he carried his precautions to the utmost scrupulosity. Along with the branch of hemp, a glass tube open at both ends, was imbedded in the mastic. One end projected about 5 inches into the bottle, and the other was immersed in water. After care had been taken to have such a portion of the air out of the bottle, the water rose to the height of a foot and three quarters, at which height it pretty constantly stood, being subject to such variations only as are observed in the Mercury of the Barometer. The permanent elevation of the water, was a certain sign that no external air found its way into the bottle, either thro' the mastic, or by any unperceived fissure; for had this been the case, the water in the tube must have descended to the level, or nearly to the level, of the water in the bason.

He contrived to vary his experiments in still another manner. Several plants were reared from the seeds, which the confined branches of the former experiments had produced. He contrived by a little attention, to bring them into flower, six weeks before the hemp, in the ordinary course of culture, arrives at this state. Unless, therefore, recourse be had to several wild suppositions, these experiments alone must be regarded as altogether decisive: for the seeds which were produced in all of them, grew to plants which brought forth other prolific seeds under the same circumstances, for several successive generations, from the time the experiments were first instituted, to that of the publication of the work, in which they are related.

The same trials were repeated on spinach, with the same result. And, that there might be no omission from negligence, and no scruple from want of authenticity, the plants were constantly inspected both by *Scopoli*, a name well known among Botanists, and by the author himself.

Such are the simple and satisfactory results which embolden me again to pronounce the general positions of Linnæus illogical and false. It is illogical, because he deduced from particular premises an universal conclusion. It is false, because it is contrary to decisive experiments. In which plants the pollen is necessary to generation, and in which it is not, can only be shewn

by particular observations on each species; and of what use the pollen may be in the latter, I shall not allow myself to conjecture. In the mean time, it may be remarked, that no plant among the hermaphrodite families, has, as yet, been found, capable of producing fertile seeds, without the influence of the pollen. Numberless experiments, however, remain to be made, before this conclusion can be admitted as probable. One genus occurs to me as well calculated for researches of this nature. I mean the *Lychnis*. In one very common species of this genus, the male and female flowers grow on separate individuals, whence it has received its trivial name. Should it appear that the female is capable of bringing the seeds to perfection, without the concurrence of the male, while the pollen is necessary to the generation of the other species, the supposition just thrown out, would be very much countenanced and confirmed.

Moreover, if in the progress of inquiry, it should be found that females sufficient for themselves, belong exclusively to the monoicious and dioicious classes, something like a probable cause of the dispositions of the stamina in hermaphrodite flowers, might be assigned. I allude to the prevention of abortion. The impregnating powder will, undoubtedly be conveyed with much greater certainty to the stigma, when it is prepared in the same flower than when the stamina either reside in a different individual, or a different blossom of the same individual.

To endeavour to assign the precise degree of merit which belongs to Linnæus, would be a curious and on many accounts an useful speculation. The rage of admiration for his performances, has for many years, been without bounds; and it has scarce yet begun to subside. If any attempt was made to moderate the zeal of Naturalists, the voice of reason was soon drowned in the clamour of applause. I question much, whether literary history exhibits such profusion of praise, since the days when ignorance and enthusiasm added to the names of those, whose powers were equal to the framing of a sophism, the title of infallible, angelic, or seraphic Doctor. The worshippers of Scotus, and Aquinas, were, perhaps, as numerous as sincere; and no doubt thought themselves as enlightened as those of Linnæus. It is possible then, that a strict and impartial scrutiny might strip him of much of his reputation; for the Schoolmen, notwithstanding the contempt in which they are held, are not without their merit.

If such an inquiry coincided with the design and limits of this paper, I would first search for encomiums in the writings of his followers. And, in this part of my task I should meet with no difficulty, but the choice of extravagance. I should hear one telling us, that "his name was Eulogy."[h] Another, that "he had thrown so much light upon nature, as no man before him had conceived, even when his imagination was exalted by the visions of the night."[i] A third affirms, that "he is the High-Priest of Nature, and had been admitted into her most hidden Sanctuaries."[k] And a fourth exclaims[l]

"Quæ regio in terris illius non plena laborum?"

h Pultney. i Hudson. k Hedwig. l Locus excidit.

From numberless affirmations of the like nature which might be collected, who would not suppose that he had acquired and communicated such knowledge as no other individual ever possessed; that he had driven away prejudices which held the world in subjection; and that he had laid open to inspection those hidden springs and movements of nature, which human sagacity had in vain investigated?

The next step, then, in this inquisition, would be to confront his Opinions and Discoveries if any are to be found in his writings, with the boundless eulogies which have been heaped upon his memory. He would, undoubtedly appear great in classification. To determine whether he is the greatest, would be difficult. If the absolute merit of different Nomenclatures be to decide the question, it would perhaps be found that he has been excelled at least in some departments.—I am led to this opinion, by having observed that those who have examined the same objects with the same view, since the publication of his writings, have been dissatisfied with them.—Thus Fabricius has thought it necessary to give a new system of Entomology, and Dr. Bloch, found his definitions insufficient when he came to study the Natural History of Fishes. Other instances will easily be recollected.

But possibly he himself furnished his successors with the means of excelling him, and their contributions to Nomenclature may be less than his. It is easier to improve, than invent. The first steps in a science are always the most difficult; and original conception requires the greatest efforts of the understanding. If then, as seems just, regard be had to the circumstances in which different writers were placed, it might still remain a question, whether greater difficulties were overcome by Linnæus, or by his Predecessors. My ignorance of the ancient arrangements of natural bodies, deters me from offering to others or even forming to myself any opinion on this point; but I should think that no man has a right to decide in his favour, till he has viewed the subject in this light.

But if, when he is considered as a Nomenclator, he should be allowed to be the highest of the lowest order, he must be detruded to the meanest place among Philosophers. Linnæus has delivered many opinions, upon different subjects, with the confidence of a man, who, having considered the contrary arguments with care, decides upon incontrovertible evidence. His expressions seldom imply doubt or hesitation. Every thing is general, every thing is positive.—But, however thoroughly he may have succeeded in pleasing himself, I presume that he will satisfy nobody else. Whoever shall have patience enough to form a catalogue of his axioms, will find it to be little better than a list of errors. Whatever part of his notions shall be exempt from this censure, will be found to be doubtful. The best that can be said of them, is, that no one has yet proved them to be false, though every day seems to bring fresh evidence of the levity of his decisions.[m]

m See Maty's Review, for March, 1785.

If this, then, be a just idea of this *Sage of Science*, whose name no Naturalist[n] is to pronounce without reverence; of this *Darling of Nature*, to whom she confided her secrets; of this *Sun*, who has arisen upon the hemisphere of Natural History; of this *comprehensive mind*, which encompassed the world: Whence has he obtained his reputation? Partly from his real merits, which are confined to classification; but, chiefly from his powerful address to the vanity of men, and particularly of rich men, for whom he has provided that *Royal Road* to knowledge, or the shew of knowledge, which Euclid could not prepare for the Sovereign of Egypt. By purchasing specimens or drawings, and hiring instructors, the names which Linnæus has assigned to natural bodies may be learned with very little expence of labour or thought. It is said, that, between self-love and flattery, many who have made such an acquisition, have been really persuaded that they were acquainted with Nature; whereas they only grasped her shadow, being familiar with a mere barren catalogue. "Quos indices solos," says Hæstner, speaking of nomenclatures, "qui memoriæ mandant, aut ad evolvendos illos manus habent, exercitatas, sibi persuadent, sed frustrà, librum ipsum Naturæ se tenere." It may therefore be charitable to remind persons so deeply immersed in nomenclature, that Natural History does not consist in a list, but in the Physiology of Animals, Plants and Fossils. That the knowledge of names, though it may be a difficulty overcome, can scarce be considered as a positive attainment. And that he only is the Naturalist, who is acquainted with the structure, analysis, properties, and use of Bodies.—Before these gentlemen rest too securely upon their own superiority, I would recommend to their mature consideration, reflections which have been formed by Naturalists, long conversant in observation themselves, and inquisitive after the improvement of others.

"I place" says one,[o] "a higher value upon a good treatise concerning a single insect, than upon a whole Entomological nomenclature." "Study," he proceeds, "the admirable history of the Polypes; read the five memoirs on Insects, and then decide on the comparative merit of productions like these, and of the most boasted nomenclatures, and declare of which you would sooner chuse to be the Author."

"Botany" says the other,[p] "will be improved in proportion as the small band of observers shall be increased, and the herd of Systematics diminished. It is certain that the prevailing tendency to frame and follow Systems *(ingenium systematicum)* is the true cause of the slow improvement of the science. Systems of Botany, not being founded on Nature and Experiment, become obsolete in time."

[n] See the expressions of admiration above quoted. [o] Bonnet. [p] Neckar.

APPENDIX.—No. 2.

ON THE

CHAIN OF BEINGS.

Read 15th December, 1785.

"Rerum causæ aliæ ex aliis aptæ et necessitate nexæ sunt."
Cic. Tusc. Quest. Lib. V. §. 25.

As, in Civil History, the period of authentic information is preceded by the extravagance of Fable, and the uncertainty of Tradition; so, in Natural History, Whimsical Fictions, and Fortuitous Hearsays, not only go before, but too often, prevent the attainment of all such knowledge, as cannot be acquired by intuition. To be ignorant, is humiliating; to be in doubt, is painful. We cast a glance over Nature, and gravely proceed to decide concerning her attributes; as the first view of a stranger often fixes his character in our mind. These decisions are handed down and admitted, and at last receive such sanction from general belief, that he who ventures to point out the disproportion between the conclusion and the proof, seldom fails to be considered, either as illiberal or paradoxical. Hence, I think, the difficulty of establishing free Inquiry, has been, in most cases, as great as the difficulty of Inquiry itself. And perhaps not the general cause only, but peculiar circumstances likewise, have contributed to establish false estimates of characters and objects in that branch of Science, one of the Axioms of which I am at present to examine. For it has happened oftener perhaps to Naturalists, than to any other set of men included within the comprehensive term of Philosophers, either to value too highly, or too much to despise the labours of the Nomenclator and of the minute observer.

In polite Letters, the Grammarian, the Lexicographer, and the Chronicler of daily occurrences, have at least been allowed to be useful, and even necessary; though common consent has always kept them at an infinite distance

below those who have appproached to the perfection of composition. But, how many instances may be seen in Natural History of extravagant honours paid to men whose views were bounded by the horizon of Definition; or whose wishes rose no higher than to the discovery of an unknown Fly! While higher minds, looking down with utter contempt on method and particulars, have been at once hurried away into hypothetical insanity. Whoever has touched but on the outskirts of Natural History may feed his pride on the mock majesty of System, the puerility of particular relations, and, as I hope this night to shew, the presumption of general opinions. Or, what is better, he may exercise his sagacity in tracing such disgraceful errors to their sources.

To be sensible of a striking resemblance between many productions of nature, a man needs only an opportunity of comparing himself with an ape; a dog with a wolf or a fox; a rabbit with a hare; or a horse with an ass. And by comparing three or a greater number, he might, on many occasions, remark a gradation, or a kind of proportion in this resemblance. As far as appears from the records of human errors, *Plato* was among the first who extended this opinion to the whole of created Beings. And the conclusion which reason drew, his imagination, as usual, converted into an allegory. According to him, the Creator forged a Chain of Beings; and, to preserve it from being broken, entangled, or sustaining any other injury to which chains are liable, fastened one of the extreme links to his Throne. *Aristotle*, inferior in poetical merit, notwithstanding his Ode to Virtue, but more conversant in observation, inherited the opinion of his master but expressed it in more becoming language. In admitting this dogma, thus early formed, the jarring Sects of Antiquity were pretty generally agreed. And, in modern times it has been received by men of the most opposite genius: by *Cesner*, who was animated by the true spirit of Natural History; by *Leibnitz*, who aspired to be the rival of *Newton*; by the acute *Bonnet*; the unphilosophical *Linnæus*; and the eloquent *Buffon*. A few only, of sounder minds and modester pretensions, have confined their opinions within the limits of their knowledge.

Of a doctrine which has been inculcated by such a multitude of writers, it is to be expected that it should vary in its appearance, and receive a different modification from the different views and abilities of different men. As far as I am acquainted with the history of this opinion I think all the various shapes it has assumed, come within one or other of these general heads.

1. According to the conception of some, each species is so dependant on the other, that the cause of its existence is to be sought in them; and such is their mutual influence, that the failure of one would be attended with the ruin of the rest.

2. Others maintain only a regular gradation, without insisting upon the necessity of the existence of the one to the existence of the other.

To fill up the measure of their absurdity, the advocates of the former opinion add, "that every thing which can exist, does exist." I should not

think it more necessary to give such an affirmation a single moment's serious consideration, than to argue with a lunatic, if I had not found to my surprize that *M. Bonnet* had taken the trouble to frame a chain of sophistry in defence of it. It is fortunate whenever we can try a proposition by so accurate a test as numbers. And, unless I am much mistaken, a very simple calculation will supply the place of a thousand arguments. Those who will refer to *Linnæus*, will find that the Beetle, called by him *Scarabæus Melolonthas*, is distinguished from others of the same genus, by the singular character of an inflected Tail. Now, retain this specific character together with the generic character of fissile antennæ, and make use of the other marks by which Insects are distinguished from one another, and let us see what these elements will afford. The feelers of the Species in question, are divisible into 7 lamellæ. We can imagine other Species with any number of lamellæ. Let us go no higher than 10. We shall thus have 9 species, to be characterized by the inflected tail (which will be the common mark of the Section) and the Lamellæ of the attennæ. Suppose further, that the varying number of joints in the Tail, will give 4 other characteristics: we shall have $4\times9=36$. Again, the distinctions of Insects, are taken from the Femora and Tibiæ. And, without any effort of the imagination, we may suppose 8 differences to exist; as the clavated Femur, the compressed Tibiæ, both these limbs dentated, the anterior longer than the posterior, or *vice versâ*. The result will be $8\times36=288$. By assuming in this manner differences which really subsist, from the footstalk and joints of the Antennæ, the Body, the Scutellum, the Wings, the Colour, and other affections of the Elytra; we may easily get a product of hundreds of millions. All these species are possible, and all will come nearer to the Melolonthas than any other Beetle. And yet of all these possible existences, only one has been discovered. But the Judges of Impossibility will perhaps say, that, in the unexplored parts of the Globe, many Insects exist, which no Linnæus has defined and no Reaumur observed. This is true. But can we grant that these amount, in one Section of one Genus to 1,000,000,000? But perhaps, and this is no groundless conjecture, these Knights Errant of Science, in the adventurous Spirit of Ariosto's Hero, will climb to the Moon, in quest of what they cannot find on Earth! It may be said again, because it has been already said, that the Planets will supply what the globe denies. Nor do I doubt, that if the Planets should refuse to countenance extravagance, the next appeal would be made to the Universe. "In eâ cogitatione nobis placemus," says the only Author,[q] as far as I know, who has treated the Connexion of Beings like a man of common sense, "opportere in aliis orbibus, quorum immensus est, numerus, reperiri et per alia planetarum Systemata esse dispersa ***** nam in hâc quidem hæc reperiri terrâ experientia oppidó negat."

