

CHAPTER XXVI.

RECASTS AND FORECASTS.

IN glancing over the proofs of this book nothing strikes me more forcibly than recollections of omitted incidents. In writing so busy a life as mine from the medical side, the side that first interests me, it has been necessary to omit outside narratives which medical men, more than most men, can supply. The subjects related in this chapter, therefore, are recasts of incidents that have accidentally been omitted.

“The Asclepiad.”

Some years ago, in order that nothing might escape from me which seemed of moment, I started the publication of a book in parts and called it *The Asclepiad*. The first volume was published in 1865, and consisted of several essays of an experimental and practical kind, including one on “Cardiac Apnoea, or Breathlessness, with Open-Air Surfaces;” on “Urea and its Physiological Influences,” and on “Scarlet Fever.” The work was discontinued for a season and was then re-started

in quarterly parts, of which forty-four have been published in eleven volumes, containing reference to a considerable number of subjects, to which I must refer as if they constituted portions of the present work. I shall now only retrace, in abstract, papers, many of which—but not all—will be found in those volumes.

Researches on Foods.

It has never been my fate to be what is called a vegetarian, but my sympathies have been with vegetarianism, and I have for quite thirty years tried to lead it into a new path by endeavouring to make the vegetable world the source of foods that are animal in taste and quality. If I have been slow to produce foods for the market, I am certain as to ultimate success, so that in coming days we shall no longer be savages, going out to kill animals lower than ourselves that we may live on their mutilated bodies.

In experiment it has been a pleasant surprise to find how near we can get towards animal food derived from the vegetable world by operations carried out in the laboratory. I have approached so near to the manufacture of milk that one or two improvements will enable men to produce the most vitalising of animal fluids at their pleasure, quite as freely as they now produce beer, and so cheaply that any quantity could be obtained in all places as a food fitted for purposes of all eras and free from any possibility of creating disease. Solid foods,

by the treatment of vegetables in the experiment-room, are also sufficiently advanced to make it a question how they shall be moulded, in the form of joints, or of shapes which have no appearance of a part of an animal body.

It has been urged on me that what I have done is not going far enough on logical grounds, if we move any step at all, and that we might, as it were, eat the very earth itself irrespective of life altogether, and rest on the primary substances, the actual elementary principles, for our bodily construction, into which life would enter as air would, and out of which shape and form would be manifested. I would not dispute this argument, and the change may come, if civilisation and the earth go on long enough; at the moment, however, it is a correct and sufficient attempt for us to transmute vegetable substance into animal substance for our own sustenance, and in this attempt alone the work of ages lies concealed. I have tried to give the effort a start and it seems to be making its way, while, at the same time, I have endeavoured to ameliorate the strictly animal method and bring it nearer to the world of civilising tendencies and aspirations.

There are many reasons why the transmutation of vegetable, into what is practically animal, food should proceed. In the first place, it is not a difficult advance. Nothing more is required for it than industry and courage. The possible absolute

necessity of the change also lies before us. Daily requirement of food is absolute, while supplies of direct animal kind are dependent on the most capricious conditions. In a large population like that of London we may be limited, even in times of wealth and peace, to three weeks' supplies. In an isolated, coast-bound country like England we might be cut off suddenly from food, if we should depend on animals that die. Again, in promoting the exclusive animal system we cultivate cruelty, disease, uncleanness, and the growth of a population we cannot expect fully to defend our laws by their testimony. The risk is altogether as bad as it can be, and is not met even when the fish or the mammal monsters of the sea are taken into consideration. Throughout the land we want scientific factories of foods, not slaughterhouses—manufacture, not slaughter. The temple of life is too sacred for the mutilation of even inferior animals, for our own support, and, veritably, "all flesh is grass."

Model Abattoirs and Slaughter Reforms.

Meanwhile, as humane science awaits development, and while the customs and tastes of mankind are being newly educated, while old tastes and customs still linger, I have been fully alive to the endeavour of introducing improvements of every possible kind into the ancient practice. I have persuaded all I could reach to depend, as far as possible, on the

vegetarian system. I have commended it to those who have trusted it and have not trusted it, and, never ceasing to teach transmutation, have done all I could for amelioration by founding the Model Abattoir Society—of which I have long been President—and by trying to introduce a perfectly lethal and painless mode of killing all kinds of animals.*

It is fair to say that to this movement there has been much more encouragement given than might have been expected. A great many towns have erected model abattoirs, and ingenious methods have been introduced for making the sacrifice of animals both rapid and merciful.

Tobacco.

In a preceding chapter great labour was spent in pointing out the method that has been followed in fighting the battle against alcohol, but nothing yet has been said about the contest that has taken place with tobacco. This is not because the contest has been considered unworthy of notice, but because it is of less pressing moment. I have not a line to write in favour of tobacco, and for a long series of years—twenty-five at least—I have scrupulously avoided smoking because of its bad effects on health and vitality. Smoking is not simply a dirty habit, but one that injures the body. It is not in character with the work of the animal machine. It stupefies

* In this work I was ever assisted by the unwearied efforts of the late Mr. H. F. Lester, the Honorary Secretary.

the mental organs; deranges the blood; impairs the circulation; weakens the digestion, and stunts the growth. It also produces local mischief and is most distinctly provocative of some fatal forms of disease. No child ought ever to be inducted into its use, and in a sanitary world conducted on sound principles indulgence in tobacco would be unknown.

