A POSSIBLE PREDISPOSING CAUSE OF DIPHThERIA.

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ANY suggestion which may assist us in arriving at a correct conclusion as to the causation of diphtheria is worthy of consideration. I wish to make one, which medical officers of health may be able to follow, and may determine as to its value. It is made upon the hypothesis that diphtheria is dependent upon a germ of living matter which is capable of reproducing itself when it meets with a congenial soil.

The suggestion is, that the quantity of carbonic dioxide in the atmosphere should be noted in those localities in which diphtheria specially develops. The close analogy which exists between the disease in question and potato-blight leads me to conclude that the conditions which promote the one have also an influence upon the other, which requires wide-spread observation for its determination. There is a close analogy between dry-rot and potato-disease, which connects the three classes of disease into one genus. Circumstances which are common to one may be common to the other, and those things which increase the productive power of the one have a similar effect upon the other, and *vice versa*. Thus, a germ of the fungus called *merulius lacrymans*, in contact with immature wood, in a position in which there is a want of ventilation and where some moisture is present, very soon produces its effect and sets up dry-rot in the ligneous tissue. But an excess of carbonic dioxide is required to promote the change in the albuminous matter of the wood: this excess is provided by ordinary oxidising processes in a badly ventilated structure. The fungus then decomposes the wood into carbonic dioxide and water. Thus are produced the two elements which are required to continue the mischief, and there is a rapid destruction of the building.

So also with potato-blight: I have found an excess of carbonic dioxide in the air obtained from fields in which potato-blight has been manifest; especially in that obtained from beneath the haulms of the plant. Germs of *botrytis infestans*, having been scattered over the haulms of potato, were found to propagate rapidly in those positions in which there was a want of ventilation. There is an acid atmosphere; if there be also excess of changing albuminous matter, the disease spreads rapidly. The first germs of the fungus vegetate in the stomata of the plant. The mycelium shoots downwards, takes up the oxygen which has been set free by the growth of the plant, prevents the incoming of carbonic dioxide at the stoma of the plant, and actually discharges into the air that which is life to the plant itself, and which is wanted below. Thus, a starving process is set up, and gangrene is produced. The plant is suffocated, so to speak, and the crop blighted. If there be not growth enough to cause this result immediately, or if some change, such as bright sunshine and a fresh wind, arrests the disease by dispersing the carbonic dioxide, the mycelium grows only in the juices of the plant. It in time reaches the tubes, produces resting spores in it, and ultimately destroys the potato itself.

In the case of diphtheria there is an opposite effect, but tending to the same end. The germ which sets up the disease finds its habitat in the throat. It may be that suffocation may arise in the early stages, the influx of oxygen into the blood being prevented at the point of inlet; but, should the production of morbid matter not be sufficient to lead to this result, the mycelium, in the form of the minutest possible granules, enters the blood, and, seizing upon the oxygen which the corpuscles already contain, interferes with their power to absorb carbonic dioxide from the tissues of the body, and brings about those changes which lead to death. The qualities of the atmosphere are altered in the throat; the conditions of the atmosphere of the blood itself are altered; and, if these changes go on beyond a certain percentage, there is but one result. The indications are to use means for the rapid removal of carbonic dioxide from the air, to decrease the power of development in the germs themselves, and to enable the patient to tide over the results of the disease.

As far as my experience goes, sulphurous acid is the most efficient remedy both locally and generally: it fulfils all the indications required; and with warmth, fresh air, and simple food, we have the best means for preventing the spread of the disease from the patient to the attendants. I am also accustomed to recommend that creasote be freely used about the house. I believe the inmates of gas-works have hitherto escaped the ravages of this disease. The germs do not grow freely in a creasote atmosphere.