But what are those sounds, solemn as the strains of Prophecy, which tell

[q] Professor Hermann.

how much more worthy of its perfect Author such a continuity and harmonious progression is, than any other assignable system of things.—"I exalt myself to the Eternal Reason. I study its Laws, and adore it. I contemplate the Universe with a philosophical eye. I search for those Relations, which form of this immense Chain one perfect whole."—Here, Sublime Contemplator of Nature, who shall conceive how thy ardent fancy could take this strong and rapid flight, before the invention of Air Balloons? None but the few, whose Souls have been transported in that ætherial machine of thine, brighter than varnish, and softer than silk, which thou hast destined to convey

"Beyond the visible diurnal sphere."

a substance rarer than inflammable air. For me, to whose inspection the plans of creative wisdom have never been submitted, I am conten' to listen at a distance, among the prophane, to those things which have been revealed to thee upon thy new Mount Sinai. I presume not to contend or to doubt. But, should there lurk among the multitude some caviller, confident of his reason, some sceptic ready to question whether thy inspiration cometh from on high, he may murmur against these thy conceptions of beauty. He may deny that a Vista is more agreeable than well disposed Groups; and that either alone, produces such an effect as a mixture of both. He may ask of thee, why thou hast forbidden the Almighty Designer to combine these different forms, and to enliven his Landscapes with Variety?

It is mentioned by *Heyne* the elegant Commentator on Virgil, as an apology for such of his explanations as may appear superfluous, that he would by no means have inserted them, if he had not observed that the sense of the passages to which they refer, however obvious, had been mistaken by Critics of Eminence. I would gladly have suppressed most of the foregoing observations, if the opinions in question had been maintained by the obscure and the ignorant alone. And having attended these lofty speculators

"Beyond the flaming bounds of Space and Time,"

I descend, with satisfaction to particulars. Yet there is reason to fear, lest if any obscurity has arisen, from allusion to Doctrines not universally known, or disgust from an imitation of that pompous stile in which they are delivered, the harshness of new and uncouth names should be added to these faults. I cannot, therefore, but wish, that those to whom the Objects themselves are unknown, would confine their attention to the qualities which I shall mention.

If any one should undertake to give a sketch of the Series of Beings, he would naturally first sit down to consider according to what principle this arrangement was originally made. It is certain that one Order would arise, if external form was regarded; another, if certain internal qualities are to be the guide: and a third would be the result of other internal qualities. In the Animal Kingdom, this question is very difficult to be decided; In the Mineral, I think,

absolutely unanswerable. It is well known, that ever since Fossils have been considered as an object of scientifical investigation, figure has been at war with constituent parts, and that the victory is still undecided One mineralogist, with as deep a reverence for outside shew as a modern Beau, places cube by the side of cube, and brings the Diamond into company with Alum. But soon comes the rude hand of the Chemist to disturb this shewy arrangement, and to confound opacity with transparency; dulness with splendor; and deformity, distortion and shapelessness, with harmony and regularity of form.

As I shall make no more mention of minerals, I shall observe by the way, that those who maintain the opinion which I am considering, must assert that either Quicksilver ought to stand nearer to the human race than Lead, or Lead than Quicksilver. For what they advance, a reason must be expected from them. If the question were concerning Individuals, or whole nations, it might, perhaps, admit of a ready answer. It may be said that if the gradation were ascertained, the reason would immediately appear. But this is either a *petitio principii*, or supporting one hypothesis by another; modes of philosophising more convenient than satisfactory.

To shew the difficulty of adjusting the claims of different Beings to certain stations, it will be proper to consider a few instances. I shall suppose that Man has taken his place, and that a competition arises among the other animals for the honour of standing next the Lord of Creation. The Ape will urge his form, the half-reasoning Elephant, his superior intelligence; the Beaver, his mechanic arts, his dependance on the co-operating powers of many associated Individuals for his well being. And may not the pertness of the Parrot produce in her favour the power of uttering articulate sounds? Nay, may not the abject Bradypus, which may be said rather to grow than to live, and in sagacity is lower than the Insects, put in a still more powerful claim? If native helplessness, if paucity and weakness of instincts be among the characteristics of man, then will an impartial Judge hesitate before he dismisses this plea as inadequate. And if he, moreover, takes into consideration the circumstances of pectoral mammæ, and no very distant similitude of habit in other respects, he must either invite this seeming outcast of nature to a seat by his side, or pronounce the contest doubtful.

Nor does this difficulty occur with respect to the human race alone. On whatever animal, or family of animals, we cast our eye, we shall perceive numberless alliances of equal proximity. Most writers make a transition from the Simiæ to the Lemures. But is there not as good reason to pass to three other Genera? to the Didelphis, on account of prehensile tail; to the Glires, by the connecting medium of the Simia Argentata, of which the body and tail most perfectly resemble those of one of the large Mures, and the pollex, the singular *tuberculum pollicare* of the same species; and to the Squirrels by the Simia Jacchus, which by its bushy tail, and aptitude to climb, comes almost under the same genus.—Nay, what is more, *Sparrman* has lately described a Squirrel of Java, which has its *pollex* provided with a round nail, precisely as the Ape.

It may be added that the Simia Rosalia, resembles the Lion in its mane. The Seniculus and Beelzebul bray like the Ass.

It would be no less difficult to find the next link to the Bradypus; for it is allied to the Pecora, by the property of rumination; to the Birds, in having a common cloaca; to the amphibious animals, by tenacity of life, and faintness of vital actions; to the Myrmecophagus, in having strong and reflected nails, and in wanting dentes incisores. From the Myrmecophagus the Manis differs only in having scales, instead of which the Dasypus is provided with a shell, by means of which this genus is allied to the Testudines. I mention these last marks of resemblance, merely to shew what kind of a chain might be constructed, if equal or stronger marks of resemblance were kept out of view. The following would be a few of the links:

Homo Sapiens,
Bradypus,
Myrmecophagus,
Manis,
Dasypus,
Testudo:

whence it appears that we might get from an Alderman to a Turtle at five steps.

I might quote innumerable instances of equal affinity, such as those that have been already mentioned; but these are sufficient. And it is proper for a moment to consider, how far those have succeeded, who have been most busily employed in forging Chains for Nature.

Buffon tells us (Nat. Hist. of the Ass) that there is a transition from the Cetacea to the Birds; from those to the Reptiles. But how such a transition is made, he has left to the sagacious reader to discover.—*Bonnet* passes from the Serpents to Snails, and from the Gall Insects to the Tænia, the connection between which I suppose he traced in that hour of mental illumination, when he saw the relation which the Ring of Saturn has with the band of silk by which the Caterpillar suspends itself. (Contemp. Part xii. Chap. xii.) From these instances, I shall leave the Society to judge, whether these authors who assert so confidently "Naturam saltum non facere;" were acquainted with any regular gradation.

Professor *Hermann* of Strasburgh, whom I have already quoted, has with far greater judgment, taken two dimensions, to represent the Affinities of Animals. And although his scheme is, in my opinion, the only one which has any foundation, or can be of any use, (while the Dissertation that accompanies it, is the best which has appeared for many years on Zoology in general) yet his failure in some essential points, sufficiently shews that two dimensions are inadequate to the purpose. His plan consists simply, in drawing lines differently constructed, in order to represent different kinds and degrees of resemblance, from the name of one animal to that of others. I have hinted that his performance will not satisfy even an indifferent Naturalist; and I believe those who shall be informed that he has placed the Feræ next to Man, and parallel to

the Apes, *i. e.* the Dog, the Wolf, and the Fox, as close to us, as the Oran Outang, will readily subscribe to this censure. And what is his reason for such a disposition? Why, truly, because we have accounts of men who have not scrupled to devour one another.

It is, moreover, to be remembered, that in order to represent properly the Relations of Beings, there ought to be a contrivance which should exhibit striking differences between such as have in many respects the closest affinity. For there are well known instances of animals so intimately allied as to be comprehended not only under the same genus, but even under the same species; which very animals have yet qualities so opposite, that one would almost be tempted to think that nature had suddenly taken a start, and carried away one of the Animals far beyond the limits of the Class and Order. Thus, the Ursus Arctos, comprehends two varieties, perfectly resembling each other in the whole conformation of the body and teeth, which are so essential an object in the eye of the nomenclator. And yet, says Hermann, the one is said never to touch flesh, but to confine itself to a vegetable diet. (See also Schreber's Mammalia, p. 505, 506.) On the other hand, continues the same author, in the Herbivorous family of the Glires, in which the teeth are formed for such a mode of living, nature has placed the Beaver, which is well known to devour Fishes, together with the Cricetus and other Mice, which do not even abstain from one another.

It seems to me wonderful, that naturalists should have been dreaming for ages about a Chain; that they should have imagined "that there exists nothing which is not the immediate effect of something preceding and the cause of something following," when it appears to me the whole truth may be told, and shewn in two sentences. Perhaps, indeed, the way in which authors have deceived themselves, may be found in a careful perusal of their observations. It is, for instance, evident from the Seventh Chapter of the Contemplation de la Nature, that M. Bonnet was led into this mistake, by confounding the Speculation concerning the Chain of Beings, with that concerning successive Causes. We can readily perceive and imagine, how one Being may be the cause of certain effects that take place in another; but we do not see how the existence of one determines the existence of another. We can believe, that unless the Sun and Moon had not both been created, and occupied the places they do at present, the waters of the Ocean would not have swelled so as to form the Tides that are now observed, and that the Earth would have moved in a different Orbit; but we have no reason to suppose it impossible that the Ocean could have existed with Tides different in height and direction, and that the Globe could have pursued another track. And yet, if I mistake not, such is the partly expressed, and partly implied reasoning of the Philosopher of Geneva.

But what, I shall perhaps be asked, what is that short and simple conception of the resemblance between different Beings? It is simply this: the Creator was pleased to form his Creatures out of a number of common elements.

By elements I understand bones, muscles, vessels, nerves, and the combinations of these, as limbs, organs of sense, viscera, &c, when speaking of animals;—and leaves, branches, roots, stalks &c. with respect to vegetables. Now it was impossible so to combine these, that the different compounds should not resemble each other, and that in different degrees. This consideration will appear more convincing to those who shall conceive that many different Beings, as Quadrupeds, Trees, &c. have been constructed according to some common ideal model.

In considering this subject, which is indeed of unlimited extent, when we descend to particulars, it is evident that I have omitted many arguments which have been employed by others: such are the arguments of those who contend that there can be no gradation from rational to irrational, from sentient to insensible. But I chose rather to produce indisputable facts, than involve myself in the discussion of such general and intricate topics as the difference between reason and instinct, and the limit at which sensibility ends and insensibility begins. But I will not totally omit one observation, which amounts at least to a strong probability against the necessary connection of Existences. We are acquainted with the remains of many animals of different classes, such as are not known to exist at present. Of the nineteen species of Cornua Ammonis, which have been found in a fossil state in England, if one only should have been destroyed, the whole of the chain below this link, that is many animals, all vegetables and all minerals, must have been annihilated, or have fallen into inextricable confusion.

I shall conclude with the expressions of a foreign author, which though I do not fully comprehend them, I yet conceive to correspond very nearly with that perplexity of relations and entanglement of affinities which actually subsist in Nature.

"Continuæ series, perpetui gradus, instauratæ appropinquationes, distantiæ in speciem tales, mixtæ umbræ, perfecta adequatio, modificationes innumeræ, cumulatæ μιταχῆσαι, non turbatus ordo, nexus inseparabiles, multiplicati transitus."

APPENDIX.—No. 3.

CONSIDERATIONS ON INFIRMARIES,

And on the Advantages of such an Establishment for the County of Cornwall.

THE establishment of Infirmaries is a mode of Charity so agreeable to the uncorrected suggestions of humanity, and at the same time sanctioned by so many modern precedents, that to question the extent of their utility may, at first sight, be considered as a kind of treason against that portion of mankind, over whom their helplessness has thrown a shade of sanctity.

And as nothing has given to Great Britain a more honorable distinction among the States of Europe than the number and accommodations of its Infirmaries, it is equally natural and generous in the inhabitants of Cornwall to desire to extend the same advantages to their own poor, and to participate in the national reputation for philanthropy. All the demands however of so laudable a species of vanity will be gratified, if, by attending to the imperfections of similar Institutions, a more certain and diffusive benefit, than any which has been yet obtained from the largest and best supported Hospital, except in very populous cities, should be procured to this county.

The objections most likely to have weight with those who have never been called upon to consider the subject, may be nearly stated under the following heads.

1*st*. When a considerable sum has been expended upon a large structure, experience discovers every day more and more that the necessary annual contributions are in perpetual danger of being withheld. Notwithstanding their recent origin, this incipient failure is appearing in many of our County-Hospitals. The reason is obvious. The first subscribers will consider them-

selves as in some measure bound to support an Institution which they had created with such pure intentions. But the force of this sentiment will soon be lost. Their successors having a less lively interest in the charity, easily suffer a relaxation of zeal. Accordingly, at this day many hospitals are expressing great distress in their reports, and loudly calling for more effectual aid; but although earnest representations may for once procure an extraordinary supply, they will infallibly lose their effect by repetition. Nor let this neglect be imputed to any increasing inhumanity of the age. It has been sensibly felt, though never perhaps distinctly proved, that Infirmaries have failed to procure those benefits which their Founders promised to themselves. They are, in truth, incapable of affording benefits so essential.

