Empiric glued to his particular, and the Methodist blown into his universal, dispensed with the need of inquiry into causes, or, indeed, into processes. While for the Methodist the specific fact was as soon as possible to be sublimed into one of the three universals, for the Empiric it was an ultimate; the one refused to see it, the other refused to pursue it. This was a sad falling off from Erasistratus, who made some necropsies; he observed, for example, that in ascites the liver might be of stony hardness.

But the Methodists soon discovered—or it was discovered for them—that to reduce medicine to two, or even to three, abstract categories was, because of its very facility, to reduce it to a rapid and fruitless pretence; they formulated, therefore, other universals subordinate to the chief triad. Yet even then, for the explanation of poisoning, of the invasion of foreign bodies, of tumours, and of surgery in general, the idea was unworkable, and, at any rate in its emptiness of content, futile.

The parallel categories to which their therapeutics were necessarily reduced were of *contraria contrariis*; if, as in the first stage of fever, there was constriction, then relaxants were to be used; if, as in the second stage, there was solution, then astringents. So, again, in presumptive local leaks or stoppages astringent or solvent remedies respectively were to be directed to the affected area. It is easy to see how such rules-of-thumb must lead, as in fact they did, to the vainest and most senseless routine, and how destructive they were of the method of Hippocrates, which, as Celsus wrote, was *mederi oportere et communia et propria intuentem*. Still, as in all such revolts, the leaders, as we have glimpses of them down the centuries in Oribasius, Aetius, Alexander of Tralles, were better than their followers. But I must permit myself again to commend the excellent and permanently influential side of their therapeutics, derived from their forefathers, Asclepiades and Erasistratus, that which congruently with their physical views led to the correspondent extension and development of the physical means of cure—of passive movements, graduated exercises, special baths, diet, regimen, and so forth. These were the methods which in the hands of Asclepiades supplemented the barbarous practices of Archagathus. A proverbial rule of the Methodists, which we trace back to Asclepiades and Erasistratus, was the well-known three days' abstinence with which they commenced the treatment in acute disease. It was in the later stages that wine and good feeding was recommended.

In obstetrics the Methodists attained distinction, especially in the person of Soranus, whose fame, and the fragments and titles of whose works, testify to remarkable abilities, not in obstetrics only, but over the whole sphere of medicine. The man is reflected in his terse, lucid, shrewd, and practical style. Soranus was, as it were, reconstructed from these relics by Reinhold Dietz of Königsberg, another learned physician carried off prematurely by death. The development of obstetrics probably arose out of the Alexandrian anatomy; we know that Herophilus wrote upon the subject. Thessalus of Tralles, on the contrary, in the reign of Nero, reveals himself to us as an arrogant boaster, and not only as vainglorious, but as the captain of troops of pretenders, to whom he promised for a fee to teach in six months all that need be known in medicine. Such medicine as Thessalus had to teach might have been written on the proverbial half-sheet of notepaper, and learnt for less money in as many hours. He vaunted himself as the foe of doctors, and on his ostentatious tomb in the Appian Way inscribed himself as *latronikes*. He vanquished, it is true, whatever there was in the science and art of medicine, of understanding, of skill, of patience, and of honour; and must have revealed to the respectable Methodists how near are the boundaries of vanity of doctrine and vanity of conduct. Asclepiades was the forerunner of the Methodists it is true; but it was by Themison and his school that the atomistic conceptions, which at best lent themselves too readily to fantasy, were so reduced, both in theory and practice, to summary forms as to be comprehensible by any illiterate charlatan.

REFERENCES.

¹ Aulus Gellius, *Noct. Att.*, xii, 5. ² Sandys's *Hist. Class. Schol.*, ii, 83. ³ Wellmann, Report of Congress, Köln, September, 1908, *Münch. med. Woch.*, October 15th, 1908. ⁴ Un médecin grec du II^e siècle A.D., *Thèse de Paris*, on Fragments of this Physician's Writings in a Latin rendering of Galen's *De Subfiguratione Empirici*. ⁵ See also *Neus Jahrbuch f. d. Klassiker Altertum*, I, 1.

AN OXYGEN GENERATOR AND INHALER:
ITS USE IN MOUNTAIN SICKNESS.

