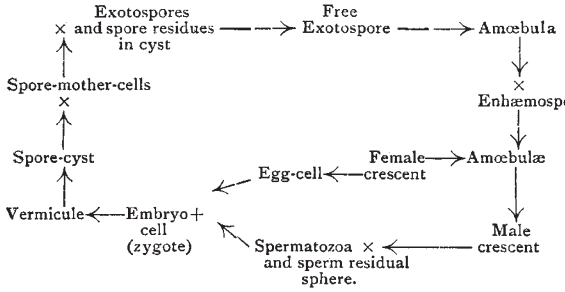
infection of the bitten animal by the parasites carried by mosquitoes or tzetze fly would be very small.

Our cycle of forms with the names here made use of may be written as below. The sign × is used to indicate fissile multiplication, and + to indicate fusion, while → merely indicates continuity.




I also give a list of the names here used with reference to the occurrence of the forms indicated in man or in gnat and an indication of the corresponding stages in a Gregarina and a Coccidium. In the column belonging to Coccidium I have employed the generalised physiological nomenclature accepted by special students of the Sporozoa (Schaudin, Lühe, &c.).

| Malaria. | Coccidium. | Gregarina. |
|---|---|---|
| 1. Exotospore, free in human blood ... ... ... ... ("Blast" of some authors.) ... ... ... ... | Sporozoite ... ... ... ... ... | Sporozoite. (Filiform young.) |
| 2. Amœbula, in red corpuscles ... ... ... ... ... | Schizont ... ... ... ... ... ... | Amœbula. |
| 3. Enhæmospore, ditto, and in blood ... ... ... | Merozoites, formed by schizogony. | |
| 4. Crescent, in human blood ... ... ... ... ... | Gametocytes ... ... ... ... ... | |
| *a*. Male ... ... ... ... ... ... ... ... | Microgametocyte ... ... ... ... | |
| *b*. Female ... ... ... ... ... ... ... ... | Macrogamete ... ... ... ... ... | Schizogony rare; sexual stages NOT OBSERVED and probably WANTING. |
| 5. Sperm-mother-cell, in gnat's stomach ... ... ... | Microgametocyte ... ... ... ... | |
| 6. Egg-cell, in gnat's stomach ... ... ... ... ... | Macrogamete ... ... ... ... ... | |
| 7. Spermatozoon, in gnat's stomach ... ... ... ... | Microgamete ... ... ... ... ... | |
| 8. Zygote or embryo-cell, in gnat's stomach ... ... | Young oocyst (sporont) ... ... ... | |
| 9. Vermicule, in gnat's stomach ... ... ... ... ... | WANTING ... ... .. ... ... (Called "ookinete" or "kineto-sporont" in the nomenclature of this column.) | Full-grown motile "gregarine." (Euglenoid phase.) |
| 10. Spore-cyst, in blood-sinus outside gnat's stomach | Older (but not larger) oocyst or sporont | Cyst enclosing one or two full-grown sporonts. |
| 11. Spore-mother-cells in cyst, in blood-sinus outside gnat's stomach ... ... ... ... ... ... ... | Sporoblasts (sporogony) ... ... | Sporoblasts. (? Conjugation in *Lankesteria Asciadiae*. Spermatozoa and ova in Stylorhynchus.) |
| 12. Exotospores in cyst, in blood-sinus outside gnat's stomach ... ... ... ... ... ... ... ... ... | Sporozoites enclosed in small groups in sporocysts within the bigger oocyst. | Sporozoites enclosed in capsules, called "pseudonaviculæ" or "sporocysts." |
| 21. Free exotospores, in gnat's salivary duct ... ... | Free sporozoite .. ... ... ... | Free sporozoite. |

## *UNIVERSITY AND EDUCATIONAL INTELLIGENCE.*

THE proposals of the Government with respect to education in England and Wales were described in the House of Commons by Mr. Balfour on Monday, and after a discussion, leave was given for the introduction of the Government Education Bill. It is proposed that in future there shall be one authority for education, primary, secondary, and technical; and that this authority, being responsible for a heavy cost to the ratepayers, shall be the rating authority for the district. Explaining the broad outlines of the measure, Mr. Balfour stated that the education authority will be the county council in counties and the borough council in county boroughs. They will work through committees appointed under schemes which will have to be approved by the Education Department. A majority of a committee at least is to be appointed by the council. The other members are to be nominated, and to be persons experienced in education. Wales, which has a secondary education authority already, is to be permitted either to retain that authority or to substitute for it the authority proposed in the Bill. With regard to secondary education, the provisions of the measure are practically identical with those embodied in the Bill of last year. County councils and borough councils are to have a 2*d*. rate to work upon, and as in many places that will be insufficient, power will be given to have that limit raised by provisional order. Boroughs already possess a certain jurisdiction over technical education, and have a rate of 1*d*. to work upon. It is not proposed to deprive any borough with a population above 10,000, or any urban district with a population above 20,000, of that jurisdiction. The councils of these boroughs and urban districts may, if they choose, become the absolute authority over primary education. They would retain their existing powers over technical education, and would become the authority for secondary education concurrently with the county council. But whether the schools in a district are voluntary or rate erected, the local educational authority created by the Bill will in future be the absolute master over all secular education. London is excluded from the operation of the Bill. The adoption of the elementary education portion of the measure would, for a time, be optional.