Rest and Luxury.

A saying of mine has become popular, namely, that there has been assigned by nature to members of the human family a term of life reaching to one hundred and five years. The idea is fair, and the experience of years has most closely demonstrated to us its correctness, so that the writer of Genesis is much nearer the truth than the after-writer, signalised as David, who gave three score years and ten as the natural duration, and who only can be accepted as witnessing a more luxurious, and, therefore, more treacherous, time. I have seen and conversed with at least four persons who, without doubt, had passed a hundred years, and one, not the worst of the number from a physical point of view, was no less than a hundred and seven. I do not presume, however, that all bodies are susceptible of such length of days. There are some so active and busy that they practically live a hundred years in two-thirds of that time, and are old by work rather than by years. There are some, too, who kill them-

selves by rest, and large numbers who do so by luxury, while all are exposed to the dangers of death in the shape of accidents and diseases, and to risks incident to hereditary type or construction of form and build. We must consequently admit a shorter mean average than the maximum natural term, and, while we do our utmost to attain the full age, must be content to accept the average in our own individual persons, knowing the worst and striving for the best.

Pulmonary Diseases.

Some years ago, in writing about the epidemic catarrh called influenza, I threw out the idea that the symptoms of congestion seen in the lungs, and so often fatal, arose from paresis of the pulmonary vessels, owing to the fact that their nervous supply from the sympathetic system was deranged or cut off, so that the heart could inject them with blood. It was urged against this view that there was no sufficient proof that the vessels of the lungs were supplied with sympathetic controlling branches. I was astonished at this statement, but, conscious of the possibilities of my own error, commenced to inquire, and to my surprise found that the criticism was correct. On thinking over the lungs as mechanisms for conveying blood over a surface exposed to the air, I could not fail to see that it would have been a very bad arrangement to have

had the blood-vessels of the lungs under the influence of the sympathetic, because it would have placed those vessels under impulses derived from nervous impressions of the mind. The lungs, under such circumstances, would have blushed like the cheek, or paled like it, whenever a mental change took place, and sudden death from congestion on the one hand and syncope on the other would have been of constant occurrence. Wisely then, the blood-current flowing through the lungs was obliged to make its course passively, uninfluenced by any direct internal emotion, and only influenced by such variations, as heat and cold, that could affect it directly from the air which the bronchial tubes inhaled or gave forth. This would be the correct mechanism which we, as animal engineers, would follow if we were constructing an apparatus that would cause blood to absorb oxygen from the air or give off carbonic acid.

Clarification and Resolution.

The earlier surgeons deserved great merit for the success with which they removed substances that had become opaque, like the crystalline lens. William Cheselden earned immense credit for the course he took in regard to cataract, but the time has come when the surgeons should begin to think of something beyond mere removal, that is to say, they should begin to study the process of clarification of substances that have become opaque.

In a paper I wrote on the synthesis of cataract, I showed that the crystalline lens could be rendered opaque by raising the specific gravity of the blood with any substance that possessed a crystalline character. Dr. Weir Mitchell, in the most original observation, had shown that excess of sugar in the blood would most distinctly produce diabetic opacity. I moved from sugar to other crystalline substances, and produced cataract of an equally definite kind, by soluble salts like chloride of ammonium, and similar bodies. I saw that if these were removed from the body affected by them, the lenses were cleared as easily as they were rendered opaque. Sir David Brewster had supposed that in cataract the transparent lens was made opaque by aberration of its fibres; others compared the opaque lens to a scratched glass. I saw Sir David on this point, and showed him my own experiments, which indicated that the lens could be infiltrated and rendered as opaque as glass is when it is covered with a solution of a saline substance like Epsom salts. He quite agreed with me in this, and at the time I maintained the policy of the treatment that should extend into clarification. I made some attempts in that direction, and Mr. Brudenell Carter supplied me with lenses he had removed in order that I might try to clarify them.

The field is open still, and a means will certainly be found by which the lens can be clarified, as by the continued use of distilled water as drink, and,

perhaps, by means of a local current, such as an electric current, by the aid of which I have made artificial lenses that were quite transparent.

In all probability this question of clarification extends beyond the crystalline lens. It may lead to the resolution of hardened parts like ligaments, membranes of joints, and lining of arterial vessels.

The Heart as a Pendulum.

The healthy heart seems to act as a pendulum. It gets blood direct from the viscera of the abdomen as they derive it by the digestion of food, and its animation is direct from the visceral chain of ganglia and nerves. It is liable to variability, to slow action, over-exertion, under-action, and to hesitation or intermittency, according to the state of its primary. It may stop altogether if it fails to get, or gets too much, of either matter or force; but in health it regulates.

Further Researches on Blood.