By LEONARD HILL, M.B., F.R.S.,

LECTURER ON PHYSIOLOGY, LONDON HOSPITAL MEDICAL SCHOOL.

I HAVE contrived this simple and inexpensive piece of apparatus for use in places and conditions where cylinder oxygen cannot be easily obtained for patients with heart disease, asthma, etc., who are in a state to manipulate the apparatus, and particularly for use in mountain sickness. Its portability and lightness make it suitable for transport, and it can be used wherever a pint or two of water can be obtained. The apparatus is of less use in cases of pneumonia, etc., where oxygen can only be tolerated when administered through a funnel or a light mask; but even for these it may be worth having for emergency work, and in uplands and hinterland, away from big cities, where oxygen cylinders cannot be obtained, for successive bags full can be made and the gas pressed out through the funnel or mask.

The apparatus consists of a small metal box—the generator—connected with a vulcanized rubber bag—the breathing bag.

The bag holds about 15 litres, and ends in a rubber mouthpiece. The bottom of the generator is closed by a screw cap and asbestos washer, and a piece of wire gauze is

Fig. 1.

interspersed between the generator and the bag. The mouthpiece is closed with a screw-clip during the generation of the gas.

The oxygen is generated out of oxyliihe—a peroxide of sodium—by contact with water, and there results a solution of caustic soda. Thus:

The caustic soda solution is used to absorb the exhaled carbonic acid. The oxyliihe is sold in flat tins containing ten blocks to the pound. Three blocks make a full

Fig. 2.

charge, and the oxygen yielded from this is amply sufficient for fifteen minutes' inhalation. I have breathed comfortably the supply from two blocks for fifteen minutes.

The figures show how the apparatus is used. In Figure 1 the bag is laid flat and emptied of air, and the oxyliihe is introduced into the generator. Figure 2 shows

how one or two pints of water are introduced into the bag, the generator being elevated so that water cannot enter it.

In Fig. 3 the bag is shown elevated after closing the screw-clip on the mouthpiece, so that water enters the generator and the oxygen is evolved. It is not necessary but better to immerse the generator in water, or hold it under a running tap to cool it during the generation, for the heat produced by the chemical action is considerable. Fig. 4 shows the inhalation proceeding. The nose is closed by a soft clip, the mouthpiece is clasped by the lips, and the screw-clip opened. The solution of caustic soda is shaken round the bottom of the bag by the hand that grasps the generator. The solution, of course, must not be shaken too violently, or drops may reach the mouthpiece.

The subject should expire deeply before inhaling, so as to diminish the dilution of the oxygen by the nitrogen within the lungs. The inhalation proceeds till about two-thirds of the bag has been emptied. It is best to stop then because the oxygen is diluted by the nitrogen given out from the body. The subject, of course, must not draw in any outside air, or let any oxygen escape into the outside air during the inhalation, but keep his lips tight round the mouthpiece and his nose shut. After use the apparatus is washed out with water and hung up to dry.

The instrument has been put to the test in the high

altitudes of Mexico by Mr. E. R. Calthrop, the distinguished engineer, who has just returned from a six months' visit to Mexico to carry out a reconnaissance survey for a projected railway. Mr. Calthrop, on his previous expedition, suffered severely from mountain sickness, and had considerable anxiety in facing the sickness again. Taking the instrument out with him after a lesson from me in its manipulation, he used it about twelve times, and each time with success. Several

of his friends had suffered at these high altitudes in the same way, and so great was the benefit he obtained that he wished me to publish the details of his experience under the authority of his name. The apparatus had removed half the difficulty and discomfort of the journey. "Mexico City," he said, "has now no terrors for me." Mexico City is at an altitude of 7,450 ft., and Mr. Calthrop says all, except the young and perfectly fit, feel the effect of altitude, after going up there by train from the sea, for the first two or three weeks. "Men of my age feel it very commonly, and have to guard against over-exertion until acclimatized." The medical men, he says, told him they often had to convey people out of the high altitudes and back to the States, taking oxygen cylinders with them in the train. Cylinder oxygen there is very expensive and awkward for conveyance. Pneumonia, he said, was a common complaint, and the best chance was to convey the patients down as quickly as possible some 3,000 ft.

