

THE HALL PHENOMENON IN LIQUIDS.

PROFESSOR ANTONIO ROITI publishes (*Atti acc. lincei*, xii. 397) under the above title the results of some experiments he has made. In preparing himself for his work, he repeated some of the ordinary experiments upon this phenomenon in metals: and the results, which contain nothing new, are shown in several diagrams. He devised one new experiment, however, which shows, as he thinks, that the effect he is investigating is not due to a direct action of the magnetic field upon the electric current *per se*. As the opinion thus reached by Professor Roiti must have been held two or three years by all who have given special attention to the matter, it is hardly worth while to inquire whether his new experiment is conclusive in itself.

In experimenting with liquids, Professor Roiti was unsuccessful in his main object, no effect similar to the well-known action in metals being detected.

It did appear, however, that the magnet, acting upon a solution of sulphate of zinc of given strength, was able to produce a change in the electric conductivity of the solution, the sign of which depended upon the direction of the magnetic force, the current in the liquid, and the degree of concentration of the solution. Thus, in a solution less concentrated than that which possesses the maximum electric conductivity, the effect was in a certain direction; while the opposite effect was produced, under the same conditions of current and magnetic force, in a solution having a concentration greater than that corresponding to this maximum. In a saturated solution no similar effect was observed.

Professor Roiti attributes this behavior of the non-saturated solutions to a want of homogeneity in the liquids, which become stirred up by the ponderomotive electromagnetic action. He makes several experiments tending to support this opinion. In a solution of ferric chloride (*cloruro ferrico*), of specific gravity 1.34, effects were obtained similar to those found with the dilute solution of sulphate of zinc. In a thin layer of mercury no similar effect was detected.

The examination of liquids with the view of detecting a 'rotational effect' similar to that observed in metals was probably first suggested in print by Ettingshausen.¹ The difficulties of the investigation were obviously great, however; and Professor Roiti appears to be the only experimenter who has yet undertaken it.

His account of his experiments is open to criticism in this respect: that it does not give sufficient data in regard to intensity of magnetic field, etc., to enable the reader to determine how severely the liquids were tested for the presence of the effect which gives the title to his article.

Moreover, he seems to have made a point of placing his side-connections unsymmetrically, so as to have, independently of the magnet's action, a considerable 'derived' current, — an arrangement which enabled him to discover the effect described above, but which,

on that very account, should be studiously avoided in seeking for the phenomenon he was trying to detect.

Professor Roiti's ultimate object in beginning this investigation was to determine whether the transverse or 'rotational' effect would in liquids correspond to the magnetic rotation of the plane of polarization of light. Of course, no conclusion whatever upon this point can be drawn from the account given of his work and its results. And, even if his experiments had been entirely successful in revealing the effect looked for, it would be necessary to exercise caution in applying results so obtained to the case of the rotation of light. In the liquids, as here examined, the particles have time to fully adjust themselves, in position and motion, to the requirements of the magnetic force and the electric current to which they are subjected; while in the phenomenon of light, assumed to be electromagnetic in character, the mere inertia of the particles of the liquid must play an important part in the action of forces, which are reversed a countless number of times every second.

In the *Comptes rendus* of Sept. 17, 1883, Professor Righi states that he has found the Hall effect in bismuth to be of the same sense as in gold, but about five thousand times greater than in the latter metal. He obtains a very marked action in bismuth by use of an ordinary bar-magnet, and believes that he can produce a perceptible effect by the action of the earth's magnetism.

JANET'S THEORY OF MORALS.

The theory of morals. BY PAUL JANET. Translated from the latest French edition [by MARY CHAPMAN]. New York, Charles Scribner's Sons, 1883. 10 + 490 p. 8°.