2d. In wounds, dislocations, fractures, and whatever cases are ranked by professional men, under the title of surgical cases, their necessary distance from so great a part of every large county, occasions two serious evils; on the one hand the Patient cannot be removed to the place of relief without expence and delay; nor on the other, without a formidable aggravation of the fever that accompanies such accidents: a circumstance strongly militating against the utility of Hospitals in sudden emergencies, the very end which many propose to themselves from such an Establishment in the county of Cornwall. A plain fact will fully elucidate the insufficiency of Hospitals in this respect. The mining country in Shropshire is situated at no greater distance than from 11 or 12 to 14 miles from Shrewsbury, yet the Proprietors of the Collieries and Iron Works have found it necessary to fix Surgeons on the spot for the sake of recent cases: and if speedy assistance be, as it indisputably is, of so great moment, it follows from this single consideration, that Cornwall is rendered by its geography peculiarly unfit for an Infirmary.

3d. A more serious inconvenience than will easily be apprehended by those who have no personal experience of Hospitals, arises from the numbers of sick brought together under one roof. Since Mr. Howard's exertions indeed the Superintendants and Servants have been shamed into more attention and cleanliness; but when men are prompted only by a cold sense of propriety, there is perpetual danger lest they should relapse into their former state of indifference, the moment the cry of humanity subsides. And with all your vigilance, you will never be able to guard against that contamination of the atmosphere which takes place wherever many Patients are collected together, which has always some tendency to retard recovery, and which, in certain situations, occasions accidents or diseases to prove mortal, that elsewhere are not extremely formidable. Neither will you be able to exclude contagion, in consequence of which Patients, whom bruises or fractures have brought into your Hospital, may be cut off by a new disorder, the product of the place.

4th. If Hospitals be compared with a very simple plan for the relief of the sick, of which the general idea is to provide well chosen Houses of Reception for the sick in different parts of a County, their disadvantages will become still

more apparent. The first great expence will be saved; the Patient will obtain relief with less delay, and less risque from the concomitant fever; and what is equal to any other advantage, he will be more tenderly nursed; for it is never to be forgotten, that Hospital nurses, of necessity, very soon become callous to the sufferings of the Sick. It is by no means uncommon to see them jesting and diverting themselves amid the groans and agonies of the dying. Negligence, in this case, is too nearly allied to indifference; and no regulations can sufficiently insure their attention. In a private House there would be several strong motives to this essential duty. The Housewife would not have her feelings blunted by so much familiarity with distress; and she would feel her honour concerned in the recovery of the sick. It might cheaply be provided, that such Houses should be equal to an Hospital in accommodations, as Beds and Linen, &c. and surely there can be no comparisor between the sweetness and quiet of a separate room and the infected air and at least occasional tumult of an Hospital.

5th. For those cases that belong to Physicians, in contradistinction to Surgeons, the difficulty is still less: Even in London, where Hospitals afford real advantages in cases of violence, the establishment of Dispensaries is rapidly gaining ground. The Patients, when they are unable to move, are attended at their own Houses; where they only suffer their own disorders, and where they enjoy the last remaining comfort of our nature—that of being attended by those to whom they have been long familiarized; and I know not whether it is fanciful to imagine that horror at entering these gloomy receptacles of wretchedness is sometimes seriously prejudicial.

Among the reasons advanced in the printed proposals of September 1790, the 4th, can only provoke a smile. It would be an hopeless task to undertake to prove how the Poor-Rates can be diminished by the erection of an Hospital: Not to mention that all its expence of building must be considered as a partial and gratuitous Poor-Rate, and that the annual subscription of the Father has often devolved upon the Son as a tax which the eye of the world forbids him to withdraw, however he may desire it. In other Counties no sensible diminution by means of Hospitals can be observed, and certainly in many parts of England, the Parishes still pay an annual salary for attendance on the indigent sick and for medicines. The number of Vagrants has indeed of late years been sensibly diminished, but probably not less in Cornwall than elsewhere. A less evil has only been swallowed up in a greater: The alarming increase of the Poor-Rates having suspended almost all voluntary benefactions to the Poor.

To those of the Faculty, whose importance is to be raised by the superintendance of the general Hospital, it will not be easy to apologize for the freedom of these remarks. But to others, the Houses of Reception may be recommended as tending to equalize and diffuse medical skill, which it can never be the interest of so large a County to confine to one spot. Dispensaries might easily be established in every Town, and by means of Dispensaries, medicines might be distributed with equal advantage as to œconomy, and with much

greater convenience to Patients. For ordinary cases, the resident part of the Faculty would be sufficient; and if Physicians are needed, it would be much cheaper, by paying for their attendance at stated times and places, to bring Physicians to Patients than to build an Hospital on purpose to bring Patients to Physicians: And what adds force to this observation, is that the most important of acute diseases and those which require frequent visitation, are necessarily excluded from Hospitals by their contagious nature.

As to the prevalence of Empirics and the diffusion of Quack Medicines, (another of the reasons assigned for the Establishment of an Infirmary) it may be doubted whether either this or the other proposal promises any great advantage; probably neither will have much efficacy: Those at least, whom Physicians cannot cure, will be allured by the promises of advertisements.

It appears therefore, if these remarks be just, that no peculiar advantage and several disadvantages belong to Hospitals. Perhaps the execution of so simple a plan as Houses of Reception is rendered unnecessary by provisions already in existence. Dispensaries bid fair to answer the purposes of humanity without bringing with them those abuses which the unalterable nature of things has attached to so many establishments: If those, who have influence with the poor, would employ it in having the windows of their habitations enlarged and better disposed for the renewal of air, one great source of epidemic diseases and of the aggravation of the danger of accidental hurts, would be removed. This defect seems to prevail no where more than in Cornwall.

Tredrea,
September 1st, 1791.

THOMAS BEDDOES.

APPENDIX.—No. 4.

THEORY and PRACTICE

OF

CURLED POTATOES.

As I was one day sauntering through the streets of Welchpool with a mind open for the reception of any new object, I saw exposed to sale, in the window of an ill-furnished grocer's shop, a small threepenny book on the subject of curled potatoes. I found it upon examination to contain facts so consonant to the best established principles in the œconomy of living systems, that I think they will probably furnish a method of preventing this very serious evil.

The cause then of the curl lies in the bulbs employed for seed. They have been forced by earthing or by too rich a soil, often so as to produce two sets of blossoms in a year. In other words, their excitability has been exhausted. An effect is produced upon the bulb analogous to the conversion of stamina into petals: and as in those vegetable monsters no seed, properly so called, is produced, so in the forced potatoes there resides none or an insufficient power of germination.

This I apprehend, for you, will be a more than sufficiently distinct statement of the hypothesis. The facts that appear to me most simple and to tend most strongly to establish it, are—1. At Michaelmas you often find potatoes planted for seed in Spring as fresh as at first, but which have never germinated. These therefore have been quite exhausted, for their failure does not depend on decay. —2. If you choose a potatoe with one end very large and one small, the eyes cut from the large end will produce curled, and from the small, healthy plants. —3. It is said that in bleak situations and an impoverished soil the curl has never appeared.—4. Where the land has been peeled and burned, the crop of potatoes is seldom or never liable to this disease.

It follows therefore if all this be true, that the raising of potatoes for seed should be a distinct object. Force those you intend for food as much as you please. The bulbs will grow, and I conceive, but it is a conjecture only, that a new production of bulbs attends the second crop of blossoms. Those designed for seed should never be earthed, and only a little mould drawn towards them before the first blossoms, that is, in June. And they should also, one would conclude upon this principle, be taken out of the ground not long after the blossoms fall, or as I should suppose, for I am obliged to conjecture again, by the time the proper seeds would be ripe: then probably the bulbs will have attained a just maturity.

I thought it would have taken more words to convey my ideas on this subject; so indeed it would to many persons, especially if unacquainted with the general principle.

Your sister started one or two strong objections, when I hinted this theory to her. You I dare say will fall upon them; and if you should not, there is no necessity for loading the post with them. Besides we have Quintilian's authority, added to observation, for believing that *Vox illa viva alit plenius.*

APPENDIX.—No. 5.

CONJECTURES

ON

EXPLOSIVE COMPOSITIONS.

"IT will no doubt strike the reader with wonder, to find a prohibition of "fire-arms in records of such unfathomable antiquity; and he will probably "from hence renew the suspicion which has been deemed absurd, that Alexander "the Great did absolutely meet with some weapons of that kind in India, as a "passage in Quintus Curtius seems to ascertain. Gunpowder has been known "in China as well as in Hindostan, far beyond all periods of investigation.— "The word fire-arms is literally in Sanscrit *Agnee-aster*, a weapon of fire: they "describe the first species of it to have been a kind of dart or arrow tipt with "fire, and discharged upon the enemy from a bamboo. Among several extra- "ordinary properties of this weapon, one was, that after it had taken its flight, "it divided into several darts or streams of flame, each of which took effect, and "which, when once kindled, could not be extinguished[r]. But this kind of "Agnee-aster is now lost.—Cannon in the Sanscrit idiom is called *Shet Agnee*, "or the weapon that kills an hundred men at once..... The Pooran "Shasters," (the historical part of their scriptures) "ascribe the invention of "these destructive weapons to Beeshookerma, who is related to have forged all "the weapons for the war which was maintained in the Suttee Jogue between "Dewta and Ossoor, or the good and bad spirits, for the space of one hundred "years." Such is the translator's commentary upon a passage of the Gentoo code which prohibits war from being waged "with any deceitful machine, or "with poisoned weapons, or with cannon and guns, or any other kind of "fire-arms."

r "It seems exactly to agree with the Feu Grégeois of the Crusades.

The circumstance in the history of the middle ages, which, as the translator justly observes, bears some resemblance to this passage, must, I should suppose, solicit the curiosity of every reader; though no writer will afford him any considerable gratification. Yet, by the application of modern science, the principal circumstances, relating to this curious invention, may perhaps be elucidated with some degree of precision, and all regret on account of our ignorance of the rest be dissipated. The authorities, which have been collected by the industry of Ducange, if criticised with minuteness, would furnish a treatise of some bulk: The following observations are all that seem to me to be essential, and, all of course that can be properly introduced into a popular essay.

The liquid, inextinguishable, maritime, Greek fire is said to have delayed the fate of the Greek empire: and from the latter end of the seventh to the middle of the fourteenth century, great effects are ascribed to it by the writers, who have recorded the transactions of those dark and calamitous ages.

We cannot however reasonably expect genuine information from any quarter. The Byzantine receipts are justly suspected of deliberate falsehood. The Greeks had an evident interest in preserving the secret, and this interest it was natural that they should endeavour to strengthen by superstitious motives. In the relation of the most obvious phenomena, by terrified spectators, circumstances are introduced which cannot possibly be admitted as matters of fact. These and other such considerations afford a strong inducement to prefer the probabilities arising from our present knowledge of chemistry to the testimony of fear and interest, of which the former inevitably would be confused and exaggerated, while the latter was calculated to mislead.

From the concurrence of the witnesses, which so far there is nothing to invalidate, we may conclude, that the Greek fire could burn without the access of atmospheric air and was occasionally explosive, and that it had a power of motion within itself. It is said to have traversed the air with the report of thunder, and is sometimes compared to a whirlwind on account of its violence. Oil, bitumens, wax, pitch, entered into its composition. But no combination of mere inflammable materials can possibly produce effects, nearly resembling the pieces in some of our artificial fire-works, and which amount, as I imagine, to a hissing noise, with occasional explosions and reports. But though sand, vinegar and other saline liquids would extinguish it, it is related to have burned under water. Here utter ignorance renders me sceptical, or else I must impute to the ancients the want of power to observe the most evident phenomena; and indeed persons unacquainted as they were with even so much natural philosophy, as in our time, has imperceptibly made its way even to those who never professedly paid any attention to it, will always be found incompetent reporters of such phenomena. I shall therefore embrace that alternative which is most flattering to my vanity, and believe in opposition to testimony, that, all circumstances being alike, the Greek fire would no more burn under water, than under vinegar or sand. The error in the observation may, I think,

be accounted for. From the oiliness of its composition one may infer, that it was at once lighter than water and immixable with that liquid. It was very much used in sea engagements. It is therefore obvious to suppose that it might have floated and continued to burn for a time on the surface of so dense a medium. As to any particular contrivance for enabling it to burn under water, such as we see in water-rockets, I conceive this to be entirely out of the question

One may therefore venture confidently to assert that, besides oils and resins, mentioned by Anna Comnena and other writers, the Greek fire must have contained nitre, or some equivalent ingredient. I am much inclined to suppose that the whole secret consisted in the admixture of this material. We know from the Roman history that the Alchemists had been extremely busy long before this period. They perhaps had become acquainted with this remarkable substance, and with some of its effects in mixture. I find no indication of the time or the manner, in which nitre became an article of commerce or of experiment: whether it was first imported from the East, or discovered within the precincts of the Roman world.

Callinicus, according to one historian a native of Heliopolis in Syria, and according to another, of Heliopolis in Egypt, is said to have taught the Greeks how to compound and manage this species of fire arms. It is however utterly incredible that one man should both have discovered the composition and conceived the application. So many combinations exceed the powers of any single mind, however stimulated. Where our information is both so scanty and inconsistent, it is surely allowable to hazard a conjecture. It may be supposed that the rapid progress of the Arabian arms, sharpened the ingenuity of the Greeks; and that in the urgency of need, a lucky thought drew forth this compound from the caverns of Alchemy, where it had perhaps long been known as exhibiting a spectacle to idle admiration. It is possible that, during this eventful period, when the most distant things and persons were thrown into collision, the natives of Constantinople might acquire abundant supplies of nitre, or become acquainted with the Indian mixtures of nitre and combustibles. When Amrou had added Egypt to the provinces of the Caliph Omar, the commerce between Europe and India was obliged to seek a different channel. The silks of China were transported by a tedious journey of 100 days to the Oxus, and after traversing the Caspian sea, ascended the river Cyrus. From the Cyrus the cargo was conveyed to the Phasis, and then along the Euxine, by Constantinople. The wares of India were also conveyed over land to the Oxus or the Caspian. One may suspect that the merchants, having their attention awakened to these objects, would eagerly convey to their trembling countrymen, any new means of defence. In the interval that took place between the conquest of Egypt and the two sieges of Constantinople, it is probable that several inhabitants of the latter city must have traversed the interior parts of Asia for the sake of exploring or arranging the new route. But it would be imprudent to lay any stress upon a conjecture that has no other foun-

dation than possibility arising from the commercial relations between such remote countries.