In the previous expedition Mr. Calthrop had had an alarming attack at 11,500 ft., after riding too quickly up the last 3,000 ft. He had at that time lost 2 st. in weight from bad feeding and the hardships of the journey. He got off his horse to take a photograph, and in half a minute could not stand, was "frightfully sick for about an hour with distressing palpitation, and had to be carried in

a litter." In two days he became fairly acclimatized again to this altitude.

On his second expedition he was affected with palpitation and a feeling of "nervous strain" on the second day after reaching Mexico City. The palpitation was continuous, but increased on climbing upstairs, and was accompanied then by breathlessness.

He filled the bag with oxygen and inhaled it for about seven minutes. The palpitation ceased, and did not return for four days. He took oxygen again on the fifth day, and experienced complete relief from the symptoms during the next seven or eight days. He was certain that the oxygen not only relieved him at the time, but that the relief lasted for some days. On his previous visits, he had been very uncomfortable for the first ten days after arriving from sea level at this high altitude. He used the apparatus three times in Mexico City, and then went down to an altitude of about 1,000 ft. and eventually to sea level, the expedition occupying nearly three months. On his return to the highlands he attained an altitude of 5,000 in two days from sea level, and had no discomfort there, but began to feel trouble again two or three days after again reaching Mexico City, where he stayed ten days, took oxygen twice, and was relieved each time. He had learnt to handle the gas bag better, used it longer, and obtained relief quicker. He breathed from the bag till

he had used most of the oxygen up, that is, about fifteen minutes. The palpitation always ceased within half an hour of beginning the inhalation. From Mexico City he went to an altitude of 9,000 ft., and was in bed there for four or five days with severe pain in the ear. He had suffered from a mastoid abscess previously. He got up feeling very feeble with much palpitation and shortness of breath. Oxygen was again taken and had even a more pronounced effect, but the after-effect only

Fig. 4.

Fig. 3.

lasted about two days, that is, a shorter time than in Mexico City. He had recourse to the apparatus four or five times at this altitude, and at the end of three weeks became fairly acclimatized. He spent six weeks at this place and traversed the railway (10,050 ft.) from there to Mexico City four times. On one of these journeys several people in the carriage were badly affected, but he having taken oxygen beforehand was undisturbed. On returning to Mexico City he had ten days' malarial fever with a temperature going up to 104° F., and an irregular pulse. He inhaled oxygen then in the presence of Dr. Deakens. His pulse fell from 136 to 98 and became regular.

Mr. Calthrop also gave the British Vice-Consul the use of the apparatus, as he, too, was suffering from cardiac irregularity. Oxygen relieved him, and the relief lasted during the subsequent week.

It seems as if the oxygen supply fell just below the needs of the heart in these men, and that a chemical change occurred in the sarcoplasm, such as the accumulation of lactic acid, and disturbed the cardiac action. The additional oxygen supply just turned the balance, consumed the unoxidized products, and relieved the heart for some time.

In the case of a lad with mitral stenosis whom Dr. James Mackenzie invited me to study with him, the pulse, as shown by polygraph tracings, became very

irregular for some minutes after he had walked up and down a flight of eleven stairs. Inhalation of oxygen markedly lessened the irregularity. Double the climb, in fact, did not have the effect of a single climb without oxygen. In mitral stenosis we have a condition of oxygen want very like that which occurs at high altitudes.

OBSERVATIONS ON A YOUNG MAN WITH MITRAL STENOSIS.
Summary of Experiments, September 27th, 1909.

Tracing.	Irregularity Lasted.
1. After lying quietly in bed, then going up and down eleven stairs	84 secs.
2. After lying quietly in bed, then going up and down eleven stairs	72 "
3. Oxygen given for 9 minutes, and continued after going up and down eleven stairs ...	30 "
4. Oxygen given, but stopped after going up and down eleven stairs	72 "
5. No oxygen given for 10 minutes before going up and down eleven stairs	60 "
6. No oxygen given for 12 minutes before going up and down eleven stairs	75 "
7. No oxygen given for 15 minutes before going up and down eleven stairs	110 "
8. Oxygen given for 5 minutes, and continued after going up and down eleven stairs ...	40 "
9. Oxygen given for 10 minutes, and continued after going up two flights of stairs ...	90 "
10. Oxygen given before and continued after going up one flight of stairs	25 "

Summary of Experiments, September 30th, 1909.

