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ART. III.—*The Fungoid and Animalcular Theory of Epidemics.* By WM. JUDKINS, M. D., of Cincinnati.

The attention of physicians and naturalists have been recently recalled to this theory, by the alleged discovery of minute cellular bodies of a fungoid character in cases of cholera, and in the atmosphere of cholera districts.

In the fall of 1832, when the cholera for the first time prevailed with such fearful malignity in this city, it was rumored that there was a numerous development of animalcula in our common hydrant water, and on examination with a magnifying lense, I discovered them in abundance, and I cautioned the citizens through the daily papers, to filter and boil the water previous to using it. And lately Doctors Brittan and Swayne, of Bristol, in England, did, this last summer, when the cholera prevailed in that place, institute a number of microscopical researches on cholera evacuations, and also, upon the condensed atmosphere collected in cholera rooms and districts. They say "that they have found a large number of sporules of a fungoid character in both the alvine evacuations from cholera patients, and also in the condensed atmosphere collected in their rooms." And here, in this city, the two Drs. Mussey have, this last fall, discovered, by sundry microscopical examinations, the same kind of animalcula, and reported them in the daily papers and *Lancet*, from the same sources. This rational and scientific method of collecting statistical information, going to explain not only some of the probable causes, but also the *phenomena* of epidemics, was sanctioned and approved by some of our older writers, even as far back as Linnaeus himself.

It would be rather out of place here to hazard any opinion on this subject in our present state of knowledge, though the existence of these fungi were sufficiently proved. There remains to be determined the still more difficult and important question of the nature of their relation to the disease, whether as a *cause*, or merely as one of its characteristic symptoms.

It is evident, however, from general experience, that the presence of this numerous family has an intimate connection of some kind with the manifestations of health and disease, in animal as well as in vegetable life, and any information relative to their character, and the purposes which they *seem* to fulfill in the sphere of creation, is valuable on this account.

The fungi, and their allied tribes, hunt, like the cholera, close, damp, dark localities, in the various forms of mildew and mould; they grow on refuse matters of muck and offal, which they rapidly decompose and assimilate; they also attack, in the form of blight and smut, vegetable organisms, which disease or debility have developed for their purpose, all such they speedily deprive of life. Their functions are implied in their name, which is de-

rived from *funus* and *ago*, to remove the dead. They are indeed the appointed executioners and the nimble scavengers of nature, clearing away whatever, by degeneration during life, or by decay after death, tends to disturb the general equilibrium. They travel unseen on every wind; they are invisible house inspectors, penetrating every nook and corner, in search of refuse matter. Some writers call them "nomades," and truly they are *wanderers* in every clime; they are equally prolific and evanescent; they multiply to countless legions wherever there is work for them to do, and they dwindle again to units when no longer wanted. By this alternate expansion and contraction, their force individually is very insignificant, but collectively it is immense, and constantly adapted to the varying requirements of nature. It is said a single cell begets some millions germs, which rise like subtle smoke in the air, sometimes tinging the atmosphere of a crimson color. Their tribes are numberless, and to each specie is assigned its own particular task. They operate in their varied species not only on the animal, but also on the vegetable kingdoms; by their size and mode of growth, each kind of fungus is adapted to its special task; some of the parasitic bands are infinitesimally small, penetrating the sap-vessels along with the water they imbibe. There are other species, as, for example the "frog cheese," or *bovista*, which expand with incredible rapidity to eight or nine feet in girth; of their disintegrating power some notion may be formed from the fact that, by sheer growing force, a single fungus has been known to raise a paving stone of eighty-three pounds in weight. The recorded ravages of the dry-rot fungi best illustrate the prodigious power of these invisible armies, and the astounding celerity of their operations. The "Queen Charlotte," a first rate ship intended for the British navy, which took seven hundred men seven years to build, was overrun by these little merulia within twenty months after she was finished. The "Rodney," another large ship in the same navy, launched in 1809, had scarcely put to sea, when her damp, sappy timber was found to be penetrated with fungi, so that all her fastenings loosened, and she had to hasten home. The infectious nature of these fungoid growths under particular circumstances have been satisfactorily established. Nor are the ravages of these invisible poisoners confined to the lower kingdoms of nature; insects, when debilitated by darkness and confinement, have been known to become subjects of their attacks. In Italy a fungoid epidemic, called "*Lamuscadine*," often spreads among the silk-worms, and destroys them by millions; soon after sickening by this distemper, the caterpillars are observed to stiffen and quickly die, their dead bodies snap easily with a brittle fracture, like that of a rotten twig, its cavity is found to be completely filled with a parasitic fungus of which the germes appear as a white efflorescence on the surface of the caterpillar. To show more conclusively the conta-

