

Aquatic Hymenopteron.

It may be of interest to some of your readers to know that, after years of unsuccessful search, I have at last bred *Prestwichia aquatica* (Lubbock) from eggs of *Notonecta*.

From one single egg there emerged no less than fourteen specimens, one male and thirteen females. This astonishing fact, besides proving that *Prestwichia* is an ovivorous parasite, beats all previous records of the number bred of allied species; but this record has since been put into complete shade. On Friday, from another egg, I bred six males and twenty-eight females; thirty-four parasites from a single egg.

After this astounding fact we must be prepared for something strange, now that the life-history of these marvellous ovivorous parasites is being worked out.

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"A High Rainbow."

THE "rainbow" described by Mr. Moreland (in your issue of June 16) was evidently of the same character and origin as an inverted arc near the zenith, which occurred in connection with a mock-moon phenomenon at Birmingham, on May 31, 1895.

An illustrated description of this, by the writer, may be found in *Symons's Meteorological Magazine* for September 1895, p. 122.

F. J. ALLEN.

Mason College, Birmingham, June 17.

THE ETIOLOGY AND PREVENTION OF MALARIAL FEVER.

THE study of the causes of intermittent or malarial fevers has received a marked impetus through the discovery by Laveran (*Traité des fièvres palustres*, 1884) of the presence in the blood of the affected persons of definite living bodies belonging to the protozoa. A large amount of important research has been carried on since, concerning these bodies or corpuscles of Laveran, which has yielded not only a clearer understanding of their morphological and biological characters, but has more accurately defined and placed on a firm basis the relation of these protozoa to the different known types of malarial fevers: febris quotidiana, tertiana, quartana—terms denoting the rhythm of the fever paroxysm. The researches of Laveran, of Marchiafava and Celli, of Golgi, of Celli and Guarneri, Grassi and Feletti, Councilman, Danilewsky, Mannaberg and others have definitely established that malarial fevers are characterised by and due to the presence, within the red blood discs of the patient, of parasites belonging to the group of protozoa known as sporozoa (gregarina, coccidia and hæmosporidia); that is to say, of minute amœboid corpuscles, measuring not more than a sixth or an eighth or less of the broad diameter of a red blood disc, having entered into a blood disc pass their life cycle intraglobularly, growing in size at the expense of the blood disc, consuming the latter's substance till of the host nothing but a small mass of black pigment—the remnant of the blood pigment—is left. The final phase in the life-history of this plasmodium malariae or hæmoplasmodium malariae is reached when by a process of simultaneous fission its body produces a number of minute oval spores. These becoming free in the blood fluid are carried by the circulation into the different internal organs: marrow of bone, brain, and notably the spleen. Here at the proper time each spore germinates into an amœboid plasmodium, which passes as such into the general circulation, and, having invaded a red blood disc, goes through all the stages of its intraglobular growth and final sporulation. There is a good deal of evidence to show that the phase of sporulation and consequent dissolution of the central part of the parasite, not consumed by the spores themselves, is actually one of the direct causes of the fever paroxysm; at any rate, these events coincide with the commencement of the febrile attack. One of the most important amongst the many interesting facts elucidated

is this, that the duration of the life cycle of the plasmodium malariae stands in a direct ratio to, and determines the rhythm of the consecutive fever attacks in this way: in febris quartana the plasmodium finishes its cycle in seventy-two hours, in febris tertiana in forty-eight hours, and in febris quotidiana and perniciosa—so common and so virulent in tropical and subtropical regions—the whole process of development is very rapid, the plasmodia are conspicuously small and very numerous, very active, and sporulation takes place chiefly in the internal viscera, notably the spleen.

There are other details elucidated, by which the different types of plasmodium malariae can be distinguished from one another; as by their size, the number of spores produced in each type, the character and intensity of the amœboid movement, &c., not the least important and fundamental detail being the artificial production by inoculation of the different types of fever: quartana, tertiana or quotidiana, according to whether for the inoculation one or the other or the third definite type of the plasmodium is employed. From all this it seems justifiable to assume that the different types correspond, if not to different species, at any rate to different well-defined varieties of the plasmodium malariae. Whether or no these varieties have become "set" and permanent (form-constant), or whether they may in one or another generation, owing to alteration of the conditions of host, season, climate or other factors, undergo transition one into the other—as is maintained by some observers—remains to be seen. This, however, has become evident, that by careful microscopic examination of the blood the nature, type and severity of the fever paroxysms can be readily diagnosed and accurately determined. This is of particular value in those atypical and irregular forms of malarial fevers, where clinical diagnosis becomes difficult and indefinite, as, for instance, when there exist several generations of plasmodia in the same affected body, and when these different generations do not start at the same time, and do not finish at the same time their life cycle, as in quartana duplex and triplex.

Koch, in a recent lecture before the Colonial Society in Berlin, lays justly stress on the importance of systematic examination of the blood by experts, so as to determine the type and character of the parasite, because—and herein lies the chief burden of Koch's remarks—the accurate determination of the type of the plasmodium should guide the treatment of the case.

It is within common knowledge that the administration of quinine is invaluable in the treatment of ague, but it is equally known that in some cases its administration is either of no avail or has proved positively harmful.

Now, Koch insists on this, that since quinine has the power to arrest and inhibit the growth and development of the plasmodium, without killing it, the administration of the quinine should be so timed that it is capable of unfolding its effects at the proper phase in the life cycle of the plasmodium, that is about the time of sporulation—immediately before the onset of the fever paroxysm—or immediately after the germination of the spores into the plasmodia—that is immediately after the onset of the fever paroxysm. These phases can only be determined by accurate and systematic microscopic examination of the blood in each individual case.

