ſkin, and ſome degree of drowſineſs, but evidently abates the ſerous diſcharge, and diminiſhes the eruption. This patient has ſeveral ſymptoms which indicate a genuine ſcorbutic *diatheſis*; and it is probable that fixed air taken internally would be a uſeful medicine in his caſe.

THE ſaline draughts of Riverius are ſuppoſed to owe their antiemetic effects to the air, which is ſeparated from the ſalt of wormwood, during the act of effervescence. And the tonic powers of many mineral waters ſeem to depend on the ſame principle. But I ſhall exceed my deſign by enlarging further on this ſubject. What has been advanced, it is hoped, will ſuffice to excite the attention of Phyſicians to a remedy, which is capable of being applied to ſo many important medicinal purpoſes.

ON

ON THE ANTISEPTIC AND SWEETENING POWERS, AND ON THE VARIETIES OF FACTITIOUS AIR.

THOUGH the fact has lately been controverted by an ingenious writer, I am fully convinced with Dr. Macbride, from the evidence of repeated experiments, that fixed air has the property both of retarding and of correcting putrefaction. It may afford matter of amuſement, to conſider in what manner theſe effects are produced.

THAT fixed air may reſtrain, and even prevent putrefaction, without poſſeſſing any inherent antiſeptic quality, is not difficult to conceive. For by ſurrounding the putreſcent ſubſtance with that kind of air,

which it yields by putrefaction, and which requires ſome vehicle to diſcharge or carry it off, the ſeparation of it is prevented, and the body thus retained in its original ſtate. This may be illuſtrated by a wet ſponge or cloth, which will never become dry in an atmoſphere ſaturated with moiſture. Or ſtill more appoſitely by putting a mixture of ſulphur and iron filings in a confined place, or in air in which candles have burned out. Under theſe circumſtances, no heat, efferveſcence, or fume can be generated; whereas the ſame mixture in freſh air preſently grows hot, ſmokes copiouſly, and ſmells very offenſively. *(a)* The ſame obſervation will account for the curious fact mentioned by Dr. Alexander, that the *effluvia* of putrid ſubſtances retard putrefaction in the bodies expoſed to them. Perhaps, however, the generation of a volatile alkali may have ſome ſhare in producing this effect.

BUT

(a) See Doctor Prieſtley's moſt ingenious papers on factitious air, which will probably be publiſhed in the 62d. vol. of the Philoſophical Tranſactions.

BUT ſuppoſing the foregoing hypotheſis to be well founded, which I advance only as conjecture, how are we to explain the ſweetening powers of fixed air? An eminent philoſopher ſeems to hint that fixed air may act as a *menſtruum* for the putrid *effluvium*, and thus imbibe or diſcharge it from the ſeptic body. The ſame idea ſuggeſted itſelf to Mr. Henry, in conſequence of the following experiment, to which I was a witneſs. A piece of putrid fleſh was ſuſpended twelve hours, in a three pint bottle cloſely corked, and filled with fixed air, which had been ſeparated from chalk by the vitriolic acid. The beef was conſiderably ſweetened, but the air in the bottle was rendered intolerably offenſive. Now it affords a natural ſolution of this fact, if we admit that fixed air, by the laws of chemical affinity, abſtracts from the ſeptic body, and holds ſuſpended or diſſolved the putrid particles which it emits. And ſuch an affinity ſeems probable, from their ready com-

bination, as well as from their diſpoſition to fly off together from putrefying ſubſtances. But how is the putrefactive proceſs checked, and the freſh generation of *effluvia* reſtrained under ſuch circumſtances? A piece of the ſame fleſh, which was employed in the foregoing experiment, was left all night in the external air, by the circulation of which the *effluvia* could not fail to be carried off as they were formed; yet the offenſive odour of the fleſh was not diminiſhed. Has not the reaſon of this difference, between the expoſure of a putrid ſubſtance to common air, and to mephitic air, been before aſſigned, when it was ſuggeſted that the latter may perhaps reſtrain the flight of that principle in bodies, the ſeparation of which conſtitutes an eſſential part of the proceſs of putrefaction? Animal fleſh will neither become putrid in *vacuo*, nor when cloſely confined from the acceſs of common air. In both caſes a vehicle is wanting for the eſcape of the mephitic air.

air. In like manner red hot wood ceaſes to burn, in inflammable air, becauſe ſuch air is already ſaturated with phlogiſton.

I HAVE advanced the preceding conjectures, concerning the manner in which fixed air may retard and correct putrefaction, not as affording me full conviction, or to indulge a fanciful hypotheſis, but to promote the further inveſtigation of a ſubject ſo curious and intereſting.

EXPERIMENT I.

