portion of deaths, in the first two years of the disease, is much less in those who are operated on than in those who are left; amounting in the former to less than eleven per cent., in the latter to more than thirty per cent. Such a result, while it justifies the operation in the cases of acute cancers which are not attended with evident cachexia, may be fairly set against the mortality from the operation itself, which I still believe to be not less than ten per cent.

ON THE

CHEMICAL CONDITIONS OF CHOLERA ATMOSPHERES.

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THE chemical conditions of cholera atmospheres is a question of intense interest in the subject of public health; but with the exception of the unpublished experiments of Dr. Prout, during the epidemic of 1832, comparatively little attention appears to have been bestowed on it. One of the most striking circumstances connected with the occurrence of the disease is, that no change very palpable to the senses prevails; and it has even been remarked, that the weather has usually been exceedingly agreeable. In London, at St. Thomas's Hospital, the neighbourhood of which afforded a large supply of cholera cases, the relative weight of the air, in August, 1854—a cholera month, and in August, 1855, when the metropolis was in an exceedingly healthy condition, is exhibited in the following table in grains per cubic foot:—

1854.	Weight of cubic	1855.	Weight of cubic
Week ending	foot in grains.	Week ending	foot in grains.
Aug. 5th ...	522.9	Aug. 4th ...	516.9
12th ...	526.7	11th ...	524.3
19th ...	525.	18th ...	525.9
26th ...	523.5	25th ...	519.2
Sept. 2nd ...	525.2	Sept. 1st ...	523.0
9th ...	530.3	8th ...	531.6
Mean ...	525.6	Mean ...	523.5

The result, as deduced from this table, which has been calculated approximately from the barometric pressure, dry and wet bulb thermometers, is analogous to that obtained by Dr. Prout, in 1832, as I was informed by himself. Corresponding observations have been made by Mr. Glaisher, at Greenwich, and the same conclusions arrived at; from which it would appear that this superior weight of a given bulk of common air was not a local phenomenon, but was diffused to a considerable distance.

Another character distinguishing September, 1854, from the corresponding period of 1855, was the absence of any atmospheric action on ozone test-paper in the former season; while during 1855, the oxidizing influence of the air has never been absent at St. Thomas's Hospital. During September, 1854, however, when no ozone could be detected in London, its action was sometimes faint, and often very strongly marked, at Lewisham, near Greenwich. Throughout the same periods the air was exceedingly stagnant; and it has since been observed by Mr. Glaisher, and also at Vienna, that rapid atmospheric movement is pretty generally accompanied by an oxidizing condition of the air.

With reference to the chemical composition of the atmospheres of inhabited localities and malarious districts, experiments have usually been conducted on the constitution of the gases which enter into the composition of the air. But the results seem to have thrown little light on the possibility of the production from such causes of any disease characterized by a regular sequence of symptoms. So far as our knowledge warrants, gases can either act only as asphyxiating media by the exclusion of oxygen, or as slow or rapid poisons. The cause capable of inducing disease, formed on a peculiar type, analogy leads us to infer, must be in an organized condition, either in a solid form, or in a finely-diffused, or vaporific state. The fact observed, that in malarious atmospheres sulphuric acid speedily become black, also points to the propriety of examining the air in such situations, with the view of filtering from it solid or condensable matter. In the epidemic of 1849-50, I examined the exterior air of an infected district with this object in view to the extent of many cubic feet; but the result was comparatively negative, and led to the inference that the

examination of large masses of air could alone hold out any prospect of a successful issue.