At intervals all through my experimental career studies relating to the blood have been pursued, many of which have been related, for the blood is a fluid that stands first in the investigation of living phenomena. Moses is credited with saying that "the blood is the life," and men of science, whether they sympathise with him or not on the other subjects he discusses and the laws he lays down,

may accept that saying as substantially true. The blood is the life; in what way it is so remains to be determined, and is the question ever recurring to me, how—as an animal engineer—I could, in construction, make it perform work. In these studies my researches have been specially directed to what I have called the pyrophorous blood, and to blood as an excitant of electricity. By these methods extremely curious results have been obtained. I have found oxidised blood, as it is oxidised in respiration, a very fine oxidiser of metallic bodies like zinc, mercury, and phosphorus; have obtained currents by these means, and have got formations so closely resembling living ones that a complete new road has been made visible to me, just as poor Mayow saw when he began to investigate the phenomena of what he called “nitro-aerial spirit,” but some trifling want of perspicacity has, so far, blinded me to some great truth which has yet to be solved in regard to blood as an excitant.

I have also sought, and sought again and again, for the means of dissolving blood when it has coagulated or formed itself into a clot, convinced that if that art were accomplished a marvellous step would at once be made in the discovery of the mystery of life and in discoveries relating to disease—indeed, at this very moment my experiment table is charged with specimens of solid blood subjected to processes under which the clot might undergo solution.

Causes of Death from Chloroform.

The number of fatal accidents from chloroform has recently been very great, and I have been applied to many times by members of the profession, and of the public also, to say whether death under chloroform occurs from failure of the heart or injury to the respiration. In answer to this question I would recall the fact I have often stated, namely, that chloroform and its chloride allies are injurious or dangerous in consequence of the chlorine they carry with them and of its excitant effects on muscular fibre. Presuming, therefore, that the heart, which is a muscle, is unduly feeble, chloroform, however carefully administered, may produce excitation, and, causing an extreme spasm, may kill by that excitant action, when death will be correctly stated as from the heart, that is to say, by syncope. But the larynx also contains its muscles which are exceedingly sensitive, and when the vapour of chloroform is allowed to diffuse through them they are sure to pass into a state of spasm more or less distinctive, in consequence of the presence of the vapour, and then death may take place owing to the contraction which they produce. Death in that instance is due to contraction of the larynx and ensues by what is called asphyxia.

Thus there are clearly two modes of death from chloroform: one by the centre of the circulation—the heart; the other by the respiration through

the larynx. Considering that we give chloroform in these days very freely so as to produce a quick anaesthesia, death by the larynx is probably far the more common occurrence of the two; is not infrequently quite instantaneous, and naturally betrays no affection of the heart, if that be looked for before the administration. I should lay it down as a principle that that mode of administration which is very slow and is felt not at all in the breathing is by far the best, although it may not be so practical as an urgent administrator may consider requisite.

In the administrations of chloroform to the lower animals until death was produced, I invariably found, immediately after death, a difference in regard to the circulation in the pulmonary circuit. When the death has been very sudden the lungs may be discovered actually destitute of all blood, and of milk-white appearance, as if the heart had thrown a current suddenly over them and had left them blanched or in a state of what may be very properly designated as pulmonary emptiness, or apnoea.

Further Research in Reanimation.

If I had my life to live over again I would spare no labour in repeating the researches on reanimation, but from what I have learned I should recommence at the central seat of power, the organic circulation. I have noticed two things: one, that

in setting into motion an ordinary engine we do nothing by merely moving the visible apparatus like the hands or wheels except to make a show of action: two, we have to start from the mainspring if we are to do any real service; for in the animal body I have observed that so long as there is ever so little supply from the centre into the other parts, there is continuance of the evidences of animation. Hitherto we have been too confined to the notion that if we could excite a movement or set of movements that looked like those of respiration or circulation we need not wait for the central action. In the future we must wait for the central movement, and hope that the rest, or secondary movements, will follow, however extraordinary it may seem. This is what happened in the examples, already given in Chapter XVI., of hibernation, and although the secondary movements may be useful when judiciously made they are not alone of use. If we could feed all the nervous centres with animating spirit, we should, without doubt, get manifestations of vital action, but that must be sustained as well as merely manifested, that is to say, the battery must be fed and fed; a process that only can be kept up by steady feeding of the central system, and of the secondary systems from it as their primary.

Apparent Seats of Disease.

It is a common and natural error to attach too much importance to diseases of a particular kind.

Thus we often consider the kidney as the origin of the disease diabetes, when it may not be the seat of origin. The disease named diabetes is one in which sugar is largely made in the great central system in the abdomen, the system of organic life, with its sympathetic nervous supply directly or indirectly at fault. The sugar circulates through the body; sets up a number of abnormal phenomena, which are symptomatic, and meanwhile the kidney goes on very actively eliminating the sugar in performance of its regular diuretic duty. We then get developed the leading sign by which we derive the distinctive name of the disease diabetes, and we try, by variation of foods, to control the disease. The kidney may undergo change of structure from its overaction, but it is not necessarily deranged in the first instance, and is not actually the *fons et origo* of the complaint. The same explanation might be given of other diseases.

