

mucous absorption and from cerumen, which the ears secreted to a great extent, and it was observed that the two perforations in the left membrane had united to form one large heart-shaped one. Fresh pellets were adjusted as before, with the same results, viz., considerable improvement in the right, with less in the left ear.

On March 15, 1879, fifty-three days later, the process of renewal was gone through with, with similar results, the mucous membrane of the drum-cavities in the meantime having taken on a healthier look and action.

On April 11, 1879, twenty-eight days later, the cotton pellets were taken out of and not reinserted into the left ear, as the hearing had become better, independent of their pressure, but could not be augmented by their insertion.

A fresh pellet in the right ear, covering about a third of the drum-membrane in the region of the perforation, improved the hearing on this side as theretofore.

On the 27th of May, 1879, forty-seven days later, the cotton pellet was taken out of the right ear, and the hearing having reached a permanent improvement, with the cotton pellet out of the ear, and the approach of warm weather rendering such protective influence unnecessary, the ears, now permanently better, were left to themselves.

On the 17th of November, 1879, the patient informed me that his hearing had remained very good all summer, and that there had been no pain or discharge from the ear since I had seen him. The hearing was found to be nearly normal, though the perforations persisted in each membrana tympani. The mucous membrane of each drum-cavity was congested, and there was some naso-pharyngeal catarrh, but the condition of the ears did not seem to demand any artificial drum-membrane. Here was a case that seemed to show the advantages of long periods of wearing the cotton pellet as a protector to the inflamed drum-cavity and as an aid to hearing during the process of quasi-healing.

CASE IV.—Mr. L. S. J., aged 83, a retired manufacturer; has been liable to attacks of pain and discharge, in the right ear, for a number of years, usually whenever he had a severe cold in his head. The hearing long ago became greatly impaired on this side, and as the hearing has gradually failed on the left side, with the sclerotic affection of old age, he consulted me on June 4, 1879. On the right side the membrana tympani was found largely perforated in its front half; its remnant was dry and pale pink in color; the mucous membrane of the drum-cavity was not very red, though decidedly congested. There was no discharge from the ear, and the wall of the auditory canal was covered with very adherent, hard, dark scales—probably composed of purulent and epithelial debris, stained by nitrate of silver, which had been used by his family physician, on this side, to stop the discharges from time to time.

The left membrana tympani was opaque, gray, indrawn, and lusterless.

H. for ordinary voice on right side = 6 in. H. for ordinary voice on left side = 6 in.

It was proposed to try the effect of an artificial drum-head on the right side, and on the 6th of June a small pellet of cotton, moistened with glycerine and water (1-4), the size of a small pea, was laid firmly over the perforation in the right drum-head.

This instantly improved the hearing to three or four feet for the ordinary vocal tones, and enabled the patient to hear conversation at table, which he had been deprived of for a long time. He was asked not to disturb the cotton pellet, and did not, wearing it faithfully for twenty days, when I saw him again.

It was found that with a little cold his ear felt uncomfortable, and that he could not hear so well; and also on the anterior wall of the auditory canal, on the dark scale of adherent matter, a patch of aspergillus nigricans had sprung up. The entire scale was now easily lifted out, having been softened by the contact of a little glycerine and water. Fearing that spores of the fungus might have gotten into the depths of the canal and in the cotton pellet, the latter was removed and the entire canal and tympanic cavity subjected to instillations of alcohol and water in equal parts, three or four times daily for three or four days. No further signs of aspergillus showing themselves by June 30, a fresh cotton pellet was placed in the ear as before, and with the immediate improvement in the hearing.

The auditory canal was now entirely clean, with bare pink walls, but a close watch was kept for the reappearance of the inveterate parasite. By July 3 a little patch of delicate down of aspergillus was observed on the floor of the auditory canal near the artificial drum-head; the latter extended over the perforation, and down as far as the floor of the canal. This patch was simply deluged with a drop of absolute alcohol on a tuft of cotton on the cotton holder. This controlled the growth from spreading; but on the 7th, the patch still being plainly visible, though smaller, it was treated in the same way with absolute alcohol, the cotton pellet all this time being in perfect position over the perforation, and acting as a great aid to hearing. The aspergillus showed no signs of growing over it, and it occurred to me that perhaps the mere presence of a pellet of absorbent cotton, deprived as it is of oily matter, proved an unpropitious soil, and further, acted as a mechanical hindrance to the inward growth of the fungus toward the drum-cavity.