MR. H. BRERETON BAKER, M.A., late scholar of Balliol College, Oxford, has been elected by the governors of Dulwich College to be headmaster of Alleyn's School, Dulwich. Mr. Baker, who has had several years' scholastic experience as senior science master in Dulwich College, is well known as a chemist of real distinction, whose important papers in the *Philosophical Transactions* and the *Journal* of the Chemical Society on the remarkable influence of traces of moisture in facilitating chemical action have attracted well-deserved attention. Physical science has long formed a prominent part of the course at Alleyn's School, which possesses physical and chemical laboratories that are probably not surpassed by those of any school in the country. It will be a matter of interest to scientific men that at least one school in the kingdom should be, not only well provided with laboratory accommodation, but should have at its head a man of acknowledged scientific reputation.

SIR PHILIP MAGNUS will preside at a public meeting to be held in connection with the conference of the National Association of Manual Training Teachers at Manchester on Easter Tuesday, April 1.

THE Government of India has had under consideration the improvement of the existing system of education of Europeans and Eurasians, and the Local Governments have been asked for an expression of their views upon the subject. Meanwhile (says the Allahabad *Pioneer Mail*) a small committee of educational officers has been appointed to examine and revise the Bengal Code of Regulations for European Schools, in the hope that it may be found possible to render it suitable for adoption throughout India. The Secretary of State has accepted the proposal of the Government of India to create an appointment of Director-General of Education in India, and Lord George Hamilton has selected Mr. H. W. Orange to fill the post.



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AT a meeting of the Edinburgh Mathematical Society on March 14, the following resolutions in regard to the teaching of elementary mathematics were agreed to:—(1) That the primary object in teaching elementary mathematics is to afford a mental training to the pupil. The commercial, technical or professional applications of the subject are of secondary importance in general education. (2) That there should be no undue haste to begin the study of the calculus with a view to its practical applications. (3) That pupils should not be encouraged in the unscientific practice of placing dependence on rules or formulæ which they do not understand. (4) That, in teaching any branch of mathematics, concrete illustrations and verifications including experimental, graphical and other methods should, wherever practicable, accompany theory. (5) That in examinations particular methods of solution or demonstration should not, as a rule, be demanded, *e.g.*, the use of algebra should not be prohibited in answering questions in arithmetic or geometry. (6) That there should not be imposed upon schools in any branch of mathematics a syllabus which does more than indicate the order in which the main divisions of a subject are to be taught.

DR. D. C. GILMAN'S reminiscences of the foundation and early days of the Johns Hopkins University, given in the current number of *Scribner's Magazine*, contain several interesting particulars concerning men connected with it. Johns Hopkins left his fortune to be divided between a university and a hospital, the two to be united in the promotion of medical science. As the capital for the university was thus provided by a single individual, there were no bodies to interfere with its plans, and no public or treasury to conciliate. Given the idea and the funds, all that had to be done was to produce the plan of an institution which should aim at having national influence, and should take to Baltimore, as teachers and students, the ablest minds that could be attracted there. Rowland was an assistant instructor in the Rensselaer Polytechnic Institute when Dr. Gilman heard of him from General Michie, and the following conversation occurred:—"What has he done?" I said. "He has lately published an article in the *Philosophical Magazine*," was his reply, "which shows great ability. If you want a young man you had better talk with him." "Why did he publish it in London," said I, "and not in the *American Journal?*" "Because it was turned down by the American editors," he said, "and the writer at once forwarded it to Prof. Clerk Maxwell, who sent it to the English periodical." When Dr. Gilman had seen Rowland and reported upon his rare powers to the trustees in Baltimore they said at once, "Engage that young man and take him with you to Europe, where he may follow the leaders in his science and be ready for a professorship." This was done; and the result is well known. Huxley gave the inaugural address, but he had to deliver it from memory, as he could not read the flimsies with which the reporters to whom he had dictated the lecture on the previous day had provided him. After this opening without music, prayer or other benediction came the storm of indignation from the religious papers. Referring to the opening, a Presbyterian minister wrote to a friend:—"It was bad enough to invite Huxley. It were better to have asked God to be present. It would have been absurd to ask them both. I am sorry Gilman began with Huxley. But it is possible yet to redeem the University from the stain of such a beginning." It took some years for the prejudice to wear away, but eventually the idea of an undenominational university controlled by laymen was accepted as reasonable, and Johns Hopkins' foundations became renowned as places of freedom and progress.