Transparency of the Body.

In 1868 it was a labour of mine to make parts of the living body transparent. I endeavoured to invent a tube through which sun-rays could be transmitted and pierce through parts that were hidden. I brought the matter before the British Association at Norwich in the year named, and exhibited some curious experiments bearing on the point, making sunlight rays go through the skin and softer structures, but not with the same readiness through

bones. Thus, I could make the bones visible and could render some so transparent that I could read large words through them. Afterwards I used this plan for diagnosing and destroying tumours in soft transparent parts.

These experiments lay dormant until the present year, when they became revived by the labours of Röntgen, who has used the light emanating from a Crookes' tube to illuminate all structures except bones, and to make bones, in shadow, perfectly visible by photography. It is a great advance, and it shows clearly that I was shortsighted, however difficult the feat might be to confirm my observations on the mere light-rays so as to give them the power of penetrating and illuminating animal tissues, as described in the paper submitted and published in the *Transactions* of the British Association twenty-eight years ago.

Vulcanisation of Elastic Tissues.

While I was busy in the vulcanisation experiments it came to be tried whether the elastic tissues of animal bodies could be vulcanised so that such tissues might resemble the hardened structure made out of elastic rubber by the dentist, and on which he fixes artificial teeth. I, therefore, vulcanised the elastic substance found in a large artery, like the aorta of an ox, and I certainly obtained some singular results. I got plates that closely resembled,

and possibly were the same as, vulcanite, and the hardness of vessels which is derived from age is to a considerable extent made demonstrable if length of time be allowed to replace intensity of action.

Electric Carbon.

I am of opinion that carbon is the conductor of electricity all over the body, and that, according to the electricity, the carbon combines with other elements in proportion to their capacity for blending with it. Thus, oxygen will combine with it in the proportion of one to one or two to one; chlorine, in the proportion of one to three with hydrogen as an addition, or one to four. And so with all bodies that conduct an electric current. But the subject is too enticing for the writer of a book like this to be led away by.

Crystallisation.

In watching the way in which solid forms are produced the subject of crystallisation has been always evoked. The straight lines look as if they were dependent on the attraction of the earth, and were fixed by it. The quietude of organic forms is strangely related to crystalline development, and the crystallisation of nervous structure is singularly demonstrated both in sleep and in death, the first, indeed, seeming altogether to depend on it. It has often been my intention to delineate a book as

illustrative of the crystallisable forms of nervous matter. It would contain a most useful series of plates, and would be as beautiful as was Mrs. Glaisher's work on *Snow Crystals*, but the labour was too serious, and the subject too entrancing for me to write upon. Nervous matter speedily crystallises at points at the termination of nerves and on terminal surfaces. These observations afford a splendid field for further research.

Two Modes of Observation of Natural Phenomena.

There are two modes in which natural phenomena may be proven: one by observing what nature herself may be doing, and which we have not previously seen, although the work is every moment in progress, and the other by tracing out the directions in which she seems to carry out her designs. The first of these will lead to accidental discovery of great phenomena; the second to systematic or philosophic discovery, which may be the work of many men, and may be linked with them all when it is complete.

The Colour of Animals and Races.

I have worked very hard at the colouring of animals. The colour of the skin entirely depends on the power of the skin to absorb or reflect sun-rays. A white man reflects, a black man absorbs,

rays, and this constitutes the difference. We can change the blood with some salts, like nitrate of silver, and so make the body black, and there is no reason why we should not find out a substance that would make the black body white. We can apply solutions like peroxide of hydrogen, which rejects partially and leaves a surface of a golden tint. I once changed the colour of black beetles by immersing them when dead in a solution of peroxide of hydrogen, and got golden, instead of black, beetles.

But the most curious observation was on a child suffering from cyanosis, in whom the hands were quite dark. By keeping one of them immersed in peroxide solution it became, visibly, of white colour. Ordinary black skin would do the same, and there is no reason why one colour should not distinguish all races of men. Two men, to my knowledge, were equal in competition and resembled each other equally except in colour; but the white man ultimately won, because he had to labour amongst white people, a result to be expected.

Nervous System as a Director of Power.

The brain as it fills the skull is composed of two centres, one large, the cerebrum, the other smaller, the cerebellum, and each of these is of two hemispheres. The whole, having a dual function, is apparently constituted of one organ. This, as the

late Dr. Wigan was the first to show, makes a distinct duality of the mind, as I have expounded in the *Asclepiad*, Vol. IX. for 1892 pp. 349-70.

The subject of the directing power of the different parts included in the cavity of the skull is one that I have tried with much care to unravel. I have tried it on the experimental side, and I have tried it by observing the changes of movement that may occur in the body of an animal when parts of the brain are subject to disease or shock, and the results have been fairly uniform. I have never ablated sections of the brain or destroyed them mechanically, but I have devised means by which sections could be temporarily suspended in function by extreme local cold, and have recorded what occurred while the suspension was maintained, and what happened before, during, and after it.