On July 11 the ear was found to be in good condition, the cotton pellet still clean, in the position it was put in, and aiding the hearing very markedly. On July 14, the patient was seen for the last prior to a long visit at Sharon Springs. The cotton pellet put into the ear on June 30 was still acting its part as aid and protector, and was allowed to stay in the ear. The summer was then passed at the Springs, and the cotton pellet continued to act well, and was still there in November, 1879.

This beneficial effect of prolonged wearing of cotton pellets I have seen in many other cases, but these four, presenting, as they do, good examples of such a use of the artificial membrane in people of different ages, occupations, and social surroundings, seem to be enough for illustration of the point it is desired to enforce.

It may, therefore, be concluded that, when the membrana tympani is perforated, and the discharge from the tympanum has ceased, a cotton pellet will do more good when properly adjusted by the surgeon and let alone, than if manipulated every day, and that such artificial drum-membranes act both as temporary aids to hearing, and favor by protection, and, perhaps, by gentle stimulation, the healing of the chronically inflamed mucous membrane of the drum-cavity, and the closing of the perforation of the drum-head; though general improvement of the ear and hearing may ensue without the later result.—*Journal of Otolgy.*

THE EFFECTS OF A FIXED IDEA.

THE following case, showing the curious effect of the imagination on a healthy and strong man, may be interesting to your readers, and throw some light on several cases of hydrophobia lately reported.

A gentleman, aged fifty-six, was away from home, and was dressing in the morning, when his mouth and nose suddenly filled with blood. He then became aware that his false teeth, which he seldom removed at night, were missing. He fancied he felt them in his pharynx, and imagined he had swallowed them during sleep. He became greatly alarmed, and immediately sent for my partner, Mr. Atkins, to whom he told the above story, and drew his attention to a hard swelling behind the larynx. Mr. Atkins examined this, which was certainly suspicious, and thrust his finger as far down the throat as possible without feeling anything internally. The patient persisting that the teeth were in the pharynx, I was telegraphed for, to bring instruments, etc.

When I arrived I found the patient in bed, with intense anxiety depicted on his countenance, with a rapid, small pulse; and, when I asked him a question, he motioned for pen and paper to communicate with me. Neither I nor Mr. Atkins could now discover any external swelling, though the patient implied by gesture that it was apparent to his own touch. I examined him with the laryngoscope with difficulty, the throat being very sensitive; and, seeing no signs of the missing teeth, I asked him why he could not speak, when he replied, "Oh! I can speak; but Mr. Atkins told me not to talk." I now introduced a probang into the throat, and the patient said he felt me touch the teeth, just behind the cricoid cartilage. I was afraid to attempt to push the probang forward, as the teeth were described as almost a complete set of lower molars; so I bent a 10-inch military silver probe and hoped to hook the teeth up. I once or twice struck something which felt hard, and the patient then said that I moved them, but the spasms both of pharynx and larynx were so severe, and the mount of glairy mucus ejected was so great, I had scarcely got the probe down before I had to withdraw it. After a few more explorations I came to the conclusion that it was an elongated horn of the hyoid bone and no foreign body that I struck against, and I was confirmed in this opinion by finding that the patient could swallow fluids without any difficulty. I told him I thought he was mistaken, and ordered a search of the room, when shortly the missing teeth were found on the top of a chest of drawers.

The patient's surprise may be imagined. All his symptoms immediately disappeared; he dressed and ate an excellent lunch.

My explanation of this curious case is that the patient's nose commenced bleeding when he was dressing; this first drew his attention to the absence of his teeth. He forgot he removed them the night before; being in a strange house he did not know where to look for them. There was probably a clot of blood in the pharynx, and this imagination magnified into the teeth. Some spasm of the pharynx produced the hardness he and Mr. Atkins felt on arrival. The rest was purely the effect of a fixed idea, which in this case was fortunately removable by the production of the supposed cause; had that not been possible, I can quite understand, from the nervous condition of the patient, that even the dreadful symptoms of hydrophobia might (had that been the fixed idea) have been produced, the excessive secretion from the pharynx having already commenced.—*E. M. Wrench, in London Lancet.*

MICROSCOPIC ORGANISMS.