The existence of rockets and fire-works in India long before Alexander, seems perfectly well established; and it is strange that neither he nor Megasthenes, who penetrated so much further eastward, should have introduced so striking an invention into Europe. Had the younger Porus known that the Western world was unacquainted with phenomena which are amusing, when no longer new, and so much astonish those who behold them for the first time, he would have thought a bundle of sky-rockets the most acceptable present he could have offered to Augustus. It is remarkable that the vanity of the ambassadors did not impart to the Romans some idea of this wonder of India.

Upon the whole, I consider it as probable, that the Greek fire was an invention originally due to the Grecian Alchemists: and as certain, since it burned independently of the atmosphere, that it contained oxygene, or that substance which in the state of an elastic fluid, has been called *dephlogisticated air*. By what other ingredient is it possible to suppose oxygene could be supplied, except by nitre? For what equivalent substance was so likely to be known? Or, shall we give them credit for having possessed some salt or calx, with which we are unacquainted?

Thus the invention of gunpowder is reduced to the common law of human discoveries, which are always progressive, and generally slowly progressive. It is not extraordinary that between the end of the seventh and the middle of the fourteenth century, nitre, if frequently compounded with other inflammable substances, should at last be mixed in such proportions with sulphur and charcoal as to be capable of exploding suddenly; nor that an accident in the fiery workshops of the Alchemists, should produce the explosion. Then the Greek fire retreated before a superior engine of destruction, and the receipt for its composition, being disused, was at length lost. The invention of gunpowder, whatever is its precise date, was not long posterior to the last crusade; when the Greek fire was in the hands of the Saracens, and its effects proved so terrible to the senses, or the imagination, of those Western Barbarians, who invaded the Holy Land, as that barren and rocky district of Syria is called. After this period, it obtains but little, if any, notice from history.

APPENDIX.—No. 6.

EXTRACTS

FROM DOCTOR BEDDOES'S CORRESPONDENCE WITH DOCTOR DARWIN.

In some of the earlier letters that passed between Doctor Beddoes and Doctor Darwin, an interesting inquiry is started relative to the origin of Pit-Coal. A few passages from these letters shall be laid before the reader, previously to the extracts relative to Zoonomia, to which the text refers. The letter first quoted, seems to have been the commencement of their correspondence.

"Sir,

"I lament that I did not propose to you, when I had the pleasure of seeing you at Shifnal, an exchange of the Shropshire for the Derbyshire fossils. I do not want the toadstone, spars, and those common productions which may be found in every shop; and you, I dare say, are in possession of many of our specimens. I wish for such as will afford some inference as to their formation; any remarkable forms of flint or petrosilex, of alabaster, a piece of the stone formed by the Matlock water, or any thing lately found and not yet circulated among mineralogists. It may not perhaps suit your leisure or inclination to undertake such a commission, but you will probably be easily able to devolve it upon some of your young and more enthusiastic acquaintances. I hope that if any one should be induced to agree to the proposal he will be satisfied with what he will receive in return, though perhaps it will be two or three months before I shall have collected all the specimens I think worth sending, among those that I know where to find.

"Your very obedient servant,

"Thomas Beddoes."

" Dear Sir,

" I have put some fossils into a box with the assistance of Mr. F. French, but intend to get some more for you in a little time. I write to know whether you would have them sent now to Shifnal or Oxford, or whether you may not probably visit Derbyshire next summer, when I could supply you more amply, and more to your intention, and where I should be happy to see you, and glad, if this motive may attract you into our hemisphere. I shall be likely perhaps, to send you fossils which you do not care for, and not send you such as you want; I should therefore advise you to come over next summer, and I will load you home again; otherwise I will send you about one hundred weight when you please.

" I think Cavallo in his book on magnetism, says that inflammable air from iron filings and vitriolic acid affected the magnetic needle. Can this be true? Has any other person tried the experiment?

" Have you any idea, how coals happen to lie stratified, as it were, with clay or sand-stone? Could these alternate strata be made by depositions in the bottom of the sea? or has the phlogistic part of the coal been sublimed from the clay, and condensed in a higher stratum? or lastly, does not the goodness of the different strata of coal arise from their bitumen having been more or less evaporated by fire?

" You see, I should endeavour to get much information from you, if I could attract you to Derby next year.

" Adieu, from dear Sir,

" Your obedient servant,

" E. Darwin."

" Dear Sir,

" I just receive your letters when I am going through a course of lectures with, I believe, the largest class that ever was assembled in Oxford, at least since the discovery of Justinian's code drew together thirty thousand students. And I think some of your specimens would suit the purpose I have in view in giving them, for I touch upon many points of physical geography. To any one who is at all interested in subjects of that nature, an invitation such as you send must be extremely welcome. I hope nothing will prevent me from reaping the benefit of it.

" To your difficulties about coal I should be able to return a ready answer, if reflecting upon the very same points could have furnished me with it. The facts which have catched my attention as applicable to your first question are, that subterraneous strata (I use this term in contradistinction to supe.ficial peat) of peat have been found intermixed with clay. Now I conceive that that peat must have been removed by water and deposited, as other strata; at the same time that a quantity of clay was brought from some different quarter. If so, was peat converted into coal by the action of fire in its present situation? the state and particularly the softness and looseness of the

strata that alternate with coal, seems a formidable objection to this supposition. Was peat or were vegetables in general converted into coal and then washed away and deposited? I have specimens of brecciated coal; I have pebbles of coal in very ancient strata, as in hard sandstone; so that coal must have existed before the accumulation and consolidation of those strata; and if it was rolled into pebbles, it might by the same means have been reduced to smaller particles and so deposited from water.

" Give me leave to say that your third question is not quite precise. The term goodness may mean power of giving heat or freedom from sulphur, and perhaps it may express some other relation. You, I dare say, mean its comparative power of heating; and I think it certain that as more bitumen has been driven from it, it will give, *cæteris paribus*, more heat; because the act of throwing off bitumen, as in common grates, must absorb heat: and the same quantity of coal we well know will give about one-third more heat in the form of coak.

" By combining another fact with Cavallo's observation, we may get at some comprehension of it. Water in boiling, chalk and vitriolic acid, and I suppose iron too, produce strong signs of electricity, and that may affect the needle, if it be really affected, as Cavallo says.

" There are at least two ways in which a man may expose himself, by asking questions or by giving responses; the latter seems to me at present much the more dangerous; and therefore you, in your prudence, have chosen the better part and left me the risk. As a compensation, I beg to change sides and to ask, whether you or any of your friends see any light streaming from the facts to which I have alluded upon the difficulties proposed; and if so, whether they can add a few more, in order to dissipate the darkness entirely? I beg the favor of you to send the fossils hither and as soon as may be; and am,

" Your's very respectfully,

" Thomas Beddoes."

" Dear Sir,

" About ten days ago I sent you a box of fossils. At the top I put some shewy specimens, which I purchased for you of a Mr. Brown, parish-clerk and fossil-philosopher of this place; for which you are in my debt 1*l.* 1*s.* 6*d.* and for which I shall trust you, till I have the pleasure of seeing you next summer; when I shall beg leave to bring you acquainted with the said Parish Clerk.

In respect to coal I wrote a paper *about* it and the tar-spring at Colebrook-Dale, about a year or two ago, which I intend for the Royal Society; and to add to it, the borings for coals from six or eight collieries, which I have got in colliery-language; and I have also the specimens of the borings (materials bored) from two mines, wrapped in papers, with their names in the above antient language.

"If you analysed the tar (petroleum) at Colebrook-Dale, and are not unwilling to have it sent to the Royal Society, I should be glad to add it to my paper; where it would hang like a diamond in an Ethiop's ear.

"All I believe about coal is, that it was *not* formed beneath the sea, because there are no marine shells in it, in general, or in the strata above it. I have some specimens of coal with impressions of shells; do you know where that coal comes from? if you do, pray inform me at your leisure. The design of my paper is to persuade others to examine the subject, which is yet so imperfectly understood.

"1. Sulphur is found in various combinations, was not this once vitriolic acid? and has not the vital air been stolen from it to constitute other acids by uniting with other bases, whence it became solid sulphur? Has not coal been a fluid acid, and the vital air taken from it to compose the acids of flint, and shale?

"2. Have not the vegetable recrements, which composed morasses, fermented, and taken fire, and the phlogistic part rose a few feet by a certain degree of heat and left the clay of the vegetables beneath; and hence the coal-strata took their alternations and thickness, hence the tar-spring was sublimed from the coal-bed below?

"If you have time and inclination to write to me on this subject, I shall be obliged to you; as I intend, in about three or four weeks, to re-copy, and send the conjectural paper above described, and should be glad to increase its value by your name, in respect to the analysis of the Colebrook bitumen.

"If the two boxes of coal-borings would be interesting to you to see, I will either send them to you or shew you them in the summer; they are not above half a hundred weight.

"You say a man can only expose himself by asking or answering questions. I think he may shew his ignorance by doing neither, when he corresponds with ingenious men.

"I am, my dear Sir,

"Your obedient servant,

"E. Darwin."

"Dear Sir,

"I acknowledge with thankfulness the receipt of your box and letter, and your good offices with Mr. Bennet. I shall be glad to be acquainted with your philosophical clerk, though considering the activity of that mind that rouses into action the powers of the people in and about Derby, I should not be surprized if philosophy should extend a step beyond the desk and reach the pulpit also. I have not analysed the tar of Colebrook-Dale, nor do I know how any light could spring from its analysis, at least any analysis to which I could subject it. Should its nature be compared with that

from wood and coal? The oily products of these I know differ much at different periods of the process. The causticity of Lord Dundonald's I imagine arises from an impregnation with volatile alkaline air; which I suppose is formed and not merely extricated during the process: perhaps also the marine acid and volatile alkali that appear in the form of sal ammoniac, are each formed by the heat of the operation; but nobody knows what marine acid is; though for my part I think it to be composed of the same materials as the nitrous, from Doctor Priestley's last experiment, and also from Margraaf's finding both the one and the other in the atmosphere; though I easily see they might have been raised in vapour.

"I shall be glad to see your paper, but I must honestly confess that no part of your system pleases me. There are as clear proofs of coal having been stratified by a deposition from water as of any other substance, both in the impressions of your specimens and in the marine exuviæ of intervening strata. Your idea of the spontaneous heating of vegetables is certainly ingenious, and may seem to have some support from analogy; but in the history of peat and subterraneous wood, I see not any reason for believing that they produce much heat during their change to that state in which they are found; and still less in the relative position of clay and coal do I see how it can be imagined that the clay is the fixed part left behind in the distillation. I am moreover unwilling to derive sulphur in almost any case from vitriolic acid. It has most evidently, in most cases, been sublimed from what Dr. Hutton calls the mineral regions; where I hardly suppose vitriolic acid to exist. As to the acid of flint, can its existence be admitted? Is it inferred from Scheele's experiments? or the chrystalline appearance of siliceous earth? I design a paper for the Royal Society on the formation of flint, in which I hope to render it probable that it has been produced from subterraneous heat: but why flint should be found in its present position I cannot comprehend. Dr. Hutton's supposition of its having been injected into chalk and wood does not assist my comprehension; and yet such as it is, each piece has derived its form from a state of fusion.

"In my speculations on the antient fortunes of the globe, no question oftener recurs than what is the depth of the stratified arrangement of the surface? Does it reach for instance, three or four miles? From Mitchell's hypotheses, it ought to reach so far at least. I think it would be very practicable with the aid of our powerful modern machinery and the concurrence of our liberal and enlightened contemporaries, to explore this.

"In the accounts of the Calabrian earthquakes, a vorticose motion is constantly mentioned. Is not this merely the wave-like motion? as a tree placed just before the wave will be tilted forwards, so just after the wave has passed, it will be thrown back. If this is not what they mean, I do not understand them; nor can I comprehend how a really vorticose motion can be produced.

"Your's respectfully,

"Thomas Beddoes."

A perusal of this correspondence gives an additional interest to the note on Pit-coal which appears in the Botanic Garden. The extracts which follow are of a later date, by some years, and refer to the first volume of Zoonomia. It may, perhaps, be scarcely necessary to remind the reader, that Doctor Darwin has defined ideas to be motions of the organs of sense, corresponding in figure to the visible or tangible objects that excited them; and has assigned the properties of solidity, figure, visibility, &c. to the spirit of animation.

" Dear Sir,

" You will not be surprized that an adversary should start up against the whole or against part of your 14th section. To debate this matter, by letter is, I fear, an impossible undertaking. I will state my principal objections concisely and clearly, if perspicuity in such a disquisition be consistent with brevity.—1. Mr. Locke has misled you to take general terms for the names of abstract ideas. I deny that we have any idea of time, place, or space; these terms, like cause, necessity, &c. being abbreviations of speech; and if you admit that Berkeley's, Hume's, Tooke's, arguments against abstract ideas are conclusive, you must give up page 114 altogether. If I am right in the explanation I have given of cause and necessity, I cannot be mistaken in my present stricture. If I knew what time, hour, &c. properly meant in any language, it would appear more strikingly true. I do not comprehend how you who have made it so probable that ideas are the motions of the immediate organs of sense could fall into this mistake, but I think you need only to have it suggested to you, to perceive that it is an oversight.—2. After much attention to your reasoning, I cannot perceive any probability in the opinion that ideas resemble external objects; and I do not think this ingenious hypothesis will protect the material world against Berkeley's Essays and Dialogues. I cannot at present conceive how a motion of an organ of sense can imitate extension, or colour, or any primary or secondary quality of bodies. If I press my finger against the edge of the table, its salient angle will form a retiring angle; but do the nerves of touch move in the form of a salient angle? and (p. 119 of vision) I am equally unable to comprehend how *the stimulated part of the retina can exactly resemble the visible figure of the whole tree in miniature*. With the figure in the eye, taken out of its orbit, we are all acquainted, but what has this to do with the fibrous motions of the retina; or how can they resemble colour? You will tell me I am doing nothing but making assertions contrary to your's, but this question must be decided by the report of impressions on the senses; though I think, as far as the *argumentum ad hominem* goes, you are assailable in this last article by virtue of your own expressions in Sect. 3. What external objects do several sensual motions mentioned there, and their vicissitudes resemble? Is it your opinion that some sensual motions resemble objects, and others not? Then it might have been well to have given a table of each sort; or, at least, a specimen of such a table. The

only way in which we judge of external objects is by the coincidence of the senses, or by exerting any one sense for a longer time, &c. in case of doubt. Thus in walking in the night I think I see an object which I am in danger of running against, and I advance my hand or my stick.—3. Much that is said of the spirit of animation I take to be *un persiflage*, otherwise p. 115 might afford me the opportunity of trying whether there is any resemblance between you and the most celebrated of the Archbishops of Toledo, viz. the one celebrated by Le Sage. All reasoning, however, which attempts to solve a new case by an old axiom is inconclusive. Axioms indeed I think had always be better be kept out of reasoning. Their use at best is to shorten discourse, like that of general terms. They can extend no farther than to cases, each already settled by proper experiments; and to settle any new case, special experiments are requisite. Were I to publish Elements of Geometry, I would not introduce an axiom.