giousness arising from these fungi, experiments have been made by placing a few healthy silk-worms with one or two diseased ones, under a glass ball, the healthy worms soon take the disease and die. And even up to the human species, if man neglects to fulfill the normal conditions of his physical existence, is liable to the retributive invasion of parasitic zoophytes, fungoid and infusorial, each tribe of which finds, in some morbid secretion of its body, or in the degenerative substance of some particular organ, its special nidus. Some of these entozæ, for example, infest the voluntary muscles, some the kidneys, some the brain, some the blood vessels, some burrow into the substance of the heart itself, some enter by an unknown aperture into the eye-ball; of these fungoid assailants, none pull down the bodily tenement with swifter or more excruciating ravages than the "*parasitic spæcia*," which are introduced into his organism in the substance of degenerate grain; these inflict that terrible disease called "dry-gangrene," and has several times been epidemic in some parts of France. It is a little remarkable that some years the spured grain is more than usually poisonous, and in others quite inert, a circumstance attributed by some scientific writers to the influence which wet weather has upon it; the fungoid development which has been found under these circumstances to impart its poisonous qualities to animals who use it. It also occurred once in England in the year 1762, and was noticed in the philosophical transactions by Dr. Wallaston, of that year; the Doctor recites, among other cases, a laboring man, his wife and five children, who were tempted by the low price of flour made from this kind of grain, to use it as a common article of diet, and they were all attacked with "dry-gangrene." A similar deprivation occurring in the wheat, is suspected to have caused the sweating sickness, which so fearfully ravaged England in the 16th century, for though the epidemic was so severe that the very birds fell dead from off the trees, with small abscesses under their wings, yet, the inhabitants of Wales and Scotland, who did not at this period eat wheat bread, escaped the fungoid infection.

A sudden and immense development of minute zoophytes, both fungoid and infusorial, has been a frequent concomitant of epidemic pestilence, and this circumstance points in a similar direction with the facts above stated; at such periods the ground has been seen to redden as if the earth was sweating blood; the rain has fallen of a similar hue, and ponds and tanks resemble a crimson color. These appearances are due to the minute zoophytes; they float in impalpable clouds through the atmosphere until its spores, made heavier by moisture, or attracted by some electric disturbance, suddenly descend to the earth, which they sometimes do in such abundance as to cover the ground for some miles in extent, giving that appearance called "*palmella-cruenta*," or gory dew; and it is most likely that it was owing to this pestilential

phenomena that crimsoned the waters of Egypt like blood, and gave rise to the first of the seven plagues.

It is said on good authority, that in 1673, the Nile reddened in this way, and remained blood-like and putrid from the seventh to the twelfth month.

During the last invasion of epidemic cholera, Dr. Burnett, an English physician, found this same "*palmella-cruenta*" in abundance, purpling the ground near Oxford, as if red wine had been poured out upon it.

Such, then, are some of the facts in the history and phenomena of these fungoid tribes, and the allied microscopic zoophytes, establishing the conclusion, pretty satisfactorily, that they have given rise to some of the most pestilential diseases that have ever visited the human family, and also pointing strongly, if not satisfactorily, towards the cause of our own epidemic cholera. And while on this subject and newly trodden path towards the cause of the epidemic cholera, there are yet some little hooks, on which some doubts may be hung; and that it is obvious to remark, that the mystery of epidemic causation is only removed one step by the hypothetic recognition of the pestiferous power ascribed to the læmodic bodies.

If they caused cholera, how are they themselves caused?

What brought them suddenly into existence some half a century ago?

Where have their germs been hidden during the centuries of human existence that had previously elapsed?

No problem has more perplexed the scientific inquiries on this subject than that presented by the generation of the various entozæ.

How is the "guinea-worm" developed that infests the inhabitants of the Torrid Zone?—the "*ascaries*" that afflicts the Abyssinians?—the "*furia infernalis*" that torments the Laplanders?

What cause produces the "*tenia soleum*," which infests so large a proportion of the inhabitants of Cairo, in Egypt?—that torments the British troops at the Cape of Good Hope?—and has spread from Egypt to Germany, and even to France and England?

How were engendered those hydatids and fluke-worms, which Dr. Jenner produced experimentally in rabbits, by feeding them exclusively on succulent food?

Brousaïas, in speculating on this subject, declares "that an irritated mucus membrane to be the indispensable nidus of the entozæ;" which Dr. Budd, on the other hand, assumes to be the cause of irritation; so that we have here two concomitant phenomena, each in its turn set up as the indisputable antecedent of the other.