By M. PASTEUR.

THE bacteria of carbuncle and the organism producing the so-called cholera of poultry can bear temperatures of -40° without losing either virulence or their power of multiplication.

ON THE NOXIOUS ACTION OF ACID VAPORS ON VEGETATION.*

By DR. G. LUNGE.

UNDER the above title, Mr. Hasenclever, the managing director of the Rhenania Chemical Works, near Aachen, has published a paper, the contents of which are not merely of great interest, but of real importance, for the British alkali making districts. Since, hitherto, only a very short notice of this paper has been published by the *Chemical News*, it will hardly require an apology if I place its essential points before the society in a more ample form.

Hasenclever commences by admitting at once the noxious action of acid gases upon vegetation, exercised wherever large quantities of such gases are given out. This takes place especially in calcining sulphurous ores and mattes; large quantities are also given out by some chemical works. Complaints have also been made in some cases against ultramarine, glass, brick works, and generally against those manufacturing establishments in which a large quantity of coals is consumed. The noxious action of acid gases on vegetation is further proved by the investigations of Stöckhardt, Freytag, and Schroeder (mentioned in my "Treatise on the Manufacture of Sulphuric Acid and Alkali," vol. i., p. 110-112 of the English edition). Hasenclever himself gives excellent colored drawings, showing the outward changes produced by acid vapors on the leaves of the carrot, Scotch fir, oak, and rose. He adds pictures of tussilago leaves damaged by flue dust, and of beech leaves damaged by frost, both of which exhibit an appearance altogether similar to that of leaves damaged by acid vapors. Since, moreover, autumnal decay, fungi, insect stings, and other influences may bring about quite similar appearances, great caution is needed before fixing upon any one of these causes as the real one; and instances are given of considerable mistakes made in this way.

When the functions of the leaves are disturbed by these spots, whatever be their cause, the trees suffer in their growth; and, if this goes on for several years, they die altogether. The decrease of growth can be observed, without cutting down the trees, by taking a sample of it by means of Pressler's auger, which shows the single annual rings.

In many places, where the action of noxious gases is quite out of the question, plantations of trees exhibit the appearance of suffering. This may be produced by the tops of some of the trees projecting too far, which interferes with the growth of their neighbors; by leaving single trees standing after cutting down those around them; and, more especially, by the drought consequent upon the regulation of water courses, the lowering of the level of lakes, and the ordinary effects of mining; and also, in towns, by the hard-

ening of the ground round the roots produced by the street traffic. Wherever the wood is impoverished, by taking from it the decayed leaves and branches without imparting to it some kind of manure, a deterioration of the trees must necessarily follow.

Undoubtedly there are some cases where none of the causes just mentioned is present, and where acid vapors must be blamed for the destruction of vegetation. It is certain that this takes place more easily in damp than in dry weather. But the proof that such destruction is due to acid vapors, frequently sought to be obtained by a comparative estimation of chlorides and sulphates in damaged and sound plants, is anything but easy and certain. It has not been established yet that an increased percentage of acid in the leaves is regularly accompanied by a decrease of growth; neither is it known what is the maximum percentage of chlorine and sulphuric acid that leaves may absorb without being corroded. König found in the fir woods, near the Lethmathe Zinc Works, relatively considerable quantities of sulphuric acid in apparently healthy trees, while Schroeder found only half as much sulphuric acid in similar trees, on the Harz, which had been destroyed by noxious vapors.

No doubt, whenever much sulphur dioxide is given off, whether by the calcining of ores or in some other way, there is a good deal of sulphuric acid found in the plants. Similarly high chlorides are found near chemical works which decompose common salt, and near potteries which glaze their ware by means of salt, but both sulphuric acid and chlorine are also found in ordinary coal smoke. It is perfectly well known that formerly when the atmosphere must have been purer from the absence of a highly developed industry, the use of coal was disliked, and even here and there prohibited on account of its "pestilential" smoke. Mohr asserts that the obelisk of Luxor, erected in 1836, on the Place de la Concorde, at Paris, has suffered more in thirty-six years there than during as many centuries in Egypt. Rhenish and Westphalian coal contains on the average $1\frac{1}{2}$ per cent. of sulphur (usually in the shape of pyrites), which must pass into the air as sulphur dioxide. The injurious effect of this is frequently felt either where coal is burnt in large quantities, or where the smoke, as in narrow valleys, is not specially diluted by air. This is proved by special instances from Stöckhardt and others. The statements of Dr. Angus Smith are also quoted, according to whom London air contains in a million of cubic meters, 1,670 grammes sulphuric acid, and Manchester air, 2,518 grammes.

