

no longer great, and does not by any means account for the difference in results between the two countries. The German student as a rule works very much longer, that is, he is a student for a longer time than the English student, who too often commences his study of chemistry not as a mental training but as a means to an end: to become a public analyst or a works analyst, and who desires to learn only as much as is absolutely necessary for some particular line he has chalked out for himself; or, worse still, to "pass" some "examination."

The importance of chemistry, especially that more regular and systematic chemistry of the carbon compounds, as a philosophical training is not yet by any means recognised in this country. And it is to be feared that until this is remedied we shall still remain, in spite of new schools, in a backward position.

According to an authority like Prof. Wundt, even qualitative and quantitative analysis are, as logical methods, superior to mathematical.¹

There is no reason to suppose that the ordinary English student is inferior to any other, and when this subject is put before him in a proper light, as a mental training of the highest order, and not simply a mechanical sort of process, more cheerful results may be looked for. But the students in our higher schools and universities should not stop at qualitative and quantitative analysis, but if possible do some synthetic work, as by this only is a real grasp of the science to be obtained.

When once we get a substratum of well-trained students, not simply analytical machines, or examination-passers, we shall not have long to wait for results of theoretical and also practical interest.

But our professors must also bestir themselves. In very few institutions in England are more than elementary courses of lectures given, generally the same thing one session after another. The professor should always be practically engaged in research work, so that his students may have a real example to follow. This of course can only take place when the present disproportionate amount of teaching is reduced. Certain it appears that the enthusiasm and rapid advance of the students working in a German university laboratory is in a great measure, probably entirely, due to the example of the professor's working.

THE CHOLERA BACILLUS

THE Report in which Dr. Koch, chief of the German Scientific Expedition, embodies the results hitherto obtained by him and his assistants with regard to the cholera in Egypt, deals in a very guarded manner with the question of the discovery of a definite cholera bacillus. As the result of experiments carried out both on living and dead cholera subjects, it appears that, whereas no distinct organism could be traced in the blood and in the organs which are so frequently the seat of micro-parasites, yet bacteria having distinct characteristics and resembling somewhat in size and form the bacilli found in glanders were discovered in the intestines and their mucous linings; and this under circumstances which seemed to identify them with the disease from which the patients were suffering. Thus, their existence in the intestinal membranes was obvious so soon after death that they could not have been brought about by any *post-mortem* changes; they were present in the case of all patients who were actually suffering from the disease, and in the bodies of all those who had died of it, whereas they were absent in the case of one patient who had had time to recover from cholera but who had died of some secondary complication; and they were not discoverable in the case of patients who, during the cholera epidemic, succumbed to other diseases. And further, the same bacillus had

been met with by Dr. Koch, a year previously, in the case of four patients who had died of cholera in India, and portions of whose intestines had been forwarded to him for examination.

From these circumstances Dr. Koch feels justified in provisionally holding the belief that these bacilli are in some way related to cholera, but as yet he is not prepared to say whether they are the cause or the effect of that disease. The number of cases which the Scientific Expedition were able to utilise for the purposes of their inquiry was very limited, and it is also suggested as possible that some of the experiments were vitiated owing to the circumstance that the disease was already subsiding in intensity when the investigations were commenced. Especially does Dr. Koch suggest that this may account for the invariable failure to produce cholera in any of the lower animals into whose bodies the intestinal secretions were inoculated; but as to this it must be remembered that human diseases are rarely communicable to other animals, and that, as regards enteric fever, a disease which etiologically and otherwise has many points of resemblance with cholera, every effort to communicate it to other mammalia has hitherto invariably failed. But the failure of infective power which may very possibly be associated with the declining stage of an epidemic would be very likely to interfere with experiments having for their object the isolation and cultivation of the bacillus, and hence we are glad to learn that Dr. Koch is to continue his investigations in India, where the varying stages of the disease can easily be met with. In the meantime, however, it will be well to remember that Drs. Lewis and Cunningham have, notwithstanding laborious microscopic and other researches in India, hitherto failed to identify any of the organisms they have met with as specifically related to cholera.

One point is set at rest by Dr. Koch's Report, and that relates to the actual nature of the disease which has been epidemic in Egypt. Both pathologically and otherwise he declares it to be identical with Asiatic cholera.

NATIONAL TRAITS IN SCIENCE¹

THERE are at present three principal currents of scientific work—German, English, and French. The scientific writings of each nationality are characteristic, and, taken as a whole, offer in each case distinctive qualities. German influence is now predominant over the scientific world, as French influence was uppermost during the earlier part of this century; but the sway of Germany over Western thought is far more potent and widespread than was ever that of France. As students once gathered in Paris, so they now flock to Germany; and thence back to their own lands they carry the notions of German science, and labour to extend, imitate, and rival them. Thus German ideas have been spread abroad, and established in foreign countries. This has set a common standard for scientific work, which is accepted in most European countries. German influence is evident by its effects in Switzerland, Russia, Italy, Poland, Belgium, England, and America, and in degrees indicated by the order given: in France, Spain, and Portugal it is hardly noticeable. Holland and the Scandinavian countries have for many years achieved so much and so excellent work that their scientific development may be said to have accompanied rather than to have followed that of Germany.

German science has unquestionably distinctive qualities. Its pursuit is a special and honoured calling, attractive to the highest talent: its productions have the stamp of professional work. The German scientific man is first and principally an investigator: he is obliged to be so, otherwise he loses in the race. He wins his posi-

¹ Wundt, "Philosophical Studies," vol. i. p. 473, 1883.

² From *Science* of October 5.