

THURSDAY, MARCH 27, 1884

THE CHOLERA BACILLUS

IN his capacity as chief of the German Cholera Commission Dr. Koch has issued a further—his sixth—report, and it is one which must become historic in connection with inquiries as to the etiology of that disease. Hitherto Dr. Koch has almost entirely confined himself to reporting facts as they were elicited, and whenever he has referred to any inferences which might be drawn from them, it has only been to show how many sources of error stood in the way of all attempts to arrive at trustworthy conclusions. This attitude of Dr. Koch has naturally tended to increase the confidence in which he is held as a scientific worker, and it has an important bearing on the character of the present report, in which the reserve hitherto maintained is thrown off, and Dr. Koch announces that the bacilli he has discovered are altogether peculiar to cholera, and further, that they are the actual cause of cholera.

The further investigations which have been made relate to the cultivation of the bacilli in question, to their behaviour in the bodies of patients during the various stages of the disease, and to the examination of additional bodies of persons dying both of cholera and of other diseases. The result is that what are now termed the cholera bacilli can be found in no bodies except those of cholera patients; that at certain stages of the cholera disease they are invariably found in the bodies of the patients, whether these have lived and died in Egypt or in a country so far distant from it as India; that these organisms confine themselves to the organ which is the seat of the disease, namely, the bowel; and that they behave exactly as do other pathogenic bacteria, their first appearance coinciding with the commencement of the disease, their increase being proportional to its advance, and their disappearance corresponding with its decline. Certain incidental studies have also tended to confirm the correctness of the hypothesis that these bacilli are the cause of cholera. It is well known that the linen of cholera patients, has conveyed the infection of that disease. Now Dr. Koch has repeatedly observed that such linen, when soiled by the alvine discharges and kept moist for a period of twenty-four hours, has been the seat of an extraordinary multiplication of the special organisms; and in connection with these experiments it was found that precisely the same result took place whenever cholera dejections, or the contents of the intestines of persons having died of cholera, were spread upon such substances as moist linen or blotting paper. And further, a thin layer of the same discharges, when placed on a moist soil, was found within twenty-four hours to have been converted into a thick mass of cholera bacilli. This latter discovery is one of extreme importance in connection with the observations so frequently made as to the spread of cholera in India by means of water-sources, the soil around which is so often befouled by the natives.

From one point of view the report gives special promise. Some bacilli of disease will, in certain stages, withstand almost every form of maltreatment; they may

be dried, frozen, and otherwise dealt with, and yet they remain as potent as ever for mischief. But Dr. Koch's cholera bacilli die off rapidly when dried, all vestige of life apparently disappearing after three hours' desiccation. And not only so, but these bacilli will only grow in alkaline solutions, a very small quantity of a free acid standing in the way of their development. To these two circumstances we may in all probability to a large extent attribute the frequency with which those who are directly associated with the sick and their discharges escape infection; and the fact that the healthy stomach contains a sufficient amount of acid to destroy the bacilli may possibly lead to the discovery of some therapeutic or other measure of prevention which may be generally adopted. Directly gastric disturbance steps in and the gastric juices give a different reaction, we are probably face to face with conditions specially favourable to the reception of the poison, and in this respect it is noteworthy that cholera so often attacks those persons who have suffered, or are suffering, from diarrhœa and other gastric disorders.

In one respect Dr. Koch's experiments have failed. He has not succeeded in producing cholera artificially in any of the lower animals. As we have already pointed out, cholera is not the only specific disease to which man alone appears to be susceptible; and it is possible that the fact of cholera discharges and portions of diseased intestines having been given as food to the lower animals with impunity may find much of its explanation in the absence, in the stomachs of those animals, of the needed alkaline cultivation fluid.

At one point of the report our confidence in the correctness of Dr. Koch's inferences is weakened. It is where he, in maintaining his view that the bacillus he has discovered is the actual cause of cholera, refers to its resemblance in one respect to the bacillus of enteric fever. Now, leading micro-pathologists in this country have hitherto declined to regard it as proved that any such specific bacillus has been discovered. Dr. Koch's views have therefore still to stand the test of scientific criticism by his fellow workers, who will doubtless, as occasion offers, repeat his experiments.

THE SCIENCE OF THE EXAMINATION-ROOM

THOSE persons whose unhappy lot it is to have much to do with examinations must often feel that there is some fundamental common factor dropped out in the relation between examiner and examinees. A straightforward paper is set in a subject, say A, in which we will suppose there is no attempt to "catch" or perplex the student, but simply to sample, as it were, the ordinary commonplace knowledge which average industry might acquire. There returns to the examiner in due time a mass of manuscript, evidently written with pains and labour, mostly quite seriously meant, but which does not deal with the subject A, but with something which, though apparently related, is evidently quite different, and which we may call A'. After a little while he begins to wonder whether the whole thing is not a nightmare. The form is apparently rational, and yet the details are hopelessly incongruous and absurd. Or, to put the thing in another shape, it is as if one set a paper in solid geometry and

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got answers from Prof. Sylvester's infinitely thin book-worm.

If the examination-system is to be maintained without being on the one hand hopelessly discredited, or on the other lapsing into a kind of ceremonial observance like academic dress or a Guy Fawkes celebration, something must seriously be done to ascertain the real relation between A and A'. It is generally presumed that the object of "plucking" a candidate is to indicate to him his imperfect knowledge. But though the student of the subject called A' is usually plucked by the examiner in A it is not clear that what may be called the moral result is in any way satisfactory. The examiner is disgusted equally with the candidate who has likely enough done his very best, just as the infinitely thin book-worm might do his best. The candidate grinds away at his A' with more assiduity than ever if he is modest enough to think his ignorance to be in fault; but this only makes his subsequent failures with the examiner in A more assured, because the radical incommensurability of A and A' becomes more intensified.

