

are again collected in the salivary glands. I should have liked to extend the series, but the continued cold weather renders it improbable that I shall be able to do so before I leave.

With your permission I should like to publish an abstract of this, confirming Ross's work; and to this Major Ross consents.

In case you should consider this advisable, I am, to avoid delay, forwarding an abstract to Dr. Manson, with a request to him to forward it to the *British Medical Journal*, if your consent is granted.

The infection of birds free from proteosoma by the bites of mosquitoes.

On December 20, the day before my arrival, twenty-two birds were examined and found free from proteosoma. On that night some of these were used for feeding the mosquitoes which had been infected on November 30 and on the 24th and subsequent days; the remainder of the birds were used for feeding the mosquitoes first infected on November 30 and December 10, 12 and 15. In other mosquitoes of this series germinal threads were found in the salivary glands; and the ones which fed, when examined later, gave the results indicated in paragraph 9.

On December 30 Dr. Rivenberg and myself examined these birds; three of them had proteosoma, two in large numbers.

On January 4 I examined them all except one, which died on January 2; in that the heart's blood contained no proteosoma, and the organs were free from pigment.

Five more of these had now proteosoma, all very numerous. On January 6 and 7 I again examined them; three more had proteosoma, all very numerous.

On January 9 no more cases had developed; but on January 18 one of them had numerous proteosoma, whilst many of the ones which had been infected had recovered, and the others now showed few proteosoma.

Thus twelve out of twenty-two birds became infected, or 54 per cent. This compares unfavourably with Ross's earlier results, as in his published series twenty-two out of twenty-eight were infected, or 79 per cent. But it is to be remembered that at the time he was working the germinal threads were found in a week; whilst in December the development was much slower, and now takes at least twice the time. It is much easier to keep the mosquitoes alive for one week than longer, while in the hot weather mosquitoes bite more readily.

These results are less unfavourable if compared with the normal proportion of birds infected with proteosoma at this season. Thus Ross out of 111 wild birds found proteosoma in 15, or 13.5 per cent.; whilst I find at this season only one with proteosoma out of 30, or 3.3 per cent.

It is possible that in the cold season the birds have a greater power of resistance; and this is rendered more probable by the short duration of the proteosomal attack in my infected birds. Of these twelve, five died within the first week. In three, in which also the proteosoma had been very numerous, none could be found ten days after the invasion; in one, in which they were never numerous, none could be found on the fifth day.

In the other three, very few are now found, though at first they were numerous.

The recovery of these birds and the death of the mosquitoes fed on them diminishes the chances of much future work on this line in the time remaining to me here.

Mention has been made of the differentiation of the contents of the coccidia previous to the formation of the germinal threads into clear and granular; the second of these can be traced day by day into those forming the germinal threads. This differentiation was clearly visible in my series. Instead of germinal threads in a minority of the coccidia, in most mosquitoes, when the germinal threads are mature, black tubular bodies are found in cysts with otherwise clear contents.

These were met with frequently in the series of mosquitoes infected in November and December. Most of these contained some coccidia with black spores; though in few all the cysts contained germinal threads. In some cysts these black spores are numerous and occupy the entire cyst; in other cysts there are only a few. In most cases germinal threads are not found in the same cyst; but there have been a few cysts in which it has been doubtful whether there are germinal threads also in the cyst, or whether there are overlying escaped threads from a neighbouring capsule.

These black spores are very resistant; I have seen some kept in water for months by Ross with no visible change, and they will withstand irrigation with liquor potassæ.

When the cysts are ruptured the spores are found all over the body, but not in cells; nor do they seem to accumulate in any one part of the body.

The most plausible view of the nature of these black spores seems to be that held by Major Ross, viz. that they are "resting spores," and that through them by another cyst the proteosoma can be propagated in conditions unfavourable for direct propagation by injection into a warm-blooded animal.

In that case three courses suggest themselves:

a. From them arise bodies capable of non-parasitic life and possibly of reproduction, but capable at certain stages of their existence of introduction into a warm-blooded host by inhalation through drinking water, or even by injection by a mosquito or other blood-sucker transferring them from the medium in which they live directly.

b. That they may be ingested by mosquito larvæ, and in them undergo such development as will result in the formation of germinal threads in the adult, which in turn might be injected into the bird.

c. That they may, when swallowed or inhaled by a warm-blooded host, so develop as to reach the circulation and pass into the sporulating phase.