" Your's, with great esteem,
" Thomas Beddoes."

" Dear Sir,

" On reperusing the sheets I have made several petty remarks upon the margin. They relate chiefly to inaccuracies. The most important is that you do not seem strictly to abide by your definition of Sensation, and that you frequently use the plural (Sensations) in a passive sense, in all which passages *feelings* would have prevented confusion. Your book will require great attention, and any ambiguity from inadvertence will oblige common readers to efforts of attention so painful as to suspend or destroy the pain of curiosity. In several places, I think, apprehension might have been assisted by a scheme, or table; for instance, p. 34, where you explain how fibrous contractions become causable by sensation, volition and association, such a tabular view as the following would, I conceive, have rendered the doctrine more perspicuous. After the paragraph No, 2, p. 34,

Original order,
Cause—Irritation of the sphincter and a certain sensation.
Effect—Evacuation.
Superinduced order,
Cause—The same sensation, (irritation being ineffectual.)
Effect—Evacuation.
Or,
Original order,
Cause—Cold to the puncta lachrymalia, a certain feeling.
Effect—Profusion of tears.
Superinduced order,
Cause—The same or a similar feeling, (without cold air.)
Effect—Profusion of tears.

" I had yesterday a long visit from the Dutchess

of Devonshire, who came from Bath on purpose to converse with me. She knows more of modern chemistry than I should have supposed any Dutchess or any Lady in England to know. She seemed to comprehend my ideas perfectly. She said she only knew my publications by extracts in the reviews, but she should, after having talked with me and seen my apparatus, procure them and read them with attention. I had not a copy of my first book to offer her. She spoke of you and repeatedly charged me to remember her to you.

"My dear Sir,

"Berkeley, I can assure you, asserts that certain words do *not* excite ideas, either in the introduction or body of his Treatise on Matter. I hold it only in this sense, that some sounds excite emotions and passions without the intervention of any ideas, as the political cry of "the church is in danger;" and Virgil's *Spargere voces in vulgum ambiguas*, is another instance. I think that *Virtue, Wisdom*, ought to be classed apart from the words *man, horse;* the latter having fixed to them certain motions of the immediate organs of sense, the other by no means so; for do not *Wisdom* and *Virtue* suggest the ideas of quite different practices and habits to different persons, according as they are superstitious, avaricious, or not? That they do suggest sensual motions, though not the same, to both, is undeniable; but on account of the variableness of this suggestion, they should be distinguished from words exciting definite sensual motions in all who understand the language. And Hartley's division—1. into words having ideas and no definitions; and 2. into words having definitions and no ideas, seems to me not much amiss. By the first one may understand such as are explicable by the exhibition of an object, and by the second such as are not, as Wisdom; to explain which you must exhibit many objects or use many words, exciting successions of sensual motions.

"I have conversed with Mr. Keir and Sir B. Boothby, on your opinion of ideas resembling objects, and both as yet think with me. Neither could see any fallacy in this argument. When two objects excite similar ideas, we judge them alike; so the sensual motion is the medium of comparison. But what medium of comparison have we in the case of sensual motions and objects exciting them? When I dip my finger into water, and again into sand, different sensual motions take place; but in neither case can I see how these motions resemble a liquid body or an incoherent mass; so also when I rub sand or water between a finger and thumb. When a salient angle makes an indentation on the skin, the *rete mucosum* makes a salient angle towards the internal parts, but so far it is only passive; and how its fibres move is mere matter of conjecture. If analogy is worth attention, may we not ask, since there seems no resemblance between a point, electricity or an acid applied to a muscle, and its figure when in motion, why should there be any likeness between the stimulus and motion produced in other fibrous motions? In neither

of the letters I wrote was there any thing important. One contained a quotation from a very ingenious thesis which you might have thought curious if the idea was not borrowed from Hartley. The other mentioned a visit from the Dutchess of Devonshire, who has made me two. We talked of you. She, I understand, had been taught that you are very ingenious, but very whimsical as a Physician and Philosopher. Dull people are very fond of persuading others that the ingenious want judgment. I begged the Dutchess to believe, provisionally, that you reasoned full as well as you wrote verses. She said she should expect your book with great impatience. Had I known twelve months ago that Zoonomia was to be published so soon, I would have gone to London instead of Bristol and given lectures on your system.

"I am, dear Sir,
"Your sincere and obliged,
"Thomas Beddoes."

"Dear Doctor,

"I am not surprized or chagrined, that you do not believe any part of my theory of ideas consisting in the motions of the fibrillæ of the extremity of the nerves of sense; for if you believed this part of the doctrine, the circumstance, that the part of the extremities of the nerve of touch stimulated into action must resemble in figure the figure of body applied to it follows of course.

"The power of correcting one sense by another has been observed by other writers on metaphysics, and was not therefore proposed as new. Your example of the corner of a table I suppose perplexed you, which may be considered as consisting of more planes than one, and may thus be reduced to as great simplicity as the example of the ivory triangle. If you allow an idea of perception to be *a part* of the extremity of nerve, of touch, or sight stimulated into action, that part must have figure, and that figure must resemble the figure of the body acting on it: if I lay a triangle of ivory on a sheet of paper, the part of the paper pressed upon must resemble the figure of the triangle pressing on it. I suppose where two people accustomed to reason, differ so *toto cœlo*, that there must be some mistake in the terms. Perhaps your mind is about the idea of solidity, or rather perhaps, you use the word idea in its common meaning, as an immaterial being, and cannot assume form.

"Enough of this.—Mr. Watt has sent me an air apparatus which I have not yet unpacked. I shall now wait with impatience for your next book to teach us the best way of making and using airs.

"Adieu,
"From your affectionate Friend,
"E. Darwin."

P. S.—"I believe your use of the words "things" and "ideas" as if in opposition to each other, as if ideas were not things, may have

perplexed the subject: two things may be similar, whether we think of them or not, but we compare our ideas of them you say when we think of them; but our ideas of them are not the middle term of the comparison, they simply represent them. We can have a reflex idea of the operations of our minds. Now as I look upon ideas to be things, (that is substances,) in motion, I can readily have an idea of an idea, and can hence compare my idea of an ivory triangle with my reflex idea of that original idea. But I believe I am got into that sublime figure of rhetoric called the Profound.—Adieu."

"Dear Sir,

"I cannot help supposing "ideas" to be motions of the fibres of the organs of sense; your evidence is as satisfactory as indirect evidence can be, and at least equals in strength that which Harvey adduced in support of the circulation. Therefore of late the term "idea" has always been synonimous with me to a system of moving filaments "*fibrarum micantium*;" hence I distinguish objects from ideas only in so far as the latter have never actually been perceived; it may therefore be superfluous to say that objects are known to be the same from the sameness of the perceptions they excite; but of the nature of sensual motions we have no perception; and therefore cannot tell whether ideas are imitations of the objects that excite them: it appears to me as if you did not distinguish between the passive and the active circumstances, when the sense of touch, for instance, is stimulated. By the active and the passive I mean the second and first parts of a perception, as stated by you at (p. 111, top.) So also the passive and active circumstances in vision are distinguishable. I perceive the figure at the bottom of the eye to resemble the shadow projected from the tree; but of the manner of contraction of the retina I have no direct or indirect sensible knowledge; *i. e.* I am utterly ignorant: from the fibrous structure I should conjecture the effect of the stimulus extended beyond the portion of the organ of sense to which it is applied; thus suppose a plane surface of any size touching the shin; fibres running beyond the touched part will probably contract through their whole length. You may say the sensual differ from the muscular fibres in their organization so as only to contract where stimulated; but is not this a mere supposition?

"Your's with much esteem,

"Thomas Beddoes."

"Dear Doctor,

"I am much obliged to you for your remark about the exterior atmosphere of inflammable air; I think it probable, that what I conjectured about its standing higher at the poles may not be well founded; since the gravity of the concentric fluids are not overcome by their centrifugal force like oil and water whirled round in a bottle: but as far as I recollect it does not affect the theory of *aurora borealis;* since if there be a superabundancy of inflammable air, more than will mix with the common atmosphere, some will rise through it.

"I do not think, that you still see, that what you say about the figure of an idea (in my sense of the word idea) consists of words without meaning. I shall once more make an essay, as I think the passage is of great consequence, and one of the principal parts of my whole theory, and am therefore unwilling to have it contradicted without argument. I assert, that ideas are parts of the extremities of the nerves of sense, [which may be conceived like the points of the knap of velvet, and not longitudinal fibres laid horizontally, as may be shown by the images left in the eye, (the *ocular spectra,*) not extending beyond their correspondent objects,] these parts have extension and consequent figure. Now if an ivory triangle presses the palm of my hand in the light, I can have both a tangible and a visible idea of the triangle, I can also have a *visible* idea of the part of my organ of touch, which is stimulated (and compressed,) and according to your view of the matter I can compare the visible idea of the triangle, and the visible idea of the part of the organ of touch together. But where is the necessity of a medium of comparison? it is no syllogism; it goes no further than to say, that a triangle pressed on my hand is the figure of the part pressed.

"Lest I should be thought prejudiced, because you had attacked the most favorite part of my theory, I wrote last week to Mr. Keir, on this subject, and have inclosed you his letter, which I do for no other purpose but to clear myself from the supposition of incorrigible prejudice in respect to my own work.

"Your affectionate Friend,

"E. Darwin."

"Dear Doctor,

"I am much obliged to you for your letter[r] with observations on Zoonomia &c. and am impatient to see your new edition, which I will take care to send for as soon as it is out.

"Your correspondent will recollect, that I do not enter into the inane dispute about the inanity of the universe, I leave that to be settled by the disciples of Berkeley and Hume; and secondly, for the diffusion of the power of contraction over the body, I appeal to common anatomical experiments; the existence of the body therefore I take for granted; it has nothing to do in my argument, which treats on the "laws of organic life," which organ and life I therefore take for granted. The other observations in your letter are all good and ingenious but I am too idle to write about them, and so shall only thank you for them.

"It is evident that to increase sensorial secretion with-

[r] This Letter contained remarks on Zoonomia by a correspondent of Doctor Beddoes's and does not appear.

out at the same time *using it*, is not easy. I have invented a method of stopping too great exertion of the system in inflammatory fevers, I believe; this great secret, yet untried, you will see in my next volume. Shall I tell it you now? Well here it is. You are to prescribe a wind-mill, lay the patient across the large stone, whirl him about sixty times in a minute, and the brain becomes gently compressed, and the fever ceases, and sleep succeeds; go on, and he dies without pain.

"What would be the event if his head was in the centre of motion? Would he become vivacious?

"For increasing sensorial power I propose electricity through the brain in fevers, and through the stomach, and warm fomentation of the head, and *hot* bath.

"Now for another secret. If you render the extremity of a nerve torpid, (if it be of an organ usually in action) an accumulation of sensorial power occurs, as in cold hands and hungry stomach; both from the want of stimulus. If this torpor of the organ be occasioned by previous excess of stimulus, no accumulation is produced; as after drunkenness or exposure to violent external heat. Now, mind, 1. In some fevers the contagious material is swallowed. 2. The stomach becomes torpid by the great stimulus of the contagious materials. 3. The heart becomes torpid by direct sympathy with the stomach, as shewn by the intermission of the pulse, when the stomach is flatulent from indigestion and in the exhibition of foxglove. 4. The stomach accumulates no sensorial power, because its sensorial power was exhausted by the stimulus of the contagion; but the heart does accumulate sensorial power, because its torpor is owing to the defect of the stimulus or power of association. 5. This accumulated power is exerted on the next link of the associated circle of motions, that is on the capillaries. Hence this fever consists in the torpor of the stomach from defect of sensorial power, the torpor of the heart from defect of the power of association, and the increased activity of the capillaries; the last is shown by the heat and dryness of the skin. All this reasoning wants further consideration.

"Adieu,

"E. Darwin."

"Dear Doctor,

"I did not think you would care much about objections to your theory of the shape of ideas deduced from the non-existence of bodies. I am much pleased with your idea of introducing mill-work into the materia medica. But if you go on at this rate, and if I succeed in any part of my project, the profession will be ruined, or at least fewer human beasts of prey will be able to find support from half-animated carcases. I hope the rotatory motion will be tried upon animals, at least. Would it do for horses having the staggers? Your reasoning on the propagation of effects from

the swallowing of contagious matter I like exceedingly. It is extraordinary however that the sensorial power of the stomach should be so insidiously wasted by contagion as to produce no synchronous actions; for the accumulation of excitability in the heart and the other actions you mention, are successive operations. It has appeared to me that the first assignable effects of contagion in one or two cases have been like those of alcohol; and in the account just published of the fever in Grenada (which was the most fatal I ever read of) intoxication is mentioned as an effect of the contagion by no means uncommon. The next in point of date seems nausea, and this I suppose you reckon a sign of exhausted excitability of the stomach; as nausea in worn-out sots follows the more slow exhaustion by alcohol: perhaps when nothing like intoxication or excitement appears, the effect is as sudden as of a stroke of lightning and so escapes observation. Fevers must differ widely according to the various stimulating power of the contagion that excites them.

"You observe it is difficult to produce sensorial power and not expend it. The difficulty perhaps is not in the nature of the thing, since such an operation must take place in all accumulation of sensorial power. When cold is applied to the surface, the expenditure seems greatly diminished, while the deep-seated secretory organ for a time yields nearly its former supply. Might not opium and cold (the cold bath) be combined with good effect? I have thought that by such a plan the cold bath might be serviceable in cases where it now produces dull head-ach and debility. I suppose in such cases the secretion of excitability is stopped along with the action of the superficial vessels so as not to go on for several hours. If this is not, what is the theory of its ill effects (the cold bath's) on weak girls?

"I remain your's truly,

"Thomas Beddoes."

APPENDIX—No. 7.

