there was some nausea and migraine it was found that the motility of the stomach was very markedly delayed.

In this case (Table VI) we see that although the stomach contents, as far as hydrochloric acid was concerned, were practically normal, the volatile acidity on the contrary was very markedly increased; in fact, the average was not less than 10, and in one examination the volatile acidity was as high as 16. We thus see that in a normal stomach during an attack of migraine, when the motility, no doubt from purely nervous causes, is delayed without any corresponding diminution in either the quantity of the free or proteid hydrochloric acid, there is a distinct increase in volatile acids.

In conclusion we can now briefly consider what appears to have been brought out. In the first place there is a method of estimating the volatile acids that is sufficiently simple, and at the same time accurate, as to be of value in the quantitative analysis of the stomach contents for clinical purposes.

The possible fallacy of the breaking up of proteids, etc., by the superheated steam leading to an increased quantity of volatile acids over that which ought really to be found, can apparently be negatived, in that in the first place the diet in all cases was exactly the same, and the period of time allowed after the tea and toast had been taken being exactly the same, one would expect, all things being equal, the amount of proteids would not vary very much, and in the next place, which is well borne out in Table I, the method yields results in the four control analyses, given in the table, which correspond so closely that for all purposes of comparison they are similar.

It is seen that the apparently normal stomach contains a certain amount of volatile acids, but so long as the quantity of free hydrochloric acid secreted by the stomach is sufficient and the gastric motility is not interfered with, this quantity averages not over 3.2. If, however, the free hydrochloric acid is decreased from any cause, even in spite of the motility being normal, the volatile acidity averages 7.6.

When we turn to cases in which the gastric secretion is apparently normal, although the motility is diminished, we find here that with a small excretion of hydrochloric acid the average is 3.7 of volatile acids, that is slightly higher than the average with normal motility, while when the free hydrochloric is low the volatile acids average 7.47.

In a case of migraine, where the chemical composition of the stomach is little altered as far as hydrochloric acid is concerned; in consequence of delayed motility there was a tendency to an increase in volatile acidity. So that these experiment with a more accurate method of estimating the volatile acids than others that have been employed, confirm the results of G. Hoppe-Seyler, etc., that the quantity of free hydrochloric acid influences the quantity of volatile acid in the stomach. The practical value of this in the treatment of stomach cases is, therefore, too apparent to need any comment.

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CASE OF MALIGNANT ŒDEMA: AMPUTATION AT THE THIGH: RECOVERY.

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IN a recent number of the BRITISH MEDICAL JOURNAL Drs. Tubby and Wright gave a most instructive account of a disease which they rightly say is nowadays very rare, namely, malignant œdema. They state that as they could not obtain any antitoxin for malignant œdema they decided to use the antistreptococcic serum, and they say "it is difficult to explain the *modus operandi* of the injections of the antistreptococcic serum except on the supposition that the presence of the streptococcus is essential to the rapid development of the bacilli of malignant œdema." I would suggest that the antistreptococcic serum had little or nothing to do with the happy ending of their case. For when one bears in mind the characteristics of the bacillus of malignant œdema, that it is an anaërobic organism, we can at once see that in free oxygen we have an antidote to its growth, the value of which is far greater than can be that of any antitoxin. The fact that the

bacillus was not found in the discharge on the gauze is not to be wondered at, because, as they state, it does not usually appear in the blood till some fifteen or twenty hours after death; moreover, the wound, I take it, had been carefully washed with an antiseptic solution.

CASE I.—A healthy boy, aged 11, fell off a truck at a brickyard; the wheel of the waggon passed over his right leg in such a way that all the soft parts were peeled off the tibia from the ankle to the knee, and the freshly-cut tissues seem to have been rubbed along the surface of the ground. The boy was carried some three miles from the scene of the accident to my house. He was almost unconscious from loss of blood and shock when I saw him. The wound was carefully washed with 1 in 2,000 perchloride solution and the parts brought together by wire sutures. Constant irrigation was applied; but within twenty hours the foot showed signs of gangrene, which spread up the leg most rapidly. Dr. Anson saw the case with me about eight hours later, and by that time the skin was quite brown and emphysematous, and crackling could be felt as high up as the eighth rib on the right side. The boy was quite collapsed and unconscious. The limb was much distended with gas, and as the stitches were cut through the characteristic smell of malignant œdema was very apparent. An hour was allowed to elapse in order to see if any amelioration of the symptoms would take place; then amputation was decided upon, not with much hope of saving his life, but rather that he should not die without something being done. There being a small patch of uncoloured skin on the inner aspect of the thigh, I at first thought of doing an amputation at the hip; but, as there would not have been sufficient sound tissue to cover the wound, we decided to simply cut away the dead part, and I amputated about 2 inches above the knee. As indicating the condition of the parts, I may say that there was not the slightest bleeding, and I did not require to tie any vessels. The boy passed a bad night, and on two occasions seemed about to die, but the free exhibition of brandy by the bowel pulled him through. Within ten hours the emphysema disappeared from the chest and abdomen, and three days later, with the help of Dr. Anson, I did an amputation 2 inches higher up, in order to get a good flap. There was rather free bleeding at the second operation, but the boy made an uninterrupted recovery, with this exception, that the ligature on the femoral cut its way through, and I had to tie it higher up. He is quite well now, and has a very good stump.

In the fact that the bacillus is an anaërobic organism lies one of the great difficulties of cultivating it unless we have an apparatus by which pure hydrogen can be poured over the colony. I managed to raise a weak colony by sinking pieces of tissue deep in the nutrient media to which I added some glucose to act as an absorber of the oxygen. A small portion of this was injected into two guinea-pigs with the result that death took place in about 48 hours, with all the symptoms of malignant œdema. A solution was made of the soil from the place of the accident, and a portion of this was injected over the inside of the thigh of another guinea-pig. This again caused death in 44 hours, with the usual *post-mortem* signs of malignant œdema. The fact that we had to deal with an organism which can only thrive in the absence of oxygen accounts fully for the great and immediate benefit which resulted from the removal of the dead part of the limb and the consequent exposure of the stump to pure air. Reasoning back, I should advise the free use of hydrogen peroxide in the treatment of such a case, because the liberation of free oxygen would be offering the bacillus of malignant œdema the very set of conditions under which it cannot exist.

MEMORANDA:

MEDICAL, SURGICAL, OBSTETRICAL, THERAPEUTICAL, PATHOLOGICAL, Etc.

THE DANGERS OF CHLOROFORM NARCOSIS.

It is a decided mistake to think that death or threatened death from chloroform must always be from the same cause, as a matter of fact this is not so. When lecturing upon this subject in Queen's College it is my custom to include under the "dangers" of anaesthetics six heads:

1. Sudden death at the beginning of inhalation ascribed to "irritation of the peripheral nervous system, accumulation of CO₂ in the blood, and stoppage of the heart." Bartholow says that in his opinion it is due to the fact that the first chloroform inhaled which reaches the cardiac ganglia paralyzes them, they being in an abnormal state of susceptibility from certain undefined causes.

2. Epileptiform syncope, described by Richardson. Death in this case is due to tetanic rigidity of the respiratory muscles, prior to muscular relaxation, consequently interfering with the pulmonary circulation, with venous engorgement and stoppage of the heart. In this case respiration ceases before the heart beats.