FERMENTS AND DISEASES.

"There are scourges that the human species brings upon itself and there are others that it suffers; and that it considers as being more inevitable than the former. Among the latter, epidemic diseases stand in the first rank; and to these man is accustomed to furnish unmurmuringly immense hecatombs, and it is difficult for him to imagine a world in which there is no pest, nor cholera, nor typhus, nor yellow fever, nor syphilis, nor scarlatina, nor many other diseases that I might name did I not limit my enumeration systematically to those whose contagious nature is known and accepted by all. Twenty years ago nothing at all was known about all such diseases, and, had some one taken it into his head to allege that a day would perhaps come when the human species would be rid of them, he would have been met with only a smile of incredulity or even of disdain. To-day, however, such a dream assumes shape, such a hope does not seem unrealizable, and those who do not accept it have no longer the right to consider it as foolish and to reject it with disdain."

Thus expresses himself Mr. E. Duclaux, at the beginning of the remarkable work that he has just published, under the title of "Ferments and Diseases," and in which he gives a complete *exposé* of those modern labors and doctrines of which Mr. Pasteur was the initiator. Our readers are assuredly acquainted with the principles that have been revealed to this illustrious chemist through the study of these innumerable, infinitely small, organized beings which swarm in nature, which make their appearance where the life of superior animals is extinguished, which multiply with a rapidity and fecundity that bewilders the imagination, and which appear to be the true cause of the most dreaded contagious diseases.

There is no one who has not heard speak of the bacteria of charbon, of microbiums, or of vibrios; but those infinitely small beings have not been seen under the microscope by everybody, and it has, therefore, seemed to us that it would be of interest, by making use of the beautiful plates in which Mr. Duclaux's book abounds, to present a few specimens to our readers. The annexed illustrations were drawn under the microscope, and represent magnifications of from 500 to 800 diameters.

Fig. 1 shows the organisms that appear in an organic decoction or infusion, such as that of hay or beef broth, for example, exposed for some time to a free contact with air. On examining a drop of the liquid by the microscope there is found in it a myriad of living beings of diverse forms, such as monads and thin corpuscles (*c*, Fig. 1), which are reproduced by fissiparism, that is to say, each of which divides through a median furrow into two beings that separate and afterward lead an independent life. There is one species known in which the division does not take more than six or seven minutes for its accomplishment. A single individual might consequently produce more than a thousand offspring in an hour, more than a million in two hours, and in three hours more than the number of inhabitants on the globe. Alongside the monads are perceived small granules (*e* and *f*, Fig. 1), which are called *Micrococci;* and, at *a* of the same figure, there are seen infusoria of large dimensions, called *Kolpodes*. These are the beasts of prey of the microscopic world that we have just described. Their organization is quite perfect; they have a mouth and a stomach, and they live at the expense of the smaller beings which they devour; and they even possess contractile vesicles that it is manifestly impossible not to liken to a heart.

This is the world of microscopic beings that was first known, and among which was implanted that doctrine of spontaneous generation that Mr. Pasteur, through irrefutable experiments, has utterly annihilated.

We should like to follow Mr. Duclaux in the complete enumeration that he gives us of this microscopic world; but his book should be read in its entirety, for there is nothing in it that can be abridged; and, in calling attention to it, we shall content ourselves with representing a few other organisms whose role has been most studied in recent times.

In Fig. 2 we have represented, to the left, the bacteria of charbon in artificial cultures, and, to the right, the same in the blood of an animal afflicted with the disease. In Fig. 3 we have the celebrated microbium of chicken cholera—a young specimen being seen to the left and an old one to the right; and, finally, in Fig. 4, we see the septic vibrio that accompanies septicæmia.

On opening the body of a dead septic animal we find therein extensive disorders, which are manifested by a general swelling. On examining by the microscope a drop of the liquid or serosity which fills the abdomen, we find therein, in multitudes (as shown in Fig. 4), moving vibrios that are sometimes very elongated and sometimes very short. The active motions of these organisms, and their abundance, scarcely permit them to be overlooked, and there is reason for surprise that they should have escaped all scientists who occupied themselves with septic diseases before Mr. Pasteur. The refraction of the vibrio, being very near that of serum, renders it difficult to find it; but is discovered at length, however, flexuous, crawling, and gliding along amid the globules of blood, like a serpent among dead leaves.