There is really reason to think that underneath the rational fabric of science as understood by intelligent persons of common sense there is a vast substratum of something altogether different, but with which a large number of individuals are quite seriously occupied. A' is only a term in fact of a very considerable series. Every now and then in the pages of this journal strong evidences crop up of the existence of this singular body of knowledge. This existence, however, is scarcely really grasped by the scientific world proper, and it might be compared to a sort of inverse of Prof. Tait's unseen universe.

The present state of things can hardly go on. It is quite certain that, whatever intrinsic interest science of the A' type may possess, it is of no kind of practical use to ordinary human beings. If it cannot be displaced by the real thing of which it is a kind of phantom, it is a serious question whether the struggle of the examination-room had better not be for a time suspended.

In the meantime it is very important to investigate the true nature of this phantom science. A little work, of which the second edition has been lately sent to this journal for review, appears to belong to its literature, which there is reason to think is rather copious. This particular publication is part of the "Students' Aids Series," bears the motto, "*Mens sana corpore sano*," and deals with botany.¹ It is impossible to seriously criticise it; indeed, from the point of view of what has been said above it would not be easy to do so. We may content ourselves with reproducing textually from its pages the *entire account* given of a well-known and very characteristic group of Thallophytes:—

THE OLIVE SEaweEDS.

These weeds vary in general appearance from small tufted filaments to immense stalks terminated by a branched thallus.

¹ "Aids to Botany." By Armand Semple, B.A., M.B., Cantab.; L.S.A., M.R.C.P., Lond., Physician North-Eastern Hospital for Children, Hackney, Physician to the Royal Society of Musicians, late Senior Examiner in Arts at Apothecaries' Hall, late Medical Clinical Assistant and Surgical Registrar at the London Hospital, author of the "Essential Features of Diseases of Children," "Aids to Chemistry" (Inorganic and Organic), "Aids to Materia Medica" (Inorganic and Organic), "Tablets of Materia Medica," "Aids to Medicine." (Duble Part.) Third Thousand. (London: Baillière, Tindall, and Cox, King William Street, Strand. Dublin: Fannin and Co. Grafton Street. Edinburgh: MacLachlan and Stewart, South Bridge. Glasgow: A. and W. Stenhouse, College Gate. New York: Putnam and Sons, 1883.)

In the higher forms a shrubby aspect, a kind of root, and an epidermal layer are observed. Their colour is not bright green, but in general olive.

The zoospores originate in **Oosporangia**, situated at ends or joints of the frond, or in each of the cells of a filamentous body called a **Trichosporangium**; they resemble those of the Green Alga.

The zoospores from the Trichosporangium have been mistaken for spermatozoids.

The spores reside in sacs termed **Perisporos**, having a lining membrane, the **Episporos**.

The perisporos or sporangia are either scattered or are arranged in **Sori** or groups on the frond's surface, or in cavities, **Scaphidia** or conceptacula, communicating by a pore with its surface.

The scaphidia may appear as club-shaped masses or receptacula at the edges of the frond.

The antheridia are ovate sacs which contain **Antherozoa** or **Phytozoa** (two ciliated spermatozoids), and appear on slender filaments in the same or other plants, and in the same or other conceptacles as the spores. If on the same plant, they are called **Monœcious**; if on different, **Dicœcious**. When in the same conceptacles with the spores, they are Hermaphrodite. To the slender filaments destitute of antheridia the name of Paraphyses is given.

We must leave to our botanical readers to notice for themselves where this instructive specimen of A' science differs from the kind of lesson which an ordinarily constituted teacher of real botany would try to communicate to his pupils. At any rate we may ask, would any one having learnt all this by rote (for there is reason to think that such is the method insisted upon) be secure in recognising a piece of bladder wrack when shown to him, or certain of any single fact in its life-history.

A curious point about the A' science is the copiousness and more or less unintelligibility of its terminology. There is no doubt, however, that this is very generally mastered, however repulsive such a task might seem at first sight. But the problem is still unsolved as to what is the end gained. With the same effort it is probable that the rudiments of an Oriental language might be acquired—say Arabic—and the question arises whether in every way this would not be more profitable.

LEFROY'S MAGNETIC SURVEY IN CANADA

Diary of a Magnetic Survey of a Portion of the Dominion of Canada, chiefly in the North-Western Territories, Executed in the Years 1842-44. By Lieut. Lefroy, R.A., now General Sir J. H. Lefroy, C.B., F.R.S., &c. (London: Longmans and Co., 1883.)

THIS record of magnetical work performed forty years ago by Lieut. Lefroy of the Royal Artillery—now General Sir J. Henry Lefroy—is a contribution of interest to the science of terrestrial magnetism.

The Magnetic Survey of the British Possessions in North America authorised by Her Majesty's Government in the year 1841 at the recommendation of the Royal Society, and in great part executed in 1843 and 1844 under the supervision of the late Sir Edward Sabine, had for its primary objects the determination of the regular and irregular changes of the magnetic elements, especially that of the horary variation of the declination; this variation being then known as subject to wide differences in the high magnetic latitudes of the northern hemisphere