It was obvious that the effect of suppression of the hinder parts of the brain, and especially the cerebellum, was to destroy forward movement, so that a backward somersault was made, while the effect of suppression of the fore parts, particularly of the *corpora striata*, was to weaken backward movements of the body, and allow the propelling cerebellum to send the body forward at all risks. Thus, when persons are awed by looking down a steep precipice, the effects of the checking power of the front centres being reduced, the impulse is for the body to cast itself down the precipice. I have recorded the case of a man considered to be out of his mind, whose peculiarity

was a determination to rush forward whatever might be the obstacle in his way, and after his death it was found that he suffered from diseased condition of the *corpora striata*. I have further pointed out that birds shot fall forward precipitately if a shot has passed through the *corpora striata*, but fall backward if the shot shall have passed through the back parts, such as the cerebellum.

It came out, in fact, that there are in the brain controlling or balancing centres by which the direction of the body is correctly sustained or incorrectly intensified. The manifestation of the condition of the brain is extremely important in the study of disease, just as important, in fact, as paralysis, or convulsion of a limb, as indicating the place of injury of a nerve, a centre, or of the spinal cord.

Water Pressure on Brain.

In a previous chapter I have described the condition produced by injecting water into the cerebrospinal fluid and the provision that is made for its removal into the circulation. It looks, thereupon, to me that there may be in the body increase or decrease of spinal fluid itself, and that this being increased or diminished pressure may modify the tension of the nervous substance both in health and disease and set up natural or unnatural phenomena such as sleep or coma.

Brain Storage.

I have spoken of the heart as a piece of mechanism, and I look upon nervous matter as a storer of the force by which the body is moved. I have reduced nervous matter to the state of pulp; filled glass vessels with it, and fed it with positive electrical supply from the prime conductor of a machine. In this way I have succeeded so well in storing the brain that the conductor, immersed in the brain pulp, which receives the shocks from the electrical machine through a knob, derived electricity so distinctly that other bodies brought near to it and suspended by a silken thread would revolve around it.

Changes of Mind.

The minds of human beings change in the most extraordinary manner in the course of years, as if the mould in which they were cast had undergone modification and held new life, so that the saying "Ye must be born again" admits of a new and strict scientific interpretation. We notice the fact very much in our own careers, and the world around us never fails to notice it. When I was young I was active in all kinds of work, but in none more than in organisation of surroundings. I never remember feeling a shade of envy, while I detested malice, hatred, and all uncharitableness, but I attached myself to those principles which I, rightly or wrongly,

thought were just, and advocated them without hesitation or fear. In time the tone of mind and action were modified, the accidental environments seeming to change in their whole nature, so much as to alter both taste and action. I cultivated more and more an old and firmer love for general and omnivorous reading both of books and of nature. I clinched in my own mind the early determination that in my profession I would do nothing to anyone that I would not willingly have done to myself; I taught the same doctrine to all students and colleagues, and have ever been happy in carrying it out, although it has not always been obviously advantageous. I retired largely from circles in which I once liked to move, and from pursuits I once delighted in following, making the laboratory, library, and consulting-room more than ever my home centres—practically a hermit life, in which the reading of a book, the writing of a song or story, the performance of an experiment, the preparation of an *Asclepiad*, or the attendance on a sick and helpless person, seemed the chief obligations and satisfactions. Grown men, no doubt, undergo changes in their nature, by which the kaleidoscope of their lives is varied, and it is good that this should be the case, because it causes variety, and really peoples the earth with different classes of population.

Second Childhood.

It is often made a matter of contempt that in the life of man there should be a stage of what has been written of as

“Second childishness and mere oblivion.”

I never could see it in that light. To me every one of the seven stages of life is the production by nature of a distinct instrument—at last an instrument that is out of tune, practically dying to all the vibrations surrounding it; laying up no vibrations—storage of force—for itself, but, pleased by passing events just for the moment, soon forgetting all about them. These are most merciful facts. Their occurrence may mean imbecility of the instrument, but it is actually a blessed occurrence to the instrument itself; it keeps it in the world, and it draws the veil over the act of death, so that death comes as if nature had her foot on the cradle and was rocking the body into the final sleep.

An old man I knew tied a string, before he died, to a burning stick of wood; revolved it, and, like a child, was pleased with the rings of fire that the motion of his arm produced. He could not have been better occupied, granting always that he was taken care of by his friends until he ultimately ceased to play his part.

What could have been a fitter termination? The young could not be better engaged than in learning

and preparing themselves for some such second childishness, so that death should be as painless and unknown as birth. Good and pure homes for second childhood and decay should become national institutions, tributary offerings to all mankind.

Sensations and Disease.

What it is I know not, but I am certain that feelings are not always governed by circumstances. I have known a man as merry as a lark when his surroundings have been specially unpropitious, and I have known a man as sad as a dirge when all around him seemed bright and fair. This must be due to some simple variation in the animal instrument which we have not yet mastered, the mystery of which has yet to be interrogated, and which seems to depend on food or air rather than on any other provocative cause.

Psychical Causes of Disease.