## *SOCIETIES AND ACADEMIES.*

### LONDON.

**Royal Society**, January 30.—"The Distribution of Magnetism as Affected by Induced Currents in an Iron Cylinder when Rotated in a Magnetic Field." By Ernest Wilson, Professor of Electrical Engineering, King's College, London. Communicated by Sir W. H. Preece, F.R.S.

One object of this research was to investigate the effect which induced currents have upon the distribution of magnetism in an iron cylinder when rotated about its longitudinal axis in a magnetic field, the direction of which was normally at right angles to the axis of rotation. The variables dealt with were the total flux of magnetism between the poles of the magnet, and the speed of rotation of the cylinder. By threading insulated copper conductors through holes drilled in a plane containing the longitudinal axis, E.M.F.'s due to the rate of change of induction at different depths have been observed, and therefrom the intensity of induction has been found. The cylinder had a diameter of 25·4 cms., and its length was 25·4 cms. It was rotated by aid of a worm and worm wheel. Periodic times of 360, 180, 90, 45 and 22·5 seconds have been dealt with, and the normal induction density B in the cylinder has been varied from about 170 to 21,000 C.G.S. units per sq. cm.

With small magnetic force, and a periodic time of 45 seconds, the value of B at the centre of the cylinder is important as compared with its value at the surface, and the phase-displacement between the two is relatively small. With intermediate magnetic force, corresponding to high average permeability in the iron, the value of B at the centre became relatively small, accompanied by considerable phase-displacement. In fact, with 22·5 seconds periodic time, B at the centre was totally reversed in sign with regard to B at the surface, or the lag was 180°. With large magnetic force, B at the centre again became important, and the phase-displacement was again small. With a periodic time of 360 seconds, the disturbances above described still existed, but they were small. Similar effects to the above were observed in the case of an iron cylinder subjected to alternating magnetic force.

The conclusion was that with an alternating magnetic force applied axially to a cylinder of given diameter, the effects were more severe than in the same cylinder (of length equal to diameter) when rotated in a magnetic field as above described at the same frequency, and for corresponding values in the surface induction density. The results of these experiments were applied to similar cylinders of different dimensions by an application of the law of squares. The effects of induced currents in the armature of a certain class of induction motor were dealt with. It is shown that plates of iron 0·1 cm. thick experience no serious deviation from uniform distribution when rotated in a magnetic field, the direction of which was in the plane of the plate, at frequencies lower than about 180. Referring to Lord Kelvin's computation that the earth's magnetism is travelling round the earth in the direction of the sun with a periodic time relatively to the earth of 960 years, it is pointed out that in a cylinder similar in all respects to the one experimented upon, but having a diameter equal to that of the earth, a periodic time of 960 years would produce similar magnetic and electric events as would be observed in the above cylinder if it could be rotated with a periodic time nearly two million times as fast as the fastest speed in these experiments. On the other hand, with a cylinder 0·0000001 cm. diameter, $7 \times 10^{14}$ revolutions per second would be required to produce the disturbances observed in these experiments.

March 6.—"The Differential Equations of Fresnel's Polarisation-vector, with an Extension to the Case of Active Media." By James Walker, M.A. Communicated by Prof. Clifton, F.R.S.

In many problems of optics we require the differential equations that the polarisation-vector has to satisfy, and the surface conditions that subsist at the interface of different media. These may be deduced from the principle of interference combined with the experimental laws of the propagation of light, without making any assumption respecting the character of the ether and the nature of the luminous vibrations. In crystalline media, Fresnel's theorem of the ellipsoid of polarisation affords the required relations between the wave-velocity and the directions of the wave-normal and of the polarisation-vector; in the case of active media, extensions of this theorem lead to similar equations giving the wave-velocity in terms of the direction-cosines of the wave-normal and the complex direction-cosines of the vector of a stream of elliptically polarised light. The differential equations are then deduced by applying the principle of interference. The surface conditions are obtained by assuming that the transition between two media takes place by a rapid continuous change of their properties and that the differential equations hold within the region of variation.

**Royal Astronomical Society**, March 14.—Dr. J. W. L. Glaisher, president, in the chair.—The secretary read a paper by Dr. Mitchell, of New York, on the flash spectrum at the Sumatra eclipse of May, 1901. Mr. Fowler gave reasons for doubting the correctness of Dr. Mitchell's view that the flash spectrum represents the upper portion of the layer of gas which, by absorption, gives the Fraunhofer lines.—A paper by Prof. Barnard on Nova Cygni, 1876, was partly read.—Mr. Maw presented a series of double star measures made by him in the



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