Into such counter perplexities are we led, when, instead of being content to investigate the fixed relations of phenomena, we

strive to penetrate into their generating causes, to their hidden essence, and to their intimate "modus operandi."

In tracing the history of epidemic cholera through various parts of the world as we find them recorded, with our own experience and observations as to its character and phenomena, we find it difficult and perplexing to give it a uniform and consistent character, agreeing with all the natural laws by which we might suppose it to be governed.

Though the evidence as above stated is pretty strong in favor of its animalcular origin, and reasoning "a priori," we should be led to conclude, then, in its movements from place to place, and from one part of the country to another, that it would naturally follow the water courses *down stream*, as it is reasonable to believe that all those "læmodic bodies" transmitted through the sewers or otherwise into the various water courses, giving origin and supplying material to keep the epidemic in full vigor; yet, we find the cholera, on its first voyage to Europe, ascending the streams of the Ganges, the Tigres, the Euphrates, the Danube, and the Volga. And we all know that, in the year 1832, when it first visited this country, it came from Quebec *up* the St. Lawrence, crossed over from Montreal to New York, up the Hudson river, thence on the head waters of the Ohio, thence down the Mississippi to New Orleans; that in the spring of 1833 the same epidemic *ascended* the Mississippi and nearly all its tributaries, fraught with the same malignant influence in nearly all its locations; and in the second month, 1849, with what anxiety did we in this city watch the progress of this epidemic, *ascending* the Mississippi from New Orleans to its lodgment among us, demonstrating very clearly that the *descending* waters do not control its movements in its passage over different countries.

On the whole, it appears from a fair comparison of such facts as we have been able to collect, that the *fungoid theory* is propagating malignant epidemics, including Asiatic cholera, though yet in doubts, approximates as near as any yet known to the profession.

On a subject which calls for extended experimental investigations, it would not be desirable, even were it possible, to express at present a more positive opinion; but, whatever may be the fate of the hypothesis, the experiments of which it must become the subject cannot fail to issue in the beneficial extension of our knowledge. Indeed, the very criterion of the scientific value of an hypothesis consists in its greater or less susceptibility of being experimentally confuted or confirmed.

ART. IV.—*The Modus Operandi of the Cod Liver Oil.* By C. W. WRIGHT, M. D., of Cincinnati.

The remarkable results lately obtained by the use of the cod liver oil in the cure of sturmountous affections, and in fact almost all cachectic diseases, has attracted a great deal of attention from the members of the medical profession.

In the cure of the various forms of cachectic diseases, which are the result of scrofulous diathesis, either hereditary or acquired, it is found that no single remedy has such a decided tendency to arrest and prevent the various forms of cacoplasmic and aplastic depositions. In the deposit of tubercular matter in the lungs, in the mesenteric glands, in the lymphatics of the neck, or in any other part of the body, no remedy is equal to this. In fact we can calculate with almost as much certainty on the removal of tubercular matter from the cervical glands by the employment of this remedy, as upon the cure of an intermittent by the administration of quinine. But the employment of this agent is not confined to the cure of tuberculosis, for it is found to exert a beneficial influence in cases of malignant, and other morbid growths, by retarding their developments and bringing about a more healthy condition of the fluids of the body.

The cod-liver oil has been long employed on the continent of Europe in the cure of rheumatism and other kindred diseases, but its beneficial influence in these and other maladies has not been fully recognised in this country until a comparatively recent period. But of late it has been administered not only in rheumatism, but in syphilitic affections of bones and their periosteum, with the most flattering results.

Chronic ulcers, accompanied with a free discharge of purulent matter, occurring in old persons, are acknowledged by all surgeons to be very difficult to cure, and frequently to resist all the ordinary methods of medication had recourse to in such cases; and if, by any means, the discharge is suddenly arrested, to be followed by most alarming, if not fatal symptoms. Now in cases of this kind, by the proper administration of the cod-liver oil, in conjunction with a well directed course of hygienic treatment, the cachectic state of the system rapidly gives way, and is succeeded by a speedy healing up of the ulcers and a restoration to perfect health. Several such cases have lately fallen under my notice, and one in particular which deserves a more especial consideration. It occurred in the person of a gentleman, aged about forty, who had been under the treatment of some of the most eminent physicians of this city for a long period of time, they having pursued the ordinary course of management taken in such cases, without any benefit resulting. But upon putting the patient on the use of the cod-liver oil, in conjunction with small doses of the syrup of the iodide of iron, there was a rapid improvement in