DOMICILIARY VERSES.

DECEMBER 1795.

INVITINGLY yon single-storied cot
Peeps o'er the frosted heath. The broad, brown door,
Scaled of its white-wash, is so low that he
Who steps in upright, steps in jeopardy
To smite his forehead. Two projecting walls
Fence in the roomy fire-place. Close by each
Is set an oaken bench, on whose hard sides,
His sore impatience, many a lubber loon,
Keen for his meal, has notched. Here, when silently
Coating the green and lozenged panes, thick snow
Bedims the scanty daylight, nestles the snug
Family, delighted up the chimney's shaft,
Illumining the chasm, to trace the spark's
Ascent; or touch with timid finger-tip
The faggot's hissing ooze, and sniff the fumes.

I knew an Irishman; to England he
Came every spring a hay-making; and much
Would praise his cabin. By a bog it stood,
And he had store of peats. Without a chimney
Stood the little cabin. Full of warmth and smoke,
It cherished its owner. The smoke he loved,
Loved for the warmth's sake, though it bleared his eyes.

Now when the North-East pinches, I bethink me
Of this poor Irishman; and think "how sweet
"It were to house with him, and pat his cur,
"And peel potatoes mid his cabin's smoke."

APPENDIX—No. 8.

RATIONAL TOYS.

IT requires but slight observation to be satisfied of the utter inutility of the articles with which the Toy-Shop is usually replenished. And on close reflection, it may possibly appear neither strained nor severe to condemn most play-things as worse than useless. Their gay appearance, and the movements which they are sometimes contrived to perform, doubtless raise strong and sudden desires in the mind of children. But satiety as quickly follows. The flush of delight, arising from the first impression, cannot but be transitory; and no sooner does the little possessor examine into the structure of his new acquisition, than he flings it aside, or breaks it to pieces and tramples it under foot, as if to revenge himself upon it for belying the promise of its exterior.

This succession of longing and loathing is a more serious evil than may at first be apprehended. If it be true that youthful curiosity cannot be frequently baulked with impunity, every such disappointment may be considered as some advance towards dullness.

We often meet with a species of toy calculated to excite surprize. This, if not liable to the same objection as the unmeaning toy, may be suspected of fostering a disposition for petty stratagems, by which a connexion between pleasure in the individual who plays them off, and pain in others is almost inevitably established.

Ten years ago, the idea of substituting models of machines in the place of ordinary toys suggested itself to one of the persons whose names are subjoined to the present paper.

Every quality, he conceived, which distinguishes models, would secure them against neglect and destruction, the merited fate of toys. The knowledge conveyed by the mutual dependency of the parts, and by the purpose of the whole, would be laid up with advantage and might be revived with pleasure. Whatever improvement the understanding derives from mathematics would more agreeably flow from well-constructed models. And mathematics would be studied with more success by children accustomed to such models. They would rouse the faculty of invention, and confer the habit of pursuing trains of thought to a great extent. To girls, by conveying information without awakening their sensibility, they would be particularly serviceable. From this statement, the utility of a set of models in schools and private families is obvious. It is equally obvious that their utility would not be confined to young people.

This scheme has been generally approved by those to whom it has been mentioned. Different persons, long since, offered to advance money towards its execut'on. Indeed, in 1796, it was partially carried into execution, when the whole design was announced under the title of Rational Toys, in a letter prefixed to Mr. Donne's explanation of his elementary mathematical models. Towards its complete execution, however, there was wanting a person well informed concerning machines, and of ready mechanical invention. This difficulty is now removed by the offer of Mr. Robert Weldon, to conduct a manufactory of Rational Toys.

It is however, requisite that a sum of money sufficient to set it on foot be advanced; and to satisfy subscribers (as far as such a circumstance may afford satisfaction) that they are likely to receive an adequate return for any sum they may advance, as also out of regard to Mr. Weldon, the persons, named below, have agreed to act as a committee of superintendance.

Soon after a sufficient sum shall have been subscribed, Mr. Weldon will furnish the subscribers with a list of models and prices, from which each may choose to the amount of his subscription. A description and drawing will accompany the models, and they will be contrived so as to take to pieces, and its name will be fixed to each part, where this is practicable.

Hereafter, if the undertaking prospers, the public may be accommodated with single models. But at present to spare the committee's time, it is proposed:

I. That no subscription of less than £20 be received.

II. That every subscription not exceeding £20 be immediately advanced. Larger subscriptions may be paid by instalments of £20.

These terms may startle many, even opulent, parents. And it is true that a set of instructive models will require a greater sacrifice than has been customary in education. But as public opinion on this subject is daily becoming more liberal, it may begin to be felt that, of all possible methods of consulting

happiness, to subtract information for the sake of adding to fortune, is the most preposterous. A few additional hundred pounds, well laid out upon the boy, may more improve the condition of existence, than the mines of Potosi bequeathed to the man. The ill-advised niggardliness of parents is one principal cause why genius has so seldom been exerted upon the means of early instruction, and why the most difficult of all occupations—that of forming the system of thought and feeling—has been so often confided to persons, whose endowments are barely adequate to the rudest mechanical labour.

COMMITTEE.

THOMAS BEDDOES, M. D. Clifton.
JOHN BILLINGSLEY, Esq. Ashwick-Grove.
WM. CLAYFIELD, Esq. Bristol.
BENJ. HOBHOUSE, Esq. M. P.
JOHN H. MOGGRIDGE, Esq. Boyce-House.
JAMES STEPHENS, Esq. Camerton-House.
JOHN WEDGWOOD, Esq. Cote-House.
WM. WYNCH, Esq. London.

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WM. REYNOLDS and Co. Bankers, Salop.
SIR JOHN CALL PYBUS, Bart. and Co. Bankers, London.
SIR JAMES ESDAILE and Co. Bankers, London.

*** Letters (post paid) addressed to Mr. WELDON, Pneumatic Institution, Bristol, will be duly attended to.

APPENDIX—No. 9.

THE HOTWELL PATIENT.

AN ELEGIAC FRAGMENT.

No more on wavering wing from sweet to sweet
O'er summer wilds I urge my restless flight,
Morn's first faint blush no more exulting greet;
Nor smiles the scene of day in rosy light.

Each listless moment ills unnam'd oppress,
The gaze of friends betrays dissembled fear,
With fault'ring tongue their child my parents bless,
As in the eyelids gleams the smother'd tear.

Some blight has swept unseen my May of life!
I feel as deep infix'd the canker's tooth;
And fire and frost with still rekindling strife
Rage through my veins, and waste my faded youth.

The sons of art pronounce their doom austere:
To home's sweet scene I sigh a deep farewell,
And brave the wearying way and wintry year
To woo coy health in Bristol's sainted cell.

Wayworn through many a rugged street I roll,
Where from the frowning seat of sordid care,
Dark-cast the shadows reach the inmost soul,
And brooding horror loads the stagnant air.

Chill'd by the glooms, on this misgiving heart
Its own sad trace each flitting object stamps,
From yon dim meads depressing breezes part,
Appall'd I breathe funereal Dowry's damps.

At each advance more direful signs appear;
The sash close barr'd against the intrusive sky—
The long loud cough that rends the affrighted ear:—
The recent crape, the wearer's downcast eye.

Ye snatch'd from life in beauty's sunniest years,
Who roam'd before these melancholy glades,
—To you a sister-sufferer breathes her fears—
Say gentle maidens once, now pitying shades,

Here does Hygëia plant her lovely shrine?
Her tresses plunge in this polluted wave?
From Avon's ooze dispense her gifts divine,
And haunt these seeming precincts of the grave?

Or from the crest of yon firm-rooted rock
(Meet emblem of his old unshaken reign)
Does Fraud the moments of the dying mock? . . . .
Why else these ghastly forms, that sable train? . . . .

Where in yon fane the Naiad of the stream
Calls round her bubbling urn the pallid hosts,
Broad Day displays the poet's gloomiest dream;
Styx' sullen banks, loath'd flood and wand'ring ghosts.

Yet not the less I join the adoring throng,
The matin rite breaks through my sweetest sleep,
Nor fail my pilgrim feet at even-song;
And all the priest of health ordains I keep.

Now twice relum'd the moon's mild lustres shine—
Still from the healing power, in soften'd pain
Or lighten'd languor, some auspicious sign
Anxious I seek; but anxious seek in vain.

Though venal voices join accordant cries,
Till Fame's loud trump the Fount's high virtues fill,
Though titled matron, with uplifted eyes,
Sound the dread wonders of the leech's skill,

I list perforce with unassenting ear.—
The fever nightly burns with fiercer flame;
Still from myself I shrink with growing fear,
To see how grace and youth have fled my frame.

Here the lorn exile feels her comforts fail.
Bleak through the yawning wainscoat drives the wind,
The quicken'd sense unsavory fumes assail;—
Her glance declares the housewife's alien mind.

Here still does Avarice count his gains from woe;
The angel Pity drops no holy dews;
My form, devoted to the realms below,
Where'er I stray, some baleful eye pursues.

The hours no more their wonted tasks beguile,
Ills not my own protract the penal day;
Relentless race, and skill'd in many a wile,
The sons of Pæan press their sinking prey.

By these condemn'd, like Danaus' guilty train,
Heartless I ply the unavailing toil,
Bowl following bowl with loathing lip I drain,
The bowl returns—my loathing lips recoil.

Mother! soft parent! earliest fost'ring friend?
Ere yet to Fate my youth reluctant yield,
O'er these sad hours your tender cares extend,
And your faint child from Craft pursuing shield.

Ah! what avail yon groves, green Ashton's boast?
The sea-born spirit of the breezy down?
The terrac'd lawn, far Cambria's chequer'd coast?
These crags high-pil'd, proud Clifton's stately crown?

In vain it smiles—the lucid long expanse,
Stretch'd from yon point, where, as the Sea-god's head,
—Fixing in still delight the charmed glance—
Calm sinks the sun in ocean's flaming bed. . . . . .

Whether led on by Hope's seductive smiles,
From Scotia's heights ye flock'd, or Erin's plain,
Or from the shores of Slavery's burning isles
Dar'd the long perils of the pathless main—

How have your toils and pious vigils sped?
Found you or charm in Bristol's far-sought cell—
Ye hoary mourners o'er the untimely dead!—
Sov'reign to save,—or soft assuasive spell?

Hither, a trembling suppliant, Mason bore
His life's whole treasure in his drooping bride,
Her tablet, sorrowing on the distant shore,
Sings the wan votary's ceaseless dirge—"*She died.*"

To times to come, false Naiad of the well!
Restor'd by thee, how Linley pours the note,
No votive verse of Sheridan shall tell—
No grateful warblings swell the fair one's throat.

Nor here Hygëia plants her lovely shrine,
No tresses bathes in this polluted wave;
From Avon's ooze she deals no gifts divine,
Nor treads, well-pleased, these precincts of the grave.

O'er the mock mourner's hard and scoffing mien,
—Blotting the scene morn's tenderest beam illumes—
In contrast dire, the unwearied hearse is seen
To wave the terror of it's dusky plumes.

I pass, and shudd'ring mark how sculptur'd stones
Press in rude throngs yon churchyard's crowded round.
The delving spade upturns commingled bones,
And lifeless forms contest the hallow'd ground.

Even there where now my pow'rless limbs are spread,
Erewhile some Equal sunk, delusion's prey;
Her last cold damps bedew'd the self same bed,
On the same sheet, a shadowy corse, she lay.

When slow the secret fang has min'd my breast,
And the tir'd pulse forgets it's feverish play,
Deep on my tomb—nor spurn this last behest—
Let hands sincere inscribe the warning lay.

"Stranger, though bold Imposture's arm would grace
"(While fond Credulity applauds his care)
"With civic wreath the Genius of the place,
"No healing spring he pours—no balmier air.

"Him for their heart's last hope, though parents hoar
"Call with joint vows to soothe the struggling breath,
"Still their joint vows in vain his aid implore,
"And still his caves of Echo murmur Death."

APPENDIX—No. 10.

UNPUBLISHED

FRAGMENTS IN VERSE,

BY DOCTOR BEDDOES.

Verses on a Cornish Lady who was prevailed upon to dance with a National Cockade, in 1790.

SWEET Maid, whose joy-diffusing smile
Can Sorrow's burthen'd heart beguile!
Whose festive mien and sunny glance
Shed lustre o'er the lively dance!

May Freedom's garland, still as now,
O'ershadow Beauty's polish'd brow;
And, stealing thence celestial grace,
Spread wide her empire o'er our race.

May Health thy airy steps attend,
And modest Mirth his measures blend,
As Time leads on thy social hours,
Thou Rosalind of Cornwall's bowers!

Thomas Beddoes.

It should be recollected that these verses were written before the tri-coloured cockade had become the ensign of blood and of despotism.

RECEIPT

TO MAKE A GOOD

Legendary Tale.

BY THOMAS BEDDOES, M. D.

IN woods immersed, beside a lake,
A very ancient castle take;
And plant therein a damsel fair,
With eyes sky-blue and auburn hair;
But, chief, be sure she's ever prone
To heave the sigh, when left alone,
At tales of tender woe to swoon,
And, pensive, watch the pale-faced moon.

Next, pray provide a hoary sire,
All snow without, within all fire;
Once served by dames, admired at courts,
And always first in knightly sports.
But now, past life's meridian hour,
Not wanting will so much as power
To poise the lance, the sword to wield,
And bear aloft the blazoned shield,
A calm, sequestered life he leads,
Confessing still, or counting beads.
Not that, as yet, the good man's soul,
Yon other world possesses whole;
Two earthly things his cares divide;
His daughter much, but most his pride.

TO

NIGHT.

OH Thou! whose shades with ever-circling pace
From clime to clime Light's flying limit chace;
Come, sable Sire of vision-haunted Sleep,
In soft oblivion harassed Nature steep;
With gentle finger close the lids of Day;
Relume the lustre of thy milky way;
Cheer with that orb serene thy vast domain,
And marshal round their Queen her twinkling train;
Thy deep repose o'er toil-spent throngs effuse,
And shed on thirsty lands thy cooling dews.

With silent step approach my tossing bed,
And wave thy poppies o'er my sinking head;
—Next, Friend of Anguish, urge thy steeds afar,
And waft my Laura in thy noiseless car:
No shadowy phantom of a faithless dream,
But breathing Life, and blooming Beauty's beam;
Gild with its winning smile her lucid eye,
O'er her tinged cheek let swift emotions fly,
Through her fine frame congenial ardours dart,
Heave her full breast, and urge her throbbing heart!