Tracing.	Irregularity Lasted.
11. After lying in bed, first effort upstairs ...	42 secs.
12. After lying in bed, second effort upstairs ...	54 "
13. After lying in bed, third effort upstairs ...	90 "
14. After oxygen, first effort upstairs	40 "
15. After oxygen, second effort upstairs	48 "
16. After oxygen, third effort upstairs	48 "
17. After oxygen, fourth effort upstairs	42 "
18. After oxygen, fifth effort upstairs	40 "
19. Mask closed, and expired air breathed. Marked irregularity in a few seconds. The mask opened, and irregularity disappeared.	
20. Upstairs immediately after this	63 "

Mr. Calthrop found the apparatus very portable and durable. It weighs about 2 lb. It travelled on a pack mule most of the time, and suffered plenty of hard usage and exposure to great changes of temperature.

The apparatus returned looking in as good order as it went out. The 1-lb. cases of oxylithe packed nicely and kept tight and in good state.

It seems, then, after this searching test that the apparatus is one which may afford considerable relief to those who have to face high altitudes.

It is obvious that the apparatus can be used also for a short exploration of a poisonous atmosphere. For this purpose a mouthpiece is supplied which is strapped to the head so as to leave the hands free, and the middle of the bag can be strapped to the body. If a second apparatus were carried, and a tin of oxylithe, and this were charged when the other was almost expended, the wearer could stay a long period in a poisonous atmosphere, in fact until he used up his supply of oxylithe. The second apparatus can be carried with the water in the bag, and the oxylithe in the generator, a screw-clip closing the pipe between the two. To recharge the first apparatus the generator must be elevated and the water returned to the bag before the new charge is put in.

The apparatus is made by Messrs. Siebe, Gorman and Co., 187, Westminster Bridge Road, S.E.

A CURIOUS instance of the apparently incorrigible readiness of the public to make experiments on themselves with anything which professes to be a secret remedy is afforded by the recent tragedy in Vienna. Somebody sent to eleven out of twenty-five officers recently appointed to the general staff some pink capsules; these have been proved to contain a large quantity of potassium cyanide, and one officer who swallowed a capsule died within a few minutes.

A CASE OF FRACTURE OF THE RADIUS TREATED BY EARLY MASSAGE AND MOVEMENT.

By J. P. HASTINGS, M.B., M.R.C.S.,
DUNEDIN, NEW ZEALAND.

I THINK that in fractures such as this the splints may safely be removed much earlier than is customary. The ulna acts as a natural splint. Previous to the performance of the passive or active movements, the limb was always gently massaged. The result was convincing.

Mr. M., aged 18, student, fell upon his right arm whilst playing football. The radius was broken, as shown in the accompanying radiograph. Examination with the fluorescent screen showed that the displacement of the bones was lateral. There was no antero-posterior deformity. The patient was put under ether, and the deformity corrected as far as possible. The limb was then put up in Gooche splints. The anterior splint extended from the bend of the elbow to the palmar flexure, the posterior from the elbow to the level of the metacarpophalangeal articulation. On the day following the frac-

ture the posterior splint was removed, and the limb gently rubbed. This was done for five or ten minutes daily for the first six days. From the very first the fingers were left free, and the patient told to exercise them. On the sixth day passive movements were begun; the posterior splint having been removed, the wrist and elbow were exercised for three to four minutes. To do this I steadied the seat of fracture with one hand, whilst with the other I moved the joints indicated. The movements were those of flexion and extension. On the eighth day I removed both splints, steadied the seat of fracture with one hand, and moved the joints as before. On the tenth day the patient was allowed to make active movements of the wrist and elbow, the seat of fracture being steadied with one hand. From the fourteenth day onwards he was allowed to make these active movements for five minutes daily without having the seat of fracture controlled in any way. On the twentieth day the splints were removed altogether. The arm was taken out of the sling on the twenty-fourth day. He now has a limb which presents no obvious signs of having been fractured; there is no deformity; at no time was there any obvious wasting of muscles. The movement at the wrist was perfect as early as the twentieth day. On the twenty-fourth day there was only a little stiffness in the right elbow-joint. He was able to write with the right hand before the twentieth day. I believe I could have dispensed with the splints on the fourteenth day, as even as early as that date the limb really required no further restraining apparatus.