LETTERS TO THE EDITOR.

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The Hæmoproteus of the Indian Pigeon.

IN the course of a letter, which was brought by the last Indian mail, my friend, Colonel J. R. Adie, imparts the very interesting information that Mrs. Adie, working at Kasauli, has recently obtained very strong presumptive evidence that the præter-vertebrate life-history of the Hæmoproteus of the Indian pigeon agrees with that discovered by Ross for the Proteosoma of the Indian sparrow and for the malaria parasite, the intermediary in the case of the Hæmoproteus being a species of Hippoboscid fly of the genus Lynchia.

Mrs. Adie obtained from Amballa some pigeons which were heavily infected with the blood-parasite and abundantly infested with the fly. In sixteen or seventeen individuals of the fly (Lynchia), out of twenty-six examined, she found either zygotes, or cysts, or sporozoites—the last swarming in the salivary-glands, and in some cases coursing down the salivary-ducts. In one case a cyst in the wall of the gut was observed to burst and liberate hundreds of sporozoites.

Mrs. Adie's observations will be published as soon as the exact experiments which were in progress at the time Colonel Adie wrote are concluded; but her observations are in several ways so interesting that I think they ought to be made known at once.

A. ALCOCK.

Belvedere, Kent, July 28.

Radio-activity and Atomic Numbers.

MR. VAN DEN BROEK's letter in NATURE of July 9 shows the importance of the charge upon the nucleus in radio-active phenomena. The cause of this may possibly be sought in considerations similar to the following.

If one assumes that an atom breaks up when all the nuclear charges are in a given relative position and that they are in rotation with an average frequency $\nu = E/h$, where E is their energy and h the element of action of the quantum theory, then each particle will pass through