Nor now, as erst, when sounds unfinished hung
And timid accents faultered on my tongue,
My passion-palsied lips their powers deny,
But, willing words and soothing tones supply!
"Star of my life, and centre of my thought!
"Whom, distant far, enamoured fancy sought:
"Oh smile serene and smooth thy polished brow,
"Propitious hear Affection's ardent vow,
"Give to my tortured soul her lost repose,
"And close the series of a Lover's woes!"—

—But instant ah! the beatific dream,
Flits at the touch of you intrusive beam:
No form soft smiling fills the void of air,
Quick close, my eyelids, fly the hateful glare!
Thought, busy Thought, through all thy boundless reign,
Seek the fair fugitive—thou seek'st in vain.
Long listless scenes the hours of light display,
The sad realities of joyless day.
Oft, ere their course his sluggish steeds have run,
Oft mute Impatience eyes the lingering sun,
And many a sigh invokes the welcome shade,
That brings to Fancy's arms the blooming maid.

Still, dear Illusions, hover o'er the night,
And gild the gloom with visionary light,
Still o'er my soul your kindly influence shed!
For where the sweet magician deigns to tread,
Debasing passions fly the hallow'd ground,
Nor dare profane the heart where she is found.

APPENDIX—No. 11.

UNPUBLISHED EXTRACTS

FROM

Doctor Beddoes's Common-Place Books.

ASSOCIATION. The associated feelings occur sooner than the associated ideas; at least, sometimes: Query if always? To day (November 22, 1801,) I met a person whose aspect instantly gave me the feeling of respect: It was some time before I remembered that he was like Doctor Black. In education it is the greatest question what feelings or ideas shall be associated with impressions or ideas: *e. g.* in case of danger of fire, whether fright shall occupy, *i. e.* a feeling, or the idea of the means of extinguishing the flames, and rescuing those in danger;[1] and so on through numberless instances. In the bodily frame something similar occurs. Sensation too readily follows, sometimes, certain powers, as mercury. In surgery, the mind of the operator ought wholly to be occupied by ideas.

ABSORPTION. Could not its effect upon the form of parts be rendered sensible (in a dog or a cat for instance,) by applying pressure to a fleshy part? As form depends upon the proportion of absorption to secretion, how much must it be altered by pressure on the stomach &c.

ARISTIPPUS, *medical*. Who can, at one moment, employ himself in the difficult exercise of combining the nicest observations on animal nature, and the next, listen with obsequious attention to the medical nonsense of fashionable ladies. It is certain that the latter would unfit and indispose most men for the former. But there may be, once in an age, a medical Aristippus, whom such varieties may become and delight, though one does not well understand how he

[1] See what has been said on this subject, at *p.* 256, of the preceding Volume.

could compensate his servility to himself, except by fleecing his patients and (laughing at them in his sleeve,) making a puppet-shew of them in his imagination, as children play at one-and-thirty by thought.

BATH, *warm*. A kind of criterion for constitutions. When it heats and quickens the pulse much, it over-stimulates. This is the case with very nervous people. Miss —— could not bear it when weak, can bear it now. Mrs. —— could bear it well one day, but not the next, after a flutter. A criterion for nervousness, and a scale for its degrees. Other debilities are not aggravated by it. The same person cannot bear it after dinner who can well in a morning.

BLISTERS. The debilitating effect of, not enough attended to. A blister often weakens more than a moderate bleeding; whether the weakness continues so long, I am not prepared to say, but I am not sure of the contrary. I have known cases in which a blister of the size of a shilling has induced fainting. Faintness is a very familiar effect. It is not the discharge, but the prior action that is followed by this consequence, as I have repeatedly ascertained, by observing that it took place before the blister had arisen.

BLISTERS *of boiling water*. Query. Do they excite eruptions like cantharides? as by suddenly exerting a great effect they should less excite associate motions.

COLD-BLOODED ANIMALS. Query. If distinguished from hot by a smaller degree of animal fermentation? or the small interior action changing and renovating the parts every moment? Their habits and powers of endurance without food, without blood for a certain time, with infrequent respirations indicate this. There seems to be a stock of active principles reposited in the solids, and ready to act with great force or quickness on any provocation. But then the effect ought to produce phenomena correspondent to those in hot-blooded animals. Opium ought to raise the temperature of frogs for example.

Mem. To try this—to opiate a number of frogs near an air-thermometer. Also to digitalize them.

Query. The hotter the animals, the more internal fermentation? Query. If an under-oxygenated atmosphere would not answer at one period, and an over-oxygenated one at another, in fevers?

Why is there a perpetual change of substance in organic animal matter? If a muscle or nerve be required to be the same for a time, why, when once made, should it be made to be unmade again? Is it necessary in the economy that these actions should be, to produce etherial fluids or influences?

If heat should not follow the artificial stimuli in frogs, may not their organization be so disposed as to produce electric fluid instead?

N. B. To try to determine this.

CHRISTMAS. *Seasons of Feasting*. In the first state of society, the master had the most and best of the feast. That custom derived from a state of things in which there was a supply of food but for a few. In the second the master

crams his guests, neglecting himself—that has continued long and still subsists. The third is a state to be; when men are to assemble upon some principle resembling us less, than giving a dinner does, to the brutes whom nature has constituted slaves to their belly.

Consumption. *Medicorum phthisicis medentium, iniquissima est conditio.* If the patient be far gone, the result disgraces him. If it be in an early stage, neither the patient nor the relations have any idea of the evils that have been prevented, and very likely the complaint passes for a whim of the doctor's.

Contractor. In building, if you alter your plan ever so little the bargain is no longer binding upon the contractor. The principle still more frequently serves the physician than the architect. On a small deviation from our instructions, we hold ourselves relieved from all responsibility. "Poor Mr. Such-an-one! he died to be sure, but he might have been alive and well at this day, had he thought proper to abide more strictly by advice."

Currie. Who has so strongly recommended himself to professional readers by the general excellence of his matter, and to unprofessional, by the charm of his classical style.

Damp. In a large room or a church, said to be sensible after the first lighting of a fire. Query if the excitation of currents do not produce this effect, as in Hutton's theory of rain? to ascertain this by hygrometers at different heights.

Digestion. If such a quantity of food be taken as the stomach can manage, digestion will be more perfect from repose, and repose more refreshing from digestion. But if it be unequal to the task imposed upon it, then heat is excited, which the weight of the bed-cloaths increases, and sleep still more. This worse in fever. By this is to be solved the constant difficulty proposed to medical men about supper-eating; which should always be answered in the affirmative, in this sense, that as much food should be in the stomach, as can be fully digested before morning.

Diseases, dissimilar, having a symptom in common, as, for instance, a cough. There are two pictures, each with a house in it, but the one with trees, cattle and a river, the other with carriages and human figures. You may as well swear that the one and the other are alike because they have the house in common. My good Madam, by sticking to the cough as evidence of identity, you reason not a whit better than good Master Fluellen, when he found an M. both in Macedon and Monmouth.

Ear. On putting cold water into the meatus auditorius externus I have felt a general *frisson*. Can this be applied to the stopping of hæmorrhage or fever, as it can be increased by more evaporable liquids? Is the shivering from inhaling ether-fumes, occasioned by the ether itself being raised by the heat of the nervous membrane into a rarer vapour?

Experiments *in medicine*. Those who decry them do not perhaps perceive, that they cut off all hope from those at present incurable.

Fatality. It is not the natural fatality only of certain complaints which deprives so many children of their parents, and so many more parents of their children. When all the world sees how often medical men differ, and of course how often one or another must be deceived, it is wonderful that they do not, from this very circumstance, deduce the extreme difficulty of judging, and the extreme danger of meddling? Ask any of these volunteer prescribers to calculate an eclipse they will feel that they want the necessary *data*: but do they not always, just as much want the necessary *data* for calculating the relation of drugs to symptoms.

Fashion. Of which the tyranny bears as hard at least upon health, as upon morals and fortune: the rigour of it to be best mitigated by physiological information. I do not know whether the whole flock would follow a leading sheep into a torrent that had whirled her away; but it is probable that the followers of fashion will follow their leader into almost any danger, though not the least advantage were to be gained by those who should get through it.

Fallacy. One of the most common in medicine is to take up the most striking visible phenomena as the cause of symptoms. Thus in measles, is what they teach of the repelling of the eruption, right? viz. that cold or ill-timed purgatives, by so acting, endanger life or occasion death? May not the disappearance of the eruption be a collateral effect merely? By a particular treatment the rash disappears, yet the complaint is rendered mild. Cold is injurious long after the eruption, and is so because the mucous membrane is then highly susceptible.

Food. It may be made a question whether the attachment of certain species of animals to certain kinds of aliment, depends upon the absolute necessity of their nature, or upon the ease with which they are able to procure their subsistence. This question many of Spallanzani's experiments have a tendency to determine, as those upon the eagle and pigeon.

Gulliver. If there should ever be a state of things in which men employed their knowledge and powers for the advantage of their health, and faithful descriptions of such valetudinarians as abound among us, should fall into the hands of the people of those days, they will have as much difficulty in believing in their reality, as we have of the creatures so abominably distorted from humanity in Gulliver's travels.

Heart. I know no object in this world of misery more to be pitied, than a young person living under the controul of a senior, with whom nothing ever lay heavy on the stomach or the heart.

Healing. Those who despair of making much proficiency in the art of, very naturally turn their talents to the art of pleasing. They are seldom joined. Men of genius and knowledge are not fond of hearing and delivering nonsense.

Hunter, John. Fancied what he could not find words for, very profound. But he was mistaken. Whenever he found himself at a loss for words, he was labouring with the delivery of nonsense.

Hunter. When one heard of John Hunter as the first surgeon in London, one felt a pleasure like that which arises from the distribution of poetical justice.

Incubation, *medical*. It may seem very hard that children after coming into life should, now-a-days, require a sort of medical incubation. To such an observation I can only reply that reducing a proposition to terms derived from ludicrous analogies, is not sufficient for its refutation; and after laughing at the joke, Ladies and Gentlemen, it will be as prudent to inquire into the truth of the statement.

Inflammatory Diseases. General and topical bleeding. Query. Would it not be of use to follow it up immediately with strong stimulants? It appears so in external inflammation, as of the eye. Query, in internal inflammation?

Darwin, after depletion, advises small doses of opium to swallow up new-forming vessels; more likely, it prevents the dilatation of old ones.

Instruction. The children of those who have had the greatest lack of, are surest to suffer from the over-accumulation of.

Interpreter, *clinical*, in which a practically useful enumeration of diseases is attempted, with a preliminary discourse upon nosology.[t]

Knight, Mr. R. P. Is always candid and intelligent, and he appears to me to have done so much more honor to the investigating powers of man than any other person of our times, as almost to form a class by himself. He is most to be compared to John Hunter; but his views are clearer, his doctrines purer from the alloy of hypothesis, and he goes deeper into his subject.

Magnet. Have any experiments been made on the time in which iron bars are convertible into magnets at different temperatures? If the conversion depend on new arrangement of particles, the change ought to take place more slowly at a very low temperature. I suspect that pokers, &c. near the fire, and iron bars of the same size and same piece in a cold place, would become magnetic, differently.

Metropolis. Has a liberalizing influence. Men in general meet with more humanity in their hearts; they leave their aversions and jealousies. The churchman and dissenter meet, without that antipathy which arises from having seen one another go to different places of worship. It is not therefore, altogether, because this centre of national resort has greater means of founding useful institutions, but, in part, because the unsocial passions which prevent them in narrower places, are, in some measure, suspended there.

Medicine. *Difficulties in the way of practising*. One of the most important experienced by the Court and West end of the Town physicians, is to compound with the medical opinions of the ladies. They have not only their notions, as who has not, concerning diseases and their remedies, but may be said to have their minds made up on these difficult and important subjects. The best thing the Doctor can do, (that is towards securing their good word, which is, self-evidently, the best thing the Doctor can do,) is then to put his pen under the guidance of these good ladies' theory, and content himself with translating their suggestions into certain learned abbreviations, *pilul: pulv: haust:* which are, perhaps, the main support of his professional dignity, as being the sole remaining mystery of medicine into which the prophane have not penetrated.

[t] I suspect that this was designed for the title of a projected work.

Medicine. Many men who have bestowed deep thought on other subjects, are sceptics in regard to medicine. What the profound distrust, it is in order that the witty should deride. From the combined influence of the opinion of these two classes, it is obvious how much more easily the sick must be surrendered up to gossips and the medical creatures of gossips. In a country which no one has been able to explore, what matter whether we take the blind or the lynx-eyed for our guide? If the art of medicine be so very uncertain, what matter by whom it is practised?

But the inconsistency of human opinions is at least equal to the inconsistency of human wishes. And it is curious to observe how the workings of the most powerful minds play people into the hands of the most incompetent in the profession. A man accustomed to close reasoning cannot long reflect upon his own health, without forming to himself a system of theory and practice. He fixes upon certain data and draws a long legitimate train of consequences. His plan being pretty well settled, he has scarce occasion but for a dispenser of drugs. Whether application be made to a dispenser or a prescriber, the road to the confidence of the patient is open. His own statement will give the cue, and a very little cunning only is necessary to follow it. Some of our most admired literati have come to take pleasure only in obsequious followers; and in some circumstances, obsequiousness either direct or indirect is more required for opinions relative to health than to any other subject.

Medicine. The complete sceptic in medicine, must either maintain that the order of animal movements has no fixed laws, or that the human understanding is incapable of discovering those laws, or that no useful progress has been actually made in the research.

Medicine. *Art of*. Staggers forward on disjointed ideas as on so many ill-placed stepping-stones, every now and then dropping its charge into a slough.

Measles. May not the eruption be innocently and advantageously checked by warm affusion. See *Fallacy*.

Mockery of Medicine. If the roof of your house were damaged, and the workmen you employed to repair it were to attend at their hours and go through all the movements of their labour, and yet not strike one effectual stroke, and yet receive their pay, what would you think of it? So it is, oftentimes, in medicine.

Muscle. 1. To irritate repeatedly over lime-water, and try if any carbonic acid is produced.

2. To cut out one and weigh it; then to extract the air by the air-pump; then to weigh a corresponding muscle, irritate it, and extract air by air-pump, and to examine both.