Such are a few of the microscopic beings, those dread enemies which for ages have passed unperceived, and which science has revealed. Mr. Pasteur has already triumphed over some of them—if not in causing them to disappear, at least in rendering them inoffensive. The road is for the future laid out, and, as Mr. Duclaux says, at its terminus will be found the preservation to their families and country of thousands of existences.—*La Nature.*

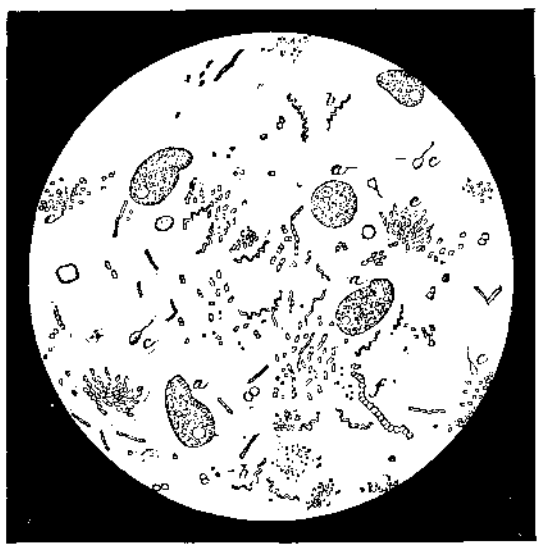

Fig. 1.—ANIMALCULES IN AN INFUSION OF HAY.

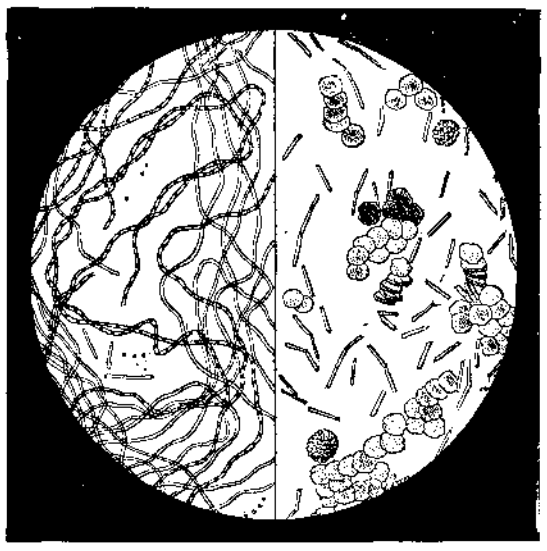

Fig. 2.—BACTERIA OF CHARBON.

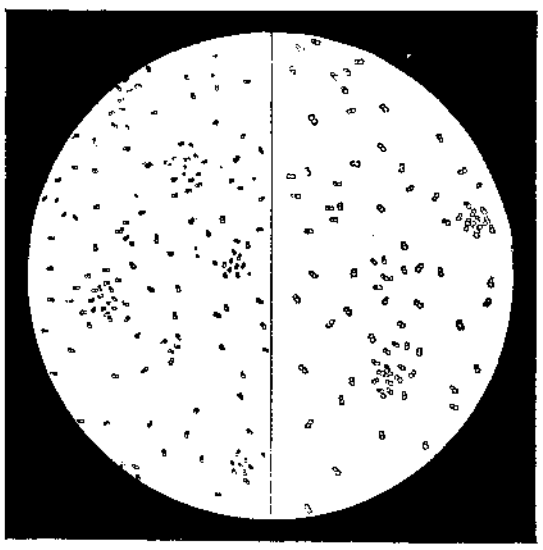

Fig. 3.—MICROBIA OF CHICKEN CHOLERA.

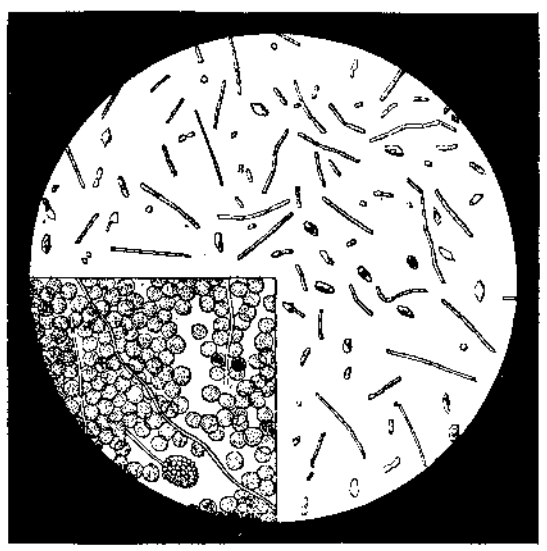

Fig. 4.—SEPTIC VIBRIOS.

Healthy Teeth.