IT is a fact lately aſcertained by a very accurate Philoſopher, that putrefaction generates air ſimilar to that which animals have breathed. But this and the ſucceeding experiment ſhews that there is ſome little diverſity in their properties and effects. Air was blown forcibly from the lungs, for a ſufficient length of time, into a phial containing diſtilled water and iron filings. The water was then filter-

ed, and a few drops of the infuſion of galls were added to it. A dark red colour, inclining to purple, was inſtantly produced.

*EXPERIMENT II.

EIGHT ounces of ox gall were poured into a bottle, which had a tube communicating with another phial, containing half an ounce of iron filings, and four ounces of diſtilled water. After ſtanding two days, part of the water was filtered, and ſuffered no change of colour from the addition of an aſtringent tincture. But the next day, when the fermentation in the gall was more evident, another filtered portion of the water ſtruck with the ſame tincture a deep roſy red. On the fifth and ſixth days, when the gall became intolerably putrid, though the vapour ſtill corroded the iron filings, it ſeemed to have loſt

* Communicated by Dr. Falconer of Bath.

loſt the power of diſſolving them. For the aſtringent tincture no longer produced any change of colour in the water, and the iron was evidently precipitated.

*EXPERIMENT III.

SOLUTIONS of iron in water, obtained by different kinds of fixed air, vary in the colours which they ſtrike with an infuſion of galls. When the vitriolic acid and foſſil alkali are employed, a black tinge is produced; when magneſia, or calcareous earths and the ſame acid are uſed, a purple hue is ſtruck; and when the air is ſupplied by fermentation, the artificial chalybeate is changed by galls into a roſy red.

EXPERIMENT IV.

AIR diſcharged from chalk by the vitriolic acid readily and perfectly combines

 with

* By the ſame.

with water; but when ſeparated by the nitrous acid, the union is more difficult to be effected, and much leſs complete. And the artificial mineral water, made by the latter, is more pungent and ſparkling than by the former acid.

EXPERIMENT V.

FACTITIOUS AIR, ſeparated from ſteel filings by the vitriolic acid, neither occaſioned any precipitation in lime water, nor rendered the cauſtic fixed alkali mild. Whereas the air ſet free from chalk and magneſia, by the ſame acid, inſtantly produced a milkineſs in lime water, and reſtored to the cauſtic alkali the power of effervescence.

EXPERIMENT VI.

A PIECE of putrid mutton, which had been employed as a ſtandard in ſome other experiments, was divided into two equal

equal parts: One of theſe was ſuſpended by a thread in a phial, containing an efferveſcing mixture of chalk and dilute ſpirit of vitriol; the other in a ſimilar phial, with a mixture of iron filings and the ſame acid. The mouths of the phials were ſlightly ſtopped with folded paper; and a briſk fermentation took place in each of them. After being expoſed ſixteen hours to the air detached from theſe ſubſtances, the bits of mutton were taken out, and examined. They were both conſiderably firmer in their texture; and the one which had been ſuſpended over the efferveſcing mixture of chalk and oil of vitriol was entirely ſweetened; but the putrid fetor of the other was not in the leaſt degree corrected.

EXPERIMENT VII.

A PIECE of putrid fleſh was ſuſpended about half an hour over a mixture of iron filings and nitrous acid, and was perfectly

ly ſweetened. It had acquired a pungent and ſlightly acid ſmell, but remained firm and free from fetor when this odour was waſhed off. The water, in which the fleſh was waſhed, did not effervefce with *lixivium tartari*; nor did the vapour ariſing from the ſpirit of nitre and iron filings produce any change of colour in a paper covered with ſyrup of violets; preſumptive proofs that the ſweetneſs of the fleſh was not reſtored by any acid fumes.

THE fixed air of metals ſeems, by ſome of theſe experiments, to be of a kind different from that which is contained in alkalis and calcareous earths. And conſequently the action of theſe ſubſtances as *fluxes*, cannot be explained on the principle of their reſtoring the air which had been loſt by calcination. Indeed there are other proofs that the reſuſcitation of calces does not depend on this cauſe. I have been aſſured by an able Chemiſt that he has repeatedly reſtored *minium* to its

its metalline ſtate, by the cauſtic alkali, aſſiſted by a proper degree of heat; and that ſeveral of the metals may be revived by the force of fire alone. It is true that a mild calcareous earth employed as a flux, is always rendered cauſtic by the operation. But this may be owing to the action of the fire, and not to the loſs of its air by elective attraction. Perhaps the operation of alkalis and calcareous earths as fluxes may depend on their abſorbing the matter which ſeems to be added to metallic ſubſtances by the proceſs of calcination, and which furniſhes ſuch an amazing increaſe of weight *(a)*? Inflammable bodies may produce the ſame effect, by volatilizing and carrying it off.

(a) ANTIMONY, when calcined, gains one eleventh part of its original weight; zinc one tenth; tin one ſixth; and lead, when converted into minium, one fourth.