Such experiments as have been made are inconclusive; and it is obvious that till the nature of these "black spores" is determined we cannot exclude, even for the proteosoma of sparrows, the possibility of some one of the many alternative possible channels of infection, some of which would only require the occasional intervention of an intermediate host.

Still less are we justified in concluding that malaria in man can only be acquired from the mosquito, or devoting our exclusive attention to that channel.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

DR. E. H. STARLING, F.R.S., has been elected to the Jodrell professorship of physiology in University College, London, in succession to Prof. E. A. Schäfer.

DR. SUTHERLAND, assistant professor of pathology, Glasgow, has been appointed professor of pathology in St. Andrews University, in succession to Prof. Muir, recently appointed to Glasgow.

For some time past the School Management Committee of the London School Board have been considering communications sent to them with reference to the metric system. It has now been resolved to send a memorandum to the Education Department containing proposals for amplifying the teaching of the system by a definite curriculum for each standard.

THE Board of Education Bill was read a third time in the House of Commons on Tuesday. An animated discussion took place upon the various clauses of the Bill, and several amendments were proposed, but no changes of any importance were made. One of the amendments moved had for its object the omission of the words which empower the Board of Education to employ for the purpose of school inspection "other organisations" besides the Universities. These words were struck out in the House of Lords, and re-inserted in Grand Committee in the Commons. The proposal to again delete the "other organisations" was negatived.

AT a meeting of the council of the City and Guilds of London Institute held on Monday it was resolved to confer the Fellowship of the Institute upon Mr. William J. Pope for the valuable and original chemical research work which he has done since he gained his diploma of associate of the institute in 1890; and upon Mr. Arthur E. Childs for the services he has rendered in developing several new branches of engineering industry since he gained his diploma in 1891. The Fellowship is conferred by the council upon those who, having obtained the associateship of the institute and spent at least five years in actual practice, produce evidence of having done some original and valuable research work, or of having otherwise contributed to the advancement of the industry in which they are engaged.

THE Agricultural and Technical Education (Ireland) Bill was read a second time in the House of Lords on Monday. Lord Ashbourne, in moving the second reading of the Bill, said its object is to promote and foster agriculture and all the kindred interests, and also to promote technical education. The Bill in its mechanical part proposes the creation of a department com-

posed of the Chief Secretary, a vice-president, and officials, for whose appointment powers are given. To them will be transferred various powers now scattered over other boards. As to the financial resources to be placed at the disposal of the new department, it is calculated that the total income from all sources will amount to from 160,000*l.* to 170,000*l.* a year; and this money will be applied to aiding and encouraging agriculture and other industries and technical instruction. The board to be formed under the Bill will be aided and advised by three bodies to be called into existence—a council of agriculture, a board of technical instruction, and an agricultural board—which will have very wide and important duties to perform. Speaking broadly and generally, the income of the board is to be devoted as follows: 55,000*l.* to technical instruction; 10,000*l.* to the improvement and development of the sea fisheries; and the remainder to agriculture and rural industries.

SOCIETIES AND ACADEMIES.

PARIS.

Academy of Sciences, July 24.—M. van Tieghem in the chair.—Presence of iodine in notable proportions in all plants containing chlorophyll of the Algæ class, by M. Armand Gautier. As a result of numerous estimations of iodine in Algæ containing chlorophyll it was found that iodine is a constant element of the protoplasm of these plants, both in sea water and fresh water, the latter, however, containing much smaller quantities of iodine. Thus, where 100 grams of dried marine Algæ give 60 mgr. of iodine, the same weight of fresh water Algæ gave only 0.25 to 2.4 mgr.—On the theory of partial differential equations, by M. N. Saltykow. The author's previous work on this subject was restricted to equations resolved with respect to partial differentials. Since, however, the solutions of the equations may offer considerable difficulties from the point of view of practical applications, the theory of any equations whatever in involution is here given.—On indeterminate equations of the form $x^{\lambda} + y^{\lambda} = cz^{\lambda}$, by M. Edmond Maillet.—On a correspondence between two ruled spaces, by M. A. Demoulin.—On the magnetic field inside a hollow cylinder traversed by a current, by M. W. de Nickolaieva.—On the dielectric cohesion of rarefied gases, by M. E. Bouty. In a preceding note it has been shown that when a tube containing a rarefied gas is placed in an electrostatic field, there is a critical intensity of field, f_c , below which the gas acts as a perfect dielectric and above which the gas allows the passage of a discharge. In the present paper the relation between the critical intensity, f_c , and the pressure of the gas, p , is quantitatively examined, and the result expressed in the form