3. To steep both and to try if any more or different salts are extractible from them.

4. To expose to nitrous gas, respectively, and other chemical processes or re-agents, in order to discover any chemical products.

N. B. Muscles may produce galvanic fluid in their contractions. To try.

Nature. It is a vulgar error to say such an invalid shall be left to nature. The thing is nearly impossible. Nature has no temple in which the sick can be deposited. Medicines made up at an apothecary's may be discarded, but some sustenance must be administered, and some plan of management followed; and the circumstances of these may be far from indifferent. What they call nature is all art; art-fed, art-dressed victuals as artificial as medicines.

Names. The force of genius preserves a writer against certain faults of taste. Shakspeare calls scarce any of his characters by adjectives expressive of the character he means to paint, except Shallow and Slender. The vulgar Author of the Pilgrim's Progress, vulgarly labels all his. It is a miserable shift to help out deficiency in dramatic drawing and colouring. It should be left to the reader to find out the proper epithet. The name and nature of different members of a family are put sadly at cross-purposes. If the hypocrite hero of the School for Scandal is to be baptised Joseph Surface, his brother ought to have stood in the *dramatis personæ* as Charles Bottom.

Nerve. To wrap a piece of nerve in tin-foil, and galvanize till exhausted, then place said nerve in oxygene to try if it will recruit.

Nosology. Cullen laid diseases upon the Procrustes bed of his nosology, and tugged at this and hacked at that, but all in vain. They could not be made to fit, as all who compare his frame with nature, must acknowledge.

Nurses, *anatomical lectures for*. Were any one to propose such a thing, he would expose himself to all the banter of our critical journals. I have never known an habitual banterer remarkably embarrassed by tenderness of feeling; nor do I soon expect to see such a phenomenon. Nevertheless were one to have a child die of water in the brain from the carelessness of a nurse, and were it to be discovered that all this might have been prevented, if the accident had been sooner known, I am not sure whether he would not restrain his wit for some weeks at least after the event, whatever sport he might be able to make before the public, of the poor author.

Perspiration. To immerse a child's hand in weak solution of nitrate of silver, ditto an old man's, ditto a dog's, to observe the difference of the precipitate. Immerse the hand or finger in nitrate of silver diluted with distilled water before and after breakfast, or before and after sudorifics; also, to discover what part of the body perspires most.

Physicians, *use of*. "Who had Mr. —— to attend his daughter"? "Doctor Such-an-one;" public censure is satisfied. Thus, as an unmarried female cannot go into public but in company with a married one, so it is with Death. He cannot make a decent entry into a family without a doctor for his chaperon.

Physicians, *posting*. Like some of Astley's jockies, who from a horse on full gallop pick up things in their way, some physicians post from sick-chamber to sick-chamber, just stopping to pick up their fee. The Physician in many cases, as in croup, should no more leave his patient, than an accoucheur a woman in labour till she is delivered.

Physicians, *puzzling multiplicity of phenomena*. A traveller may course the high roads of a country for twenty years and yet know nothing of it. Our fashionable Doctors drive full gallop along the beaten paths of medicine, but, very wisely, lest they should become dizzy by the rapidly succeeding objects on either hand, they either keep their eyes fixed on the road before them, or shut them close.

Physicians, *fashionable*. In many places of fashionable resort, the pratice of medicine, seems but a pompous or specious kind of mummery. It seems as if sickness were an affair of complaisance towards physicians and apothecaries. Thus the language is not, so many invalids have been cured, but such a Doctor makes so much money.

Such men may make, no doubt, a conspicuous figure in the books of their banker, but not a line will be devoted to them in the annals of medical improvement. If they were not aware of the *desiderata* of medicine, I know of no terms strong enough to express the detestation in which they ought to be held. If they were, it is certain that they took no step towards supplying them, and on this supposition I leave them to the mercy of the reader's abhorrence.

Phosphorus. To eat a little; bleed; smell and try the air in the dark, if luminous.

Physiology. What would chemistry have been in comparison of what it now is, if apothecaries only had cultivated it? So will physiology be, unless it be taken up separately.

Premature culture favours every species of constitutional disease, engenders scrophulous and nervous complaints where they are not hereditary, and produces new forms of human misery. In this respect, the children of the poor enjoy a much greater chance of health. In the evidence respecting the slave-trade there is nothing more abominable than the servitude to accomplishments. As to labour and the lash—is the case less miserable when it is the mind that suffers?

Quackery. The extension of it remains to be proved. There may be an increase of advertised medicines, but when I consider the immense number of herbs mentioned in our old herbals, and recollect how busy were our old women, I see that they very much exceed the quack medicines, and I venture to believe that medicine, in proportion to the population of the country, is less frequently administered by unprofessional hands than at any former period.

Rabies canina. To try hot-bath 104° and affusion of cold water, and

that six times a day—boiling water on the neck—also removing a part of the cranium and keeping the brain compressed.

Resignation. *Effect of knowledge in producing.* It is not only in conferring active power that the advantage of knowledge is conspicuous. He who sees the end of suffering will be more apt to endure it patiently than he who does not. Children, not having the prospect of relief from surgical operations, do not suffer the slightest without vehement outcries. The common people, not having contemplated the end, nor conceiving the means in any way, flinch from every painful mode of cure with more cowardice than the most tender of their superiors. But, what I have not seldom observed with admiration, where there is no prospect of relief, knowledge has a soothing influence. The man who knows it *must* be, does not oppose his will and scarcely his wishes, to the ascertained laws of existence. Medical men perhaps, in equal circumstances, die more resigned; and if so, the exhibition of the destructible organs of which the human frame is composed, will often render the approach of death less terrible; and the ultimate effect of anatomy rendered popular will be directly the reverse of the first impression.

Reform, *medical.* The quantities of medicine ordered drive people to quack medicines. People can drop the latter when they please, but *cercundia erga medicum* makes them keep on longer with the former, than either the stomach or the purse can well endure. To rescue the public from the stomach part of this evil, it will be proper to enact that the apothecary shall charge for more draughts than he supplies, as used to be the case with post-horses in France.

Rheumatism. There is a degree of rheumatism, semi-acute, no redness of joints, but some fever, and much pain (increased by warmth) in which there is prodigious dyspnæa though the intercostal muscles be not painful. Here seems to be some weakness of the muscles of respiration, which, I think, the heart partakes of, and under these circumstances I suspect the heart readily enlarges; having known instances of such rheumatics labouring under enlargement of the heart.

Rooms, *temperated.* Better than any climate in winter. The question is, whether you chuse a commodious prison with health, or to be at large and diseased. It is not to be expected that you should enjoy the advantages of health under disease.

Sagacity or Subtlety, and solidity or soundness of judgment. The one needed to catch the minute movements of nature, the other to prevent the intrusions of fancy. The first quality much wanted among our medical observers; yet the first in order and perhaps in importance, as it is to provide materials for the combinations of the second. We can tell that so much rhubarb and colomel will purge, so much ipecacuanha vomit, that is we can see where the hand of nature's church-clock points, but for the run of her second and third hands we have no eye.

Sensations. Of great importance to avoid disagreeable ones in fevers—

vivid colours, or associatively offensive objects. Accurately observing attendants have assured me, that nauseous medicines in fever did much injury, especially to children.

Sleep. A subject requiring much study, or rather, much accumulation of facts. There is the utmost poverty of facts in all that has been written on it; probably gross errors, as appearances in the sleep of the sick, may be supposed to arise from disease and yet have existed in health when the sleep was not watched. Observation can be made much better by unprofessional people. In sleep the passing ideas are lost, so the connected muscular movements must be lost too. As in sleeping over a book, and it drops down, or before it drops and as it is dropping, the purpose is recalled and I save it. In sleep, if the ideas return, the connected movements return too: so people might be practised to do any thing in sleep—may be made to talk or walk.

In inflammatory disorders, if due evacuations be not premised, aggravation. Query, from congestion? if they be premised, amendment; and both amendment and aggravation take place more rapidly than in waking state.

Sterne. His writings put people in good humour with the follies of one another. To bring a passage from Hall and Burton is nothing. A traveller in Upper Egypt meeting with a streamlet that is received into the Nile after he had flowed in majesty for a thousand miles, might as well come home and boast that he had discovered the sacred head of the river.

Sympathy. A term that ought to be soon expunged from the language of philosophical medicine, having been a term of ignorance. Sympathetic movements tend to become independent, as in hepatic epilepsy. The fits will continue after the liver is cured.

Theory. All of the human species, not idiots, must theorize. This law, if there be any difference, is most binding in regard to the objects that oftenest come under our notice or most engage our affections. Concerning these we must, all of us, make or borrow a theory.

A severe judgment is compatible with a blooming imagination. The same individual may be as the tree that bears, and the hand that prunes. Of the growth of medical plantations much produces neither flowers nor fruits. Even some theorists that tower above their fellows, may be compared to the tree that reminded the Dean of St. Patrick's of his future fate; only they can hardly be said to have died first at top, because there was probably never any intellectual vigour there.

Thought. The light and load of former ages are upon every mind that thinks. It is no more possible to escape than from the influence of the circumambient air. Some minds indeed, in their elevation, suffer less pressure and enjoy a purer light.

Tragedy, *French*, has always appeared to me as if written under the inspection of a master of the ceremonies, and at the dramatic representations that I have witnessed, no character appeared to enter upon the stage without being admitted by a lord in waiting.

Walks. Too long, in summer, injurious to children. They should be suffered to recruit frequently. Soon exhausted and soon recruited. In many cases, children of two years old, or so, have fallen off directly upon an uninterrupted walk of a mile and a half. The same will happen to adults of great delicacy.

Washing. Among the hardships incident to poor married women with a family, one is particularly severe. This is frequent dabbling in water to wash. Nothing can support the constitution of many against the trial. I have kept an account of the health of several for months; I could do them service in the short interval; but so sure as came the wash, so sure came all the complaints back again. In consequence of this employment and this only, a slight cold shall undermine the constitution, keep them sickly for years, and at last destroy them. Can no good genius invent a machine by which opulent neighbours, attentive to their hard-fated fellow-creatures, may be able to relieve some of them from this destructive drudgery.

Whirling *a firebrand*. To use this as a test for the eye in persons nervous and not nervous, *i. e.* to see if to some, at a certain velocity, it will not appear a circle and to others not.

Women. On any alarming seizure I have seen all in a large lodging-house turn out till the suffering person was completely surrounded. This eagerness is unquestionably, in part, to be referred to motives highly praise-worthy. But they seldom stop at simple sympathy, or even at such assistance as is requested at their hands. They take the lead, ask questions, and decide as if they were so many graduates from the most renowned medical university in the civilized world.

The Author feels pleasure in adding on this last leaf the following ably-drawn character of Doctor Beddoes, which appeared in the Edinburgh Medical and Surgical Journal for January last.

"The reputation of Doctor Beddoes, as a physician, has not yet attained so high a rank as it deserves. There is an ardour of talent, an animating earnestness, a stimulant exaggeration in his writings, well adapted to arouse the torpor and to provoke the attention of medical readers. He had the mind of a poet, and a painter, and displayed the powers of his imagination in vivid representations of facts and theories. He was a pioneer in the road to discovery. He was full of enterprize, and free from prejudice, and, above all, he shewed an ardour for improvements, a disinterested sincerity, a love of truth, which shunned neither trouble nor reproach. It is to be regretted, that he suffered himself to be carried away with expectations of benefit which he thought would arise from every new hypothesis, and every untried remedy. Some of his wildest sallies were made in search of means for preventing disorders of the lungs; but although his learning has done much in making known the destructive ravages of that malady, his efforts in proposing a method of treatment have not yet been attended with the happiest success. There is a sobriety in the English people, which leads them to receive every new proposal with caution, and if it be found not to answer all that is said of it, they are apt to reject it altogether, and view future attempts with more sturdiness and distrust. Dr. Beddoes possessed *satis eloquentiæ sapientiæ parum*, for the times in which he lived. Those high views, and that habitual appeal to the classical minds of philosophers which he uniformly displayed, have not obtained such sanction as they ought; his zeal has been mistaken for presumption, but perhaps some future age will affix to it the juster character of energy and truth. He was a man of great learning, and understood perfectly the Greek, Latin, French, Italian, Spanish, and German languages. His temper was admirable, and he was highly respectable in all the relations of private life."

Printed by E. Bryan, Corn-street, Bristol.

A mistatement has accidentally found its way into the Memoirs of the Life of Dr. Beddoes, page 389, which appeared to Dr. Craufuird of such importance, that he has addressed the following letter to the Author, with a particular request that it should be made public.

" Dear Sir,

" I thank you for the Life of Dr. Beddoes which you have sent me: the perusal will, no doubt, give me a melancholy pleasure.

" The only part which I have hitherto read, is the narrative of his last illness. Some particulars of this are unaccountably erroneous, and as the error relates to me, I must beg leave to enter my protest. Having made it sufficiently apparent that the case of Dr. Beddoes was at the time hopeless, you proceed to observe, " As the symptoms seemed to become hourly more serious, Dr. Craufuird took an opportunity of expressing to the family his wish that the inclinations of his patient should no longer be silently acquiesced in, but that some other of his medical friends should be instantly sent for." This is directly contrary to the fact: at this period it was perfectly evident that Dr. Beddoes would, in all probability, expire before further assistance could arrive, and that such assistance must, at all events, be unavailing. With this conviction in full force on my mind, to have requested further assistance would have been absurd. In the beginning and during the progress of Dr. Beddoes' complaint (in compliance with the common custom in such instances) I had uniformly suggested the expediency of further advice, which was as uniformly refused.

" Mr. King, to whom I had from the beginning mentioned my fears of the fatal termination, at the period mentioned, himself proposed the consultation and even named the physicians. To this proposal I could not give a direct refusal, though my answer, " that Dr. Beddoes being absolutely moribund, all assistance must be nugatory and unavailing" might have prevented the measure.

" You may recollect that on our meeting I made a similar remark to you in the presence of Dr. Bernard (to whom I had before communicated my opinion) and also then observed to you that it was neither my suggestion nor wish that you should be sent for at that moment.

" From the inconsistency of proposing a consultation on a patient in the agonies of death, I trust that I stand exculpated.

" I am, dear Sir,

" Your's respectfully.

" W. K. CRAUFUIRD.

" Clifton, 12th Dec. 1810.

" Since writing the preceding I have seen both Dr. Bernard and Mr. King; the circumstances as I have stated them are still fresh in their memories."