For this purpose, in 1854, air was passed through carefully-prepared distilled water, contained in Wolfe's bottles, by means of a large aspirating apparatus, of the capacity of sixteen cubic feet, which was kept constantly in action during the day for several months. Occasionally freezing mixtures were applied to portions of the apparatus, and a tube filled with pumice moistened with sulphuric acid, placed near the aspirator, completed the series. A range of glass tubes conducted the air from a cholera ward into the aspirator. The ward was 32 feet long, 20 wide, and 9 high. The air was drawn from the centre of the ward, near the ceiling; and when the apartment was filled with cholera patients, the air, after traversing several layers of distilled water, speedily charred the sulphuric acid, and deposited a variety of solids in all the Wolfe's bottles, which could even be detected in some measure by the eye. The objects consisted of blue and red cotton fibres, from the dresses of the inmates, portions of hair, wool, fungi, sporules of fungi, abundance of vibriones, or lower forms of animal life, with particles of silica and dirt. In this and in all the experiments conducted on the air of closed apartments, the distilled water was rendered strongly acid, from the presence of sulphuric and sulphurous acids, derived from the products of gas and coal combustion. The distilled water used in these experiments was boiled for some time previous to being introduced into the apparatus, and was divided into two portions, one part being placed in a stoppered bottle, beside the Wolfe's bottles, through which the air was conducted, the sediment, if any, being afterwards examined and compared with that resulting from the experiment. When the ward was only partially filled, vegetable epiderm, vegetable cellular tissue, fragments of cotton, linen, vegetable hairs, sponge spiculæ, minute fungi, spiral vessels, sporules, spore cases, animal epithelium, oil-globules, and silicious particles were conspicuous, while vibriones were entirely absent, or at least mere traces could be discriminated. This is an interesting result, since, in the first case only 98.6 cubic feet were examined, and of the partially empty ward 240 cubic feet passed through the apparatus. When the ward was empty, cotton fibres, wool, a trace of fungus, with carbonaceous and silicious particles, were alone observable, the amount of air examined being 304 cubic feet. The air external to the ward, and in the immediate neighbourhood, afforded, from 560 cubic feet, one cotton fibre, one of wool, a crystalline body, probably a sponge spicula, sporules, beautiful mycelia of fungi in various stages of development, and some carbonaceous matter. The distilled water, in this instance, likewise yielded a strongly acid reaction, produced by sulphur acids. The possible influence of sewer atmospheres predicted interesting results from an examination of such air; and accordingly, it was found that the predominating feature of this experiment was animal life, in the form of swarms of vibriones, in various stages of advancement. The chemical reaction in this case, unlike that in the preceding experiments, was invariably alkaline, due to the evolution of ammonia from the nitrogenous matters contained in the sewage liquors. These experiments render it sufficiently obvious, that organic living bodies constantly surround us in close apartments, and particularly that animal matter, under certain circumstances, exists in the air. It is scarcely legitimate to infer, that the absence from the air of matter capable of communicating cholera has been proved by these experiments, since it is certain that nitrogenous materials, distinct from the germs of vibriones, must have been present, to supply food to these living beings. The researches show, that foreign animal matter, injurious to health, may speedily be concentrated in certain localities, which will undoubtedly assist, in conjunction with meteorological conditions, in the production and propagation of disease. Pathological investigation, carefully conducted by my colleague, Mr. Rainey, detected, in one case, an entozoon in the glottis, the only analogues of which have hitherto been found in the substance of the muscles of animals, a fact which would seem to indicate that the germ of this creature had been derived from the atmosphere, or at least directly from external sources. Careful pathological examination failed to detect in the mouth or air-passages sporules, germs, or living beings, in those patients who died of cholera. The experiments of Mr. Rainey prove that organic solutions readily yield a soil for the growth of such atmospheric sporules as were detected in these investigations; and that when such solutions are brought only in contact with filtered atmospheric air, they are not attacked by mouldy growths. For a detail of the following interesting experiments, I am indebted to Mr. Rainey; they may be cited as striking evidence against the theory of equivocal generation,

and as bearing upon the improbable theory of the possible production of disease by the agency of fungi.

"The decoction which is found to answer best is a saturated solution of nut-galls and alum, made by boiling these two substances, in a larger quantity than can be dissolved, in water for an hour or two. If some of this clear solution be set aside, whilst hot, in a bottle, covered merely with a piece of paper to keep out the dust, fungi will in a few days be observed to form in it, provided the temperature be sufficiently high for that purpose. This experiment will succeed very well during the summer months.

"If the solution be very strong, the fungi will be apparent first on the surface; but if weak, their mycelia will form first at the bottom of the phial, and, gradually accumulating, they will reach the surface, and the fungi will become developed. In the experiment which was made, this fact was ascertained, and repeated merely to show that the solution which was afterwards employed was capable, on exposure to a small quantity of air, of developing such fungi.

"Next, a quantity of this same solution, after having been boiled for half an hour, was put, whilst hot, into a wide-mouthed glass jar, and carefully covered over with a piece of thick bladder, every part of which was kept in contact with the solution, so that no air could possibly get into the vessel. This was next securely tied down, and the jar inverted, and suspended by a piece of string, with the mouth downwards, for several months. The first effect which followed was, as might have been anticipated, the pressing in of the bladder in consequence of the diminution of the bulk of the fluid, which was made very tense and concave on its exposed surface. After this, air gradually entered the jar, and the fluid diminished in quantity. At first the diminution which took place from day to day was apparent, but after it had been suspended for a month or two, it took place much more slowly; however, after some months, half the fluid had escaped, and its place had been taken up by the air, which could be seen to be accumulated in bubbles on the surface of the fluid, at the upper part of the jar. Now, the remarkable part of this experiment is, that no organic bodies ever form on the surface of the fluid in the jar, although the quantity of air within it may be almost sufficient to fill it, in consequence of nearly the whole of the fluid having evaporated. In the experiments performed, the fluid in the vessel closed with the bladder has been the same as that contained in the phials, as first mentioned, and they have all been in the same apartment; so that the difference in the conditions under which the fluid in the jar and that in the bottles was placed is, that the air in contact with the former had been filtered, as it were, through a coraceous membrane, the contact of the tannin of the galls with the bladder having converted it into a kind of leather, while that in the bottles was exposed to air under ordinary circumstances. Hence, as no vegetable growths are formed in the fluid exposed to the air in the jar, it seems that a something has been abstracted from it by the mechanical process of filtration to which it had been subjected, which existed in the air of the apartment, and which had access to the solution in the open bottles; for if the fungi which were formed in the first set of experiments had been the result of some process by which living bodies could be produced *de novo* out of dead matter, the organic bodies ought also to have been formed in the jar, as the fluid was the same, and the air in contact with it also the same, with the difference above mentioned; and therefore, on this supposition, the effect ought to have been the same also; but as this was not the case, the legitimate inference is, that the fungi which were found on the surface of the solution in the bottle were not the result of equivocal generation, but the developed germs of plants floating in the air, and brought in contact with the solution, which formed a medium favourable for their development. The process by which the air enters the suspended jar is not simply due to its mechanical filtration through the porous tissue of the bladder, but it must first become intimately combined with, or dissolved in, the fluid on its exposed surface, and then, by diffusion, become mixed with that in the interstices of the tissue of the opposite side, and thus gain access to the interior of the jar, where an imperfect vacuum being formed, the air will be under a less pressure, and thus it will be made to expand, and to disentangle itself with the fluid in the bottom part of the jar, and ascend to the top. One part of it will, however, remain until the solution is almost saturated with air; after which, the process will proceed very slowly. That such is the case is evident, for after a large quantity of fluid has escaped, the further diminution is so gradual, that the loss it sustains in a month or two is scarcely appreciable."