The points for observation are: as to the presence of an excess of carbonic dioxide in the atmosphere in those positions, and at those times, when there is also present excess of changing albuminous matter. The altera-

tion from three hundred parts to six hundred parts in a million may be quite sufficient to determine the difference between an aborted germ of disease and a germ capable of development. If, therefore, a family be living in an atmosphere in which the quantity of carbonic dioxide is abnormally high, they are providing in themselves a manure-bed in which the disease may more easily grow than it would if the conditions were not present. This appears to be one of the reasons why the disease spreads so easily in schools, and why a foul atmosphere tends to its increase when specific morbid matter is present in a particular place. Ventilation, warmth, simple food, sulphurous acid, and creasote are the remedies for the disease, as well as the best means for preventing its extension. I would suggest also that the underground atmosphere should be tested, and also the quantity of gases contained in the water which the victims drink. Water deprived of its natural oxygen, and with an excess of carbonic dioxide, is in a good condition to assist in the diffusion of diphtheria, as of all other infectious diseases:

CLINICAL ACCOUNT OF A CASE OF SARCOMA OF THE FEMUR, FOR WHICH THE LIMB WAS REMOVED AT THE HIP-JOINT.

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DISARTICULATION at the hip-joint is an operation of great magnitude, and comparatively infrequent; but, besides, there are in the following case other features which may be interesting.

A. B., a young fellow twenty years of age, had enjoyed perfect health until four months previous to admission under my care into St. Thomas's Hospital on October 28th, 1878. He had never had a day's sickness previously. At this period, he first began to experience pain in his left thigh, which came on without antecedent injury or known cause of any kind whatsoever. He never had suffered from any venereal disease. The pain continued very severe, and a month after its first onset the thigh was noticed to be swollen. The swelling continued to increase rapidly, and was accompanied by severe pain, fever, and sleeplessness until admission.

There is no history of cancer in the family, nor of syphilis. The family history on the father's side is a consumptive one. The lad's paternal aunt, uncle, and grandmother died of phthisis. The father and mother are quite healthy. The boy is the third child, the eldest being alive and well; the second died at one month old of "fits".

On admission, the lad was much emaciated; his expression haggard and anxious from continual suffering day and night. The morning temperature was 100 deg. or 101 deg. Fahr.; the evening temperature a degree or two higher; he sweated profusely; his eyes were glistening, and features sunken. The rapid emaciation, the constantly high temperature, with regular evening rise, and the sweating at night resembled, and in fact constituted, a hectic condition. The temperature-chart (see next page) shows the evening increment occurring every night antecedent to the operation.

The whole thigh, from within two inches of its lower extremity quite up to the lesser trochanter, was occupied by an extremely elastic, smooth, fusiform, or cylindriciform swelling, over which the skin was pale and tense, but not adherent, and showed enlarged superficial veins. There was considerable synovial effusion into the knee-joint. Eight inches below the iliac spine, the sound limb measured only fourteen inches, the diseased nineteen inches and a half. The surface of the diseased limb felt much warmer than the opposite; but a thermometer for the purpose of ascertaining the exact difference was not at the time available. The elasticity was so marked as to suggest fluctuation very closely; in fact, as it afterwards proved, the tumour was so soft that a deceptive feeling of fluctuation was easily accounted for by the semi-fluid vascular character of the growth. Two exploratory punctures were made at different places, giving issue only to blood, which in one case came *per saltum*. No lymphatic glands were enlarged.

The close resemblance these symptoms in their entirety present to an acute inflammation appears to me very interesting. How similar in many ways are they, for instance, to an acute osteitis or osteomyelitis, with necrosis of the femur.

Very similar general symptoms would thus sometimes appear to arise from an excessive production of cells in the form of a tumour, and cells in the shape of an abscess. We have fever, and hectic temperatures, with rapid emaciation and profuse sweating in both instances. There were chilly fits, but nothing like marked rigor in A. B.'s case. But the local symptoms of pain, increased heat, pseudo-fluctuation, deep-seated swelling connected evidently with the femur, introduced a sufficient element of doubt to cause me to make a deep incision through the growth after the