I have known fear act as a cause of disease, and am sure that this origin of disease deserves to be much more carefully studied than it has hitherto been. Habit is another singular psychical condition. It often leads to a permanent perversion, and checks that variety which makes the whole organism find scope for action and live throughout to the end. Travel does good very often merely by breaking habit. Imitation is another psychical cause of

disease, a fact that is wonderfully shown in suicide, and is exhibited constantly in supposed deeds of valour or adventure where a man does a thing simply because another man has done some dangerous, though perhaps quite foolish, act.

Proximities.

It has always seemed to me in the course of a medical life that there is much more influence in proximities than is usually supposed. A stone only clashes with the earth when it comes into proximity with it, and it is just the same in living things. It is only by proximity that the passions of love or hate are manifested, and thousands of children owe their existence to proximity alone. Grief is greatly intensified by proximity, and I have seen a woman stricken with the saddest affliction on the death of a child she loved, who would have taken the event with positive complacency if it had occurred at some far distant spot. It is the same in regard to time as to place. If a person should read a review of his or her book, recently written, he or she may be delighted or outraged; but if the book has been written many years ago the same author or authoress, though he or she may never have seen the article before, may have no feeling about it whatever.

A man I knew was maddened up to the borders of suicide by a review, and the ill-grained person

who wrote the review would have been a gladdened and more conceited fool than ever if the madness he had called forth had gone its entire length; but the writer escaped suicide, and ten years later looked upon the attack in its true light, as mere rubbish, and actually proffered ten guineas to aid the needs of the perpetrator of the criticism.

In the treatment and management of diseased people proximity becomes an astonishing element. The proximity of either doctor or nurse may change the whole aspect of a case. One of my artistic friends, speaking of a very ugly physician, begged, in sober earnestness, "If I am ill do not bring that man to me, good as he may be, for he offends my artistic soul and his proximity is always a curse to me." This was plain speaking, but I have not a shadow of a doubt that the man who spoke felt strongly what he said.

Hallucination as a Reality.

I once attended an old gentleman who began to figure as a spiritualist, and who said he held communion with a mutual past friend—the late Mr. Robert Chambers—with his own wife, with Dr. Arthur Leared, whom I also knew, and with others. I am sure he was not deceiving either himself or his friends. His nervous system being gradually modified from the failure of some parts of it, he was practically living on what remained, and, by

necessity, changed the natural into the supernatural, an error we often fall into and from which the most singular beliefs and manifestations assume temporary reality. Visions, perhaps, are of this character, and some persons are built with singularly constructed mental forms, which dominate. When I was a boy I often traversed distances without knowing them and without noticing objects that occupied surrounding space, my mind being entirely bent on some one object, as the making of a kite, or the building of a machine by which we could fly or travel. I have, also, in professional life, during sleep, had visions of, and seeming communications with, those in whom I was at the moment specially interested. There was always some perversion of the actual, as if the apparent and the real were admixed, but there was enough to constitute a vision, if I had liked to accept some parts of it as reliable.

Medical Destiny.

No medical man can reasonably be a materialist, for he is charged with the animating spirit that is eternal. But it is his particular duty to deal with the mutable instrument through which the immutable manifests itself as an animal; to keep it attuned to its surroundings; to adapt it to what it is formed to receive, and to create an universal harmony. He may even consider pain as unnecessary to a high civilisation, disease as an

accident, and death as the one visible sign of life, that is to say, of the universal life by which the animal body is animated and which never fades away.

The Spirit or Anima.

It is unnecessary to add that the search into the nature of the spirit or animating principle that exists in the universe, and enters the body, moving it according to its build and construction, has ever been under consideration. To the mind it is analogous to the forces with which we are acquainted. We have compared it with electricity, and in a course of lectures I delivered in 1869, using in experiment a coil of enormous size, many facts were derived which were of the most striking character. Its electricity brought active living instruments into rigidity and quietude. It traversed them in lines, or rejected transmission. It spoke in thunder; it whispered; it had a silent voice; it was everywhere diffused, so as to give no indication of itself; it gathered particles together in an instant, or separated them; it hid itself; it displayed itself.

I made a box covered with plate-glass; put into it different substances derived from an animal instrument in its dead or quiescent form; showered down upon the same the wonderful electrical spirit; made the substances move like things endowed, for the

moment, with life, attracting or even repelling each other, but falling in obedience to attraction when the animating spirit was withdrawn. In many respects this subtle spirit of the universe seems to animate, but whether it is the working power of another supreme and mightier power has to be revealed. We say that God is light, and that He is clothed with light as with a garment, so that light may be a superior power to electricity and may itself be a power of something still superior. Caloric stands before us in a similar way, but all has to be revealed, it may be by our own labours, or it may be by wiser beings who shall visit us from other centres of the universe, retaining still their instrumental form and animate quality.

Body and Spirit.

In the end the message which science seems to give is that the natural body, mutable, mortal, and built out of the materials of the earth, remains under the care and dominion of man for civilisation and improvement, while the spiritual part, which we have not as yet been allowed to see, remains under the care and dominion of Him who is so inconceivably greater, grander, and wiser than we are—the Creator and Giver of Life.

Vitality and Mortality.