Also in another direction Koch's remarks are of value, viz. in drawing renewed attention to the high probability of the view first expressed by Laveran, then maintained and expressed with ability by Dr. Manson, to the effect that, similarly to what has been proved in Texas fever of cattle for the tick, so also in human malarial fevers the mosquito (or gnat) plays an important part in the transmission and spread of the disease, being in fact the instrument by which natural inoculation is effected. Thus Koch mentions an island off the coast of German (malarial) East

Africa, in which the absence of the mosquito is associated with a conspicuous absence of ague. It would, however, be premature to sweep aside by such observations those of many previous writers, according to whom infection with the malarial poison occurs both by way of the alimentary canal (through drinking water) and of the respiratory organs (through air). However this may be, whether malarial infection under natural conditions is carried out to a large extent by way of inoculation through mosquitoes; whether the mosquito serves merely as the instrument of infection; or whether it is—as is maintained by Laveran, and notably by Manson—the host of the malarial plasmodium; whether artificial immunity against malarial fever is procurable and by what means, are some of the questions which, having a principal bearing on prevention, ought to receive an immediate answer.

It is for reasons of this kind that Koch's great authority and weighty opinion are welcome; they ought to stimulate to action those Governments whose possessions in tropical and subtropical countries impose on them the responsibility of better protecting the health and life of their civil and military subjects, a responsibility which hitherto, unfortunately, does not seem to have weighed heavily on them. Our own Indian Government has with laudable spirit initiated important work by appointing for specific research on malaria an able young military surgeon, Surgeon-Major Dr. Ronald Ross. While this is a beginning, it is small as compared with what is needed to meet the case; what is wanted is a staff of specialists, whose systematic and concerted work is required to elucidate the many problems connected with the subject. The Colonial Office also, with its sway over vast malarial territories in tropical and subtropical Africa, might do a great deal in the matter, considering that the health and life of their numerous civil and military servants is exposed continually in some of the most notorious hotbeds of deadly fevers to dangers which ought to, and with advancing exact knowledge might be prevented.

E. KLEIN.

THE UNIVERSITY OF LONDON COMMISSION BILL.

THE second reading of the University of London Commission Bill last week, without a division, should make its passage into law this Session certain. After the elaborate pains taken by the leaders of the irreconcilable graduates to personally instruct members of Parliament during the week preceding the debate, the feeble nature of the actual opposition came as something of a surprise. It is dangerous to treat Parliament as if it were a body of graduates with a vote to cast at a senatorial election, and methods suitable for the one kind of campaign are likely to fail in the other, as Sir John Gorst made plain, when he referred to the misstatements of fact which are inseparable from a contested election. But the danger is by no means altogether overpast. Having failed to persuade Parliament to reject the Bill, Sir John Lubbock and his friends are now preparing to do their best to wreck it and to ensure its passage in a form which will effectually prevent the University from adding to its present usefulness or doing anything to encourage learning and research. The member for the University has placed his name to two amendments, each of them, if accepted, calculated to stultify the labours of half a generation for the advancement of higher education in the metropolis. To begin with he proposes to abolish the thirty-mile limit, which is necessary if the reconstituted University is to be a seat of learning for London as well as of London. The effect of this would be to encourage those provincial Colleges at present unconnected with any University to apply for

incorporation with London, to delay indefinitely the formation of a University for the Midlands—a foundation much to be desired, and to render impracticable the working of the Boards of Studies of the new University in London—a provision upon which a large part of its efficiency will depend. It would be difficult to imagine any single amendment which could reach further in its evil consequences, or be more destructive of the whole purpose of the Bill than this.

But Sir John is not content with making any unity of policy unattainable; he is anxious to ensure that as large a proportion as possible of the University scholarships and exhibitions shall help to maintain the students of other seats of learning. It has long been one of the anomalies of the present University that a large number of the scholarships are won by men and women who are studying elsewhere than in London, and very frequently at other Universities. Especially is this the case with mathematics, the rewards for which study are almost invariably taken by Cambridge men. In order to maintain and extend this condition of things, the member for the University proposes that external students shall be admitted to the examinations for internal students. Under the dual examination system which the Senate will have the power of establishing, by the terms of the Bill, should it seem advisable to do so, internal students will be admitted to the examinations for external students; and rightly, for these tests, like the present ones, will be open to all the world, irrespective of the manner or place of study. But this is no argument for reciprocity in regard to the internal examinations. Should an internal student win an external scholarship, the University funds will at least go to the encouragement of learning in London itself; but should an external student take an internal scholarship, the University chest will, in the large majority of instances, be depleted for the benefit of some other institution. And what is even more objectionable, this amendment would divest the internal degree of its chief value in the eyes of students and the public alike, the guarantee namely which it will give under the Bill as it stands, that its holders have undergone a definite course of training and study. This guarantee is far more valuable in the eyes of those who understand educational matters than the difficulty of the questions which a candidate may succeed in answering during a few days at the close of his studentship, under conditions which at best admit a large measure of chance.

It is hard to believe that the Colleges will consent to take a part in reconstitution on these lines, or that Parliament will play into the hands of the wreckers by accepting such amendments. The proposal to bind the hands of the Senate and force them willy-nilly to subject external and internal students to the same examination—a point to which so much attention was directed in the recent debate—is not worth serious argument; for apart from its inherent impracticability, the facultative dual examination was the basis of the compromise on which the present Bill rests, and to destroy this would be to render legislation ineffectual because unacceptable to all the teaching bodies interested.

THE SCIENCE AND ART BUILDINGS AT SOUTH KENSINGTON.

WE were able to print last week the text of the Memorial forwarded to the Government by the President of the Royal Academy, pointing out how disastrous it would be for the future of Art in this country if the new proposals regarding the buildings at South Kensington were carried out. As our readers will remember, the same course had already been taken by the President of the Royal Society with regard to the Science side of the question.