The *Herald* (N. Y.) correspondent with the party in search of the lost crew of the Jeannette has been impressed by the beauty of the teeth of natives of Northern Siberia. He saw old men of sixty and seventy with sets of teeth small and pearly white, polished and healthy. Decay and suffering are unknown. A physician of Yakutsk attributed this to the habits and the kind of food eaten by the natives, and to a certain care taken by them from childhood up. First, the natives do not touch sugar in any form, for the simple reason that they cannot afford to buy it. Secondly, they are in the habit of drinking daily large quantities of fermented sour milk summer and winter, which is antiscorbutic, and is very beneficial in preserving the teeth. And lastly, they have the habit of chewing a preparation of the resin of the fir tree, a piece of which, tasting like tar, they masticate after every meal, in order specially to clear the teeth and gums of particles of food that may remain after meals. The gum or resin is prepared and sold by all apothecaries in Siberia, and is much used by Russian ladies.

FIREPROOF paper may be made, according to the *Pharmaceutische Zeitung*, from a pulp consisting of 1 part of vegetable fiber, 2 parts of asbestos, 1-10 part of borax, 1-5 part of alum. The ink is made from 85 parts of graphite, 0·8 part of copal varnish, 7·5 parts of copperas, 30 parts of tincture of nutgalls, and a sufficient quantity of indigo carmine.

Smoke and Waste.

In the course of his recent address at Leeds, as president of the Institution of Mechanical Engineers, Mr. Percy G. B. Westmacott said:

"We may pride and plume ourselves upon the vast strides which science, art, and engineering have made in our time, but posterity will assuredly lay its finger upon the great blot of waste, and many stigmatize our age as the Black Age, which has spoilt, by careless, unnecessary, and selfish emissions of smoke and noxious gases, many a noble town and many a lovely spot on earth. The smoke nuisance is altogether inexcusable, and cannot be too severely dealt with. Science and art have practically overcome it; and experience enables many, like myself, to assert that money can be profitably laid out and yield good interest in the abatement of this unpardonable nuisance.

"Then with regard to waste, much ingenuity and skill have certainly been displayed, and much work has already been done, to lessen this evil; and the records of our institution will bear witness that many of our members have striven and succeeded well in their efforts to remove this stigma from our age. I would urge upon the younger members of our profession to study this question profoundly and as if the whole of their success in life depended upon it, and never to undertake the smallest piece of work without wrapping it round with economy. Those who carry out this advice will assuredly succeed. May I not go so far as to say that no really good and useful invention is ever wasted or completely thrown aside, even though it may be superseded permanently or for a time by some other invention? This, to my mind, is an important reflection, one extending far beyond professional views; for its realization would greatly assist in alleviating those injurious alarms which are often felt when some new and striking invention bursts upon the world.

"To illustrate this, let us take for an example the present prominent question of lighting. We may go back to the period when the diffusion of light depended upon oil; after a time candles were introduced; then came the great and important invention of gas; and now, at the present time, electricity is being brought into use. Well, what do we find in all these competing agents, each good and useful in its way? We find that not any one of these sources of light exercises a monopoly. Candles have not interfered with the use and progress of the oil lamp; gas has not snuffed out candles, nor stopped the flow of oil for lighting purposes; and I do not hold with those who believe that electricity will totally eclipse gas. Or, again, let us take for example the means of transport across the land. Rough and miry tracks were, first of all, made for cattle traffic; they were then improved for horse and cart traffic, and these were still further developed by Macadam for swift-running carriage traffic.

"Then there were canals; and, lastly, railways, which owe their origin to the very simple idea of confining the run of vehicles to a defined line of hard rails. This happy idea laid the foundation of that great development of mechanical traffic which has assisted to open out and spread abroad the riches of the world, and has given to science and mechanical art a wide field of labor. Thus a new system of transport may become the main artery through which material is moved and spread over the land; but the increased facility which such an improved system of conveyance gives, and the enlargement of trade which results therefrom, require increased feeding powers; and thus the system which one day is the principle artery forms another day the side arteries. And yet the amount of work done by the old system is not necessarily diminished; on the contrary, it may be very materially increased by the impetus of improvement in some other direction and by the benefits of competition. Now, it may at first sight seem singular that railways, lessening, as they have done, to an enormous extent the cost of land carriage in comparison with cart traffic, have neither done away with horses and carts, nor drained canals of their freights. On the contrary, there is more horse and cart traffic than ever; indeed, railway companies are among the largest proprietors of horses, and the most extensive carters in the country."