CASES OF

GASTRIC AND ABDOMINAL NEURALGIA.

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THE frequency of gastric and abdominal neuralgia has for some time appeared to me unusually great, and has led me to think that the publication of a few illustrative cases might be of advantage and interest to some of my professional brethren.

CASE 1.—A lady, tall but not spare, scarcely past mid age, of rather phlegmatic temperament and dull complexion, who had passed several years in India, and suffered from the epidemic fever, came under my care under the following circumstances:—She had spent the evening with a relative, and returning home between ten and eleven, ate a little plain cake. Immediately after this, she was seized with extremely severe pain referred to the lower part of the sternum and epigastrium. I found her rolling about in agony, the hands clammy and cold, the pulse feeble, the face flushed. She had been sick and brought up some French beans she had taken at dinner; the tongue was natural, or nearly so; hot fomentations gave relief. I gave her some hot brandy-and-water, and a dose of chloric ether, tincture of camphor, and Battley's solution, and applied a liniment containing chloroform and opium to the seat of pain. The distress soon began to subside; she became quiet, and in half an hour from the time of its great severity, the pain was gone, or nearly so. The previous night she had been feverish, and had not slept well. The next morning I found she had passed another bad night; her tongue, she said, had been dried up with fever; no return of pain; no tenderness at the epigastrium; nausea and vomiting occurred this morning. I began the administration of quinine in five-grain doses, of which she took two in the course of the day; and in the evening calomel and extract of aloes, of each three grains; she was very poorly, depressed and nauseated all day, but in the evening, one hour after she had taken the calomel, she began to feel better, and she passed a better night. The following day the bowels were well open, the pulse was 90, small. After this she went on taking quinine in two-and-a-half-grain doses three or four times a day, occasionally having recourse to the calomel and aloes, and improved very much for some days; the pain then recurred one evening after her tea, but less severely than before, and was not relieved by the chloroform liniment. The next morning she described herself as feeling so faint, "hot and yet cold." I now gave her bark and carbonate of ammonia, with carbonate of iron and manganese at her meals, and in about ten days she was quite recovered, and went to the country.

Remarks.—If I thought this was merely a case of indigestion of course I should not cite it; I am satisfied that such was by no means the case. The patient had contracted fever in India, and had never been thoroughly free from it since; her own remark was that she was *never free from it except while travelling about*. This corroborates exactly Dr. Macculloch's statement, that frequent change of air is the only remedy to be relied on in inveterately chronic cases of obscure intermittent. Some months before the same lady had been under my care for neuralgic headache, and the same evening febrile paroxysm then occurred. It is worth observing that the severe attack of gastric pain corresponded very nearly with the change of the moon; and her husband, without being aware of this, observed to me that in India she always could tell the occurrence of the changes of the moon by a burning and hyperæsthesia of the palms of the hands. That relapses of fever occur at the lunar periods is a common observation in India, and has been also noticed in England. The case illustrates the persistence of malarious influence, and its tendency to produce neuralgia. At a period like the present, when neuralgic disorders are so rife, any person who has suffered from malarious disorder, and has even the least trace of it remaining in their system, must regard themselves as constantly in peril of more or less severe neuralgic attacks.

CASE 2.—W. R.—, aged forty-four, painter; never had colic; teeth and gums healthy; no decided blue line; has been ill one year, and not strong the last few years; is tall, thin, and rather anæmic; is subject to violent pains, which come on across the middle of the abdomen, and double him up, so that he can neither stand nor walk; they come on suddenly, last twenty-four hours, and remit, sometimes suddenly, more often gradually; the pain abates during the attacks, if he lies quite still, but the least movement brings it on again. During the attacks, he has nausea, and vomits sometimes very much, with