IF books on ethics are to be noticed at all in a scientific journal, they might be, as a rule, safely classified under the head of fossils. No literature deals with a subject which would seem to be more living; yet no literature is, on the whole, more desiccated and dead. Human conduct, with all its infinite variety of standards and impulses, with all its marvellous interworking of passions and emotions, with all its pressing and personal problems, conflicts, and obligations — what subject would seem to stimulate students to greater vividness, picturesqueness, or incisiveness of treatment? Every man is in his own way an ethical philosopher. No one can escape thinking about the right principles of his conduct. Books on this subject address the largest possible audience on the one unavoidable subject of reflection. And yet there seems to be some subtle influence which dries up even literary instincts when they approach this theme and which makes even brilliant writers wearisome. There

¹ *Anz. akad. wissenschaft. Wien*, March, 1880.

is hardly any living English writer more abounding in vitality and wit than Mr. Leslie Stephen; but even he, when he enters this enchanted region, seems benumbed and drowsy, and is positively hard to read. There is said to be no American teacher who has imparted more moral force to his students than the venerable president of Williams college; but, the moment he arranges his instruction in a book, it is as if he gathered his living flowers from useful and from noxious plants, and laid away these virtues and vices, all pressed and juiceless, in successive drawers.

The last work of Janet, which he frankly describes as his *Magna moralia*, is certainly as little open to these criticisms as any book of its kind. It attracted much attention on its first appearance in 1874, and was for some years used as a text-book in Harvard college. It is now translated, and very well translated, for the use of President Porter's classes in Yale college. It has lucidity, as our last literary adviser would call it, and is full of learning. Its strength lies where the German masterpieces are weakest, — in force and variety of illustration. It is hardly extravagant to say that so clear and picturesque a treatise, in the hands of an alert teacher, might save the study of ethics from its almost inevitable fate of being very dull.

The stand-point of the author may be very briefly described. He is a conspicuous instance of the many minds who desire to be eclectics, but whose hearts will not permit them. He sees that the problem of ethics, like that of all present philosophy, is a problem of reconciliation. He sets himself to comprehend in his system the whole range of contributions to ethics made by modern utilitarianism, but he is none the less at heart a Kantian. The moral law of Kant appears to him too formal, too abstract, too empty, and he is repeatedly offering corrections and supplements; yet if Fichte is a disciple of Kant, so, in spite of frequent controversy with the master, is Janet. His first thrust is at the least-guarded part of the experiential method, — its incapacity to distinguish between quantity and quality in conduct. Here he discloses with ease the contribution which Mr. Mill has made to the view of conduct which he believed himself to be opposing; and we pass from the recognition of this distinction of quality in acts to the principle which alone can give quality to them. This principle he defines as their intrinsic excellence; and this excellence, in its turn, is to be judged by the contribution of acts to the unfolding of the best in man, — of his real person-

ality, his reasonable will. Thus we find before us the moral dynamic of a completed life, the conception of an end in which happiness and excellence shall coincide, — in short, a moral ideal. This discussion occupies the first of three divisions in the treatise. The two remaining books unfold this fundamental conception in its relation to outward standards of duty and to inward laws of life. They proceed with great clearness and almost with vivacity of treatment, and invite us in somewhat fragmentary fashion to a great variety of problems, both of metaphysics and casuistry, which we cannot here consider.

Returning to the main contribution of the book to the theory of morals, the present reviewer has no controversy to undertake with its evident purpose. The ideal aim which it presents is not stated with the frankness of Grote, or with the fulness of Green; yet it is as plain with Janet as with Grote, that man is essentially 'an ideal-making animal,'¹ and as certain, though not so plain, with Janet as with Green, that the development of the moral ideal is a personal and inward, and not a social, evolution.² What we shall here with some diffidence suggest, however, is the highly technical character of all these treatises, and, indeed, of the whole range of ethical literature. We repeat the impression with which we began this notice. Here is a subject which deals more directly than any other with the real and daily relations of life; yet, as we have just now tried to describe the purport of a remarkably lucid book, we have found ourselves forced into the language of specialists, and away from the methods of practical affairs. It is quite possible for a man to be a highly trained moral philosopher, and yet be a powerless adviser concerning a specific moral problem, so far removed has been the science of right conduct from the subject with which it is supposed to deal. Now, we maintain that a science of life should frankly take its start from the data and the problems of life, and should proceed inductively to analyze and classify these data, and to discover what may be their law. The literature of moral conduct may be at present divided into two distinct classes, — the books which deal with theory, and the vast and rapidly growing literature which deals with the practical conduct of social life. This latter department is largely the growth of the last few years. It may be called ethical sociology. It describes the duties one owes to himself and to society, — the duties, or, in the case of Pro-

¹ Grote on moral ideals, p. 46, ff.