Chlorine also regularly occurs in coals, and is not found in their ashes, but expelled along with the volatile constituents. The chlorine of gas water must be reduced to this origin. There is also chlorine in blast furnace gases.

Soot seems to be quite harmless by itself, as proved by Stöckhardt's experiments; but becomes very injurious to plants when containing metallic sulphates, as is often the case in industrial districts.

Hasenclever now turns to the question, How the injurious effect of acid vapor upon vegetation, whether arising from the direct evolution of such vapor or from coal smoke, may be best prevented? Tall chimneys are quite inefficient in the case of large quantities of vapors; the dilution by air, even when sufficient in fair weather, fails to act in damp weather. Only in isolated establishments, and with moderate quantities of vapors, does dilution by tall chimneys prove satisfactory. Washing out the acids from coal smoke has not been found practicable. The legal enactments for the complete combustion of smoke enforced in some English towns have done some good, but have only diminished the black smoke. In Germany, at watering places, and other towns or villages which depend upon the concourse of visitors, the establishment of factories is not permitted, or is at least restricted. Dr. Angus Smith frequently points out that too great an accumulation of industrial establishments in any one locality should be avoided. At Hanover (and some other large German towns) the existing factories are not interfered with, but no new factories are licensed within the urban district.

All this refers to coal smoke. The sulphur dioxide escaping from glass works in enormous quantities is nowhere condensed; it is too much diluted for the condensation to be effectual. In vitriol works the escape of sulphurous and sulphuric acid has been very much lessened by the introduction of Gay Lussac towers. But considerable difficulties still exist in the case of copper, zinc, and lead smelting works. In Germany many of these now calcine the ores in Gerstenhoefer's or in Hasenclever and Helbig's kilns, and thus utilize a portion of the sulphur as vitriol. But even then the condensation of the calcining gases is not perfect, and further progress in this direction is very desirable. Still there is a considerable difference between the desolate aspect presented by the neighborhood of those smelting works which do not condense at all, and the field and garden culture observable close to the other kind of works, although even these interfere with fir woods, fruit bearing trees, and some other kinds of trees.

We now come to the escape of hydrochloric acid from factories decomposing common salt by sulphuric acid. Everybody knows the former state of matters in this respect as laid bare by the Belgian Commission of 1855, and the reports of the British alkali inspectors since 1863. The large escapes formerly complained of can be directly traced to the fact that at that period far more hydrochloric acid was produced as an involuntary by-product than could be utilized or sold. In Germany, at least, this is no more so; the demand for hydrochloric acid on the part of color, copper, glue, dye, and sugar works has increased to such an extent that some factories produce this acid as their principal article, making soda ash only as a by-product. This is best proved by the fact that no special legislation on the condensation of hydrochloric acid was thought necessary in Prussia, although the question was mooted in its proper place, because it was considered that the self interest of the manufacturers was quite sufficient to insure efficient condensation. The German alkali works usually possess even a larger condensing space than that laid down as sufficient by Dr. A. Smith, and no damage worth speaking of is done to vegetation in their neighborhood where they are isolated; but where they are situated among many other industrial establishments they are sometimes singled out, and held responsible far beyond their due, for the damage unavoidable in such circumstances.

This is illustrated by a private communication to Mr. Hasenclever from Dr. Fletcher referring to the acids escaping in the neighborhood of St. Helen's. Dr. Fletcher calculates the weekly escape from—

Fire gases at	800 tons SO ₂
Copper works at	380 " "
Glass works at	180 " "
Alkali works at	25 " HCl

Hasenclever himself gives a table referring to the twenty

* A paper read before the Newcastle-upon-Tyne Chemical Society.