There can be no doubt that the prophecy, "Death will be swallowed up in victory," will come true,

This may be by some discovered art or science by which men will treat animal bodies, but it may be also by the correct knowledge which all persons will attain of the nature of death, the continuance of life, and the progressive removal of the natural body no longer fitted for holding the spiritual. Then death will have no sting, the grave no victory.

Spiritual Departure.

Persons become so attached to their own and other animal bodies as animated forms of instruments it becomes painful to them to think of their eternal parts sailing into the infinite, leaving the perishable and transmutable instrument in the earth to be destroyed by dissolution into the elements, to be re-formed, and in another shape to live again. But as the conception is gained and held, it is really, if it be not perverted, rather pleasant than otherwise. It promises a boundless universe, an everlasting existence, a solution of what now seems inscrutable.

Physiology of Sin.

The Biblical statement that we are born in sin and shaped in iniquity is as true and beautiful a sentence as was ever written. There is a most perfect physiology in it. As we are constructed so we are, and we show what we are, sinful or righteous, shapen in purity or shapen in iniquity.

In one of my conversations with the late Cardinal Manning this topic was considered in regard to alcoholism. I told the Cardinal that there was a phase of alcoholic disease in which telling untruths became a symptom, however good the person affected might originally have been. He fully assented, and I was led to say that falsehood was not an inexplicable vice, because alcohol deranged the construction of the organism and that this was typical of the origin of vices. He was deeply interested, and when I related that I contemplated a work on the subject, to be called *The Physiology of Sin*, he seemed moved in my direction of thought. I regret I have not completed my design.

The late Dr. Phillpotts, Bishop of Exeter, must have been moved in a similar way. He wished to create in the Church an order of Medical Deacons, men who by their medical training could become accomplished priests and instructors of mankind. He much desired me to set the example. The late Frederic Barton, B.A., a Positivist and translator of Comte's Catechism, who lived with me for three years before I was married, taught the same lesson, namely, that ministers ought to be medically educated. Dr. Congreve, originally a clergyman, afterwards a leader of the English Positivists, practically emphasised this view by passing the examination as a member of the College of Physicians.

The Morituri.

In our civilisation there always exists in our midst a population to which I have given the name of the "morituri," persons ready to die. In the age of the Caesars they were specially recognised amongst the gladiators. There are numbers of them now, and although they are not truly gladiators they are on every side. They show themselves all round as morituri, on the Bench, in the pulpit, in the consulting-room, addressing a multitude on some political trouble, and even in the perfect rest of sleep. They fall more commonly when they are about to undergo some slight risk, as in having to bear the shock of an operation under chloroform. They are a fixed number in the community, so that I have been able to calculate that there is one of them in about every three thousand.

Physical Attraction.

In every line of experiment I have had to follow it has appeared to me that the primary motor power has always been, and is, attraction—attraction of particles for particles, of the world for all particles. This at first appears to be strange, since it suggests that whatever draws a thing steadily and firmly to itself must mean rest, and in regard to life entire quiescence, veritable death. The thought of rest is dispelled so soon as we see the effects that arise

from the acts of a bell-ringer, and if we can only imagine the centre of the round earth always pulling towards itself, we can see the source of motion from all parts, whenever and wherever upon the attraction a temporary opposing force is set up on and against the attraction.

The needle in the galvanometer is set by the attraction in a given direction, and is held there permanently so long as there is no opposition, but if I set free a counter-force the needle moves in obedience to it, although the central and primary force maintains its undying energy. In the same manner attraction is a force of life. I only walk or move by virtue of a power generated in me that is temporarily in opposition to the permanent and primary. I am weak; I fall. I am buried when the permanent primary—attraction—is not overcome by the secondary and temporary faculty which I call my strength, because there is not distributed in my own organism the equivalent, at least, of that power with which the needle is endowed when the galvanometer is in play.

Lethal Chamber.

Since the origin of the Lethal Chamber, which I had the good fortune to present to the world in name as well as in fact, it has surprised me to see how many persons have demanded its use, not only for the lower animals, but for themselves, or for purposes

connected with condemned criminals, who, it is ignorantly supposed, ought to be made examples by capital punishment. I have never been able to respond favourably to these enthusiasts.

In instances where life cannot be saved and where pain cannot be quenched the chamber is both merciful and legitimate, but I see no further use for it in so far as the human being is concerned, and the idea of letting it to the public executioner for his insane quackery is one of the most repugnant employments of it that could be proposed, stripping it in fact of its mercy, defiling it, and turning it into a mere centre of barbarous and pretended utility.

Life on the Floor of the Sea.

Why the earth is left with so much sea in comparison with land is a very curious question, and what constitutes the bottom or floor of the sea is equally singular. We may know all some day; we shall certainly eventually put limits to the oceans if nothing else of a natural kind arises to produce the same effect, for the old Apocalyptic vision, "There shall be no more sea," always sounds a true prediction; but whether that prediction will be fulfilled by a natural means over which we have no control, whether we shall build up the sea from substances on the land, or whether we shall learn how to live under the sea and

shall explore its foundations, are great engineering questions that have to be solved. The last idea, that of existing below the sea, appears to be the most remote, and yet in a physiological point of view it is nearest to truth, for we really could live under the sea.