² T. H. Green, *Prolegomena to ethics*, 1883, pp. 189, 201.

fessor Sumner's little book, the absence of duties, between social classes; the problems of charity, temperance, and all the varied aspects of moral reform. Now, between these practical applications of ethics and the books on ethical theory there lies an unbridged chasm. The maxim of Kant gets ample illustration: "Ideas without content are empty; observation without ideas is blind."¹ When sociologists approach any theory of morals, they exhibit an almost ludicrous ignorance, as when Professor Sumner interprets sympathy in the spirit of unconscious Hobbism. When, on the other hand, a student of the metaphysics of morals approaches a problem of practical conduct, he is apt to find his law unmeaning. Here, then, it would seem, is an opportunity for what may be fairly called inductive ethics. It is not the method which commonly claims this name, and which simply means the exclusion of any evolution of personality; it is the construction of a theory of ethics from an examination of the facts of social life, the data of philanthropy, the testimony of ideal aims, the characteristics of moral personalities. This would be a method of ethics which would be constantly close to life, and which would gather up the real issues of conduct into their higher significance and tendency.

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BACTERIA.

Bacteria. By Dr. ANTOINE MAGNIN and GEORGE M. STERNBERG, M.D., F.R.M.S. New York, Wood, 1883. 19+11+494 p., 12 pl., illustr. 8¢.

THIS portly and handsome volume will be read with interest by all who have followed the painstaking and thorough work of Dr. Sternberg during the last three or four years. To him belongs the credit not only of having translated and published, in 1880, Magnin's useful book on the bacteria, but of having applied himself with tireless devotion and very considerable success to the actual work of laborious researches, often made under discouraging circumstances, and with little genuine sympathy from his fellow-countrymen. Dr. Sternberg is at the head of the American school of working bacteriologists, if, indeed, he is not its only member; so that any work coming from his practised hand should meet with a hearty welcome.

The present volume, which might well be called a handbook of bacteriology, is made up partly of Magnin's older treatise referred to above, and partly of new material supplied

by Dr. Sternberg. Magnin's account of the morphology and the physiology of the bacteria, covering one hundred and fifty-two pages, is preserved intact. The rest of the older book is omitted; and in its place we have four 'parts' written by Dr. Sternberg, and discussing respectively, 'Technology,' 'Germicides and antiseptics,' 'Bacteria in infectious diseases,' and 'Bacteria in surgical lesions.' These, taken together, make up more than one-half the book.

Of Magnin's work it is not needful to speak. His book is familiar. We may turn, then, to the parts prepared expressly by the American author. Under 'Technology' we have a succinct but clear account of the various methods of collection, of cultivation, of staining and of photographing the bacteria, and of the attenuation of virus. Of most of them the author speaks from experience; and this chapter will be of the utmost value to the student and the investigator. Of course, in a subject like this, intricate and refined to the last degree, actual personal guidance is essential, or, at least, highly desirable; and we believe that Dr. Sternberg has given enough of the technology to help, but not enough to harm, the student.

Under the head of 'Photography' (p. 194) the author says,—

"It is but fair to say that satisfactory results can only be obtained by the expenditure of a considerable amount of time and money, as the work must be done with high powers, and the technical difficulties to be overcome are by no means inconsiderable. The illustrations in the present volume may be taken as fair samples of what may be accomplished, and it will be found easier to criticise these than to improve upon them."

The plates are, indeed, of an unusually high order; the heliotypes of human (yellow-fever) blood being something remarkable, and not likely to be improved upon at present.

Under the head of 'Germicides and antiseptics' we observe at the outset (p. 210) the following conspicuous finger-post:—

"If it were proven that the infectious character of every kind of infective material depended upon the presence of a specific living germ, as has been shown to be true in the case of certain kinds of infective material, *germicide* and *disinfectant* would be synonymous terms. Although this has not been proved, it is a significant fact that all of the disinfectants of established value have been shown by laboratory experiments to be potent germicides."

Numerous original experiments are here recorded; and the author agrees with the other authorities in giving little germicide value to most common disinfectants, and in pointing out the extraordinary efficacy of mercuric bichloride.

¹ Kritik der reinen vernunft, s. 81, ed. Hartenstein.