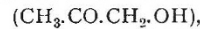
$$f = A \left(1 + Bp + \frac{C}{p} \right),$$

where A, B, C, are constants, B, and perhaps C, being independent of the nature of the gas, and A increasing with the molecular weight of the gas.—The instantaneous disappearance of the Kerr phenomenon, by MM. H. Abraham and J. Lemoine. By the use of a rotating mirror M. Blondlot has shown that the time that elapses between the suppression of the electric field and the disappearance of the Kerr effect is less than 1/40,000 of a second. In the present paper it is shown by a different method that the time cannot exceed 1/10,000 of this, namely 1/400,000,000th of a second.—On the isomeric states of chromic acetate, by M. A. Recoura. A detailed description of the normal acetate, possessing the properties of an ordinary metallic salt, and the violet acetate, in cold solutions of which alkalis give no precipitate.—Mixed copper-silver salts, by M. Paul Sabatier. The salts described are the basic nitrates, $3Cu(OH)_2 \cdot 2AgNO_3$, and $2Cu(OH)_2 \cdot 2AgNO_3$, two similar chlorates, the sulphate, $3Cu(OH)_2 \cdot Ag_2SO_4$, and the thio-sulphate $2Cu(OH)_2 \cdot Ag_2S_2O_3$.—On the purification of iridium, by M. E. Leidié. The method suggested is based upon the conversion of the metal into chlorides, and subsequent use of sodium nitrite. The iron and lead are first precipitated as oxides, and gold as the metal, the solution then containing double nitrites of ruthenium, rhodium, and iridium, and sodium osmate. The ruthenium and osmium are eliminated as volatile peroxides, and the rhodium and iridium converted into the double chlorides with sodium chloride, these being readily separable.—On a double nitrite of ruthenium and potassium, by M. L. Brizard. The new salt described has the composition $Ru_2H_2(NO_2)_4 \cdot 3KNO_2 \cdot 4H_2O$.—On the reducing properties of boron and aluminium, by MM. Duboin and Gauthier.—Oxid-

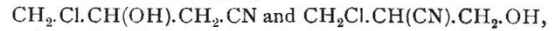
ation of propylglycol by bromine water, by M. André Kling. By the reaction of bromine upon propyl-glycol,



in sunlight, an appreciable amount of acetol,



is produced.—On some opium alkaloids, by M. Émile Leroy.—Determinations of the heats of combustion, neutralisation, and solution of codeine, thebaine, papaverine, and narcotine.—On the elimination of nitrogen and phosphorus in infants nourished at the breast, by M. Echsner de Coninck.—On dichlor-3,4-butanoic acid, by M. R. Lespieau. Of the two possible formulæ for this acid,



experimental evidence is given in favour of the former.—Action of bromine on isobutyl bromide in presence of anhydrous aluminium bromide and aluminium chloride, by M. A. Mouneyrat. Starting with the monobromobutane,



by the action of bromine in presence of aluminium bromide, four substances are obtained, isobutylene bromide, a tribromoisobutane, boiling at 130° under 26 mm. pressure, tetrabromoisobutane, all in small quantities, and, as chief product, a tribromoisobutane boiling at 112°, probably $CH_3 \cdot CBr(CH_3) \cdot CHBr_2$.—On the composition of the albumen of the carob bean; production of galactose and mannose by hydrolysis, by MM. Ed. Bourquelot and H. Hérisséy.—Experiments on the state refractory to the serum of the eel, by MM. L. Camus and E. Gley. The natural immunity of the hedgehog to the poisonous action of eel serum is now shown to be also possessed by other animals, such as the common frog, toad, chicken and pigeon. This immunity, which the authors have shown to be due to a specific resistance of the red blood corpuscles, is called by them cytologic immunity, to distinguish it from the humoral or acquired immunity resulting from the production of antitoxin in the immunised animal.—Experimental researches on an agglutinine produced by the albumen gland of *Helix pomatia*, by M. L. Camus.—Intra-uterine transmission of vaccinal immunity and the antiviral power of the serum, by MM. Beclère, Chambon, Ménard, and Coulomb.—On the branchial respiration in Diplopods, by M. M. Causard.—On the breccias of the Briannonnais, by M. W. Kilian.—On a bathymeter founded upon the use of Crusher cylinders, by MM. Charbonnier and Galy-Aché.

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