A few years ago a Frenchman named St. Simon Sicard, exhibiting at the old Panopticon in Leicester Square, did succeed in living for a time under water. But a more curious thing took place later. In November 1879 I was fetched by one of the directors of the old Royal Polytechnic to see a man walking about under the water of the great tank in which the diving-bell used to descend. I found the gentleman, who was named to me as Mr. Fleuss, walking about quite coolly many feet under the surface of the water, and I discovered that in his waterproof suiting he was supplied with oxygen gas compressed in the helmet he wore; that he had a means of breathing from that source; that he could fix the products of his respiration and continue the process for an hour at least. I made numerous observations on Mr. Fleuss by immersing him in other substances than water, such as carbonic acid and coal gas, but he was proof to them in the same way, and he could carry a lighted lantern, which lived just as he did, to illumine his path and show him his way. I published in the *Asclepiad* all the facts about Mr. Fleuss, who actually could live under the sea, and I have no

doubt that, by an extension and advance upon his method, hosts of men—better equipped—could explore as they wished and keep on the floors of the illuminated seas as distinctly as on the land. We should then say, rightly enough, "There shall be no more sea," and St. John would rank as a very distinctive physical prophet. Fleuss, who has the courage of a lion and the insight of the accomplished natural experimentalist, still lives. I once saw him on the floor of a huge tank of water at the Royal Agricultural Hall walking about, getting up and lying down, as unconcerned as if he had been in the air, and I once saw him, in a tank of carbonic acid, try in vain to light lucifer matches by the usual mode of friction. Nature very often carries out the same process in the fish, but in a different way; she puts the oxygen into the water and constructs a gill, or breathing surface, to absorb the oxygen, at the same time arranging the instrument in many ways to meet the new conditions; and we might succeed in making an engine work in water in some similar way, but it would cost much money, time, and labour.

Ideal of an Older Earth.

I have entertained a conviction that the surface of the world on which we now live and enact our parts is not the first surface that has been, but that there was once a larger surface equivalent

to what there would be if the moon were incorporated so as to form one planet combined with the earth. If that were ever the case everything on the earth was individually larger than it now is; living things existed that were larger than they now are, and many of the marvellous legends regarding them which we retain and prize were not mere inventions but remnants of records of past developments. Once I ventured to express this ideal in the ears of a well-known geologist and professor of geology, who listened with deep interest and was inclined to think I was correct, but said that the certain existence of strata and of fossils stood in the way. His remarks about fossils led me to experiment, and in the old *Medical Times*, and later in the *Asclepiad*, Vol. IX., pp. 411-29, I related how I made mixtures of earthy substances, buried in them dead animals and plants, and subjected these little masses, in a vulcaniser, to a heat of three hundred to four hundred degrees of water-gas, afterwards drying the masses down until they could be broken in pieces. Then—as I have told—I found the remains fossilised, so that it was explained that fossils of the most commanding size could, in a mighty convulsion of the planet, be made to exist, not as evidences of the work of long ages, but of a few years, or even of hours.

I was struck with the sight of flints buried in chalk, and heard it said that they were proofs of living things that once accumulated or had built

up the stone. I made a solution of silicate of lime, put it in a glass vessel, and allowed carbonic acid to bubble through the fluid, upon which chalk was found, and in it were deposits of silicic acid; they dried into little hard bodies like flints, some of which I have still in preservation. Flints, therefore, and chalk might easily have been constructed by the mere ebullition of carbonic acid through a silicate sea, and in a few hours, as compared with millions of centuries as is generally assumed by the learned. The learned, of course, may be right in their surmise, but they are open to correction.

The Journey Round the Sun.

I noticed in the first lines of these chapters the journey made round the sun. There is no other such journey that we know of. We all take it, and I humbly submit that medical men ought to know that journey better than any. We ought to understand as far as we can what are the regions we go through; how we are affected on the way, and how we ought to protect ourselves, if we are able, or at any rate prepare ourselves for vicissitudes. Preparation of this kind, which requires common-sense observation, though it may ever be imperfect, may be far more perfect than we expect, and may illuminate the paths of ages yet to come.

CHAPTER XXVII.

VITAL PHOSPHORESCENCE.

THE writing of the last chapters of a book I have often found to be a more anxious task than any other; it is so now, but I think it best to devote them to what has been an all-absorbing study of my life. It has all through seemed to me a duty to accept the new theory which Liebig introduced, namely, that the leading point to remember in regard to the body is the oxidation of carbon, and to hold the idea of that as a producer of animal heat and of the great vital functions. Receiving this, however, I could never forget another element, phosphorus, and another process, phosphorescence. When Frobisher, over one hundred and sixty years ago, at an expense of some £10, first showed phosphorus to the Fellows of the Royal Society and described some of its properties, he could scarcely, I think, have been aware of the enormous fact he was elucidating. He had obtained the element from living structures like bones, and on questions of vitality it has continued to hold a promising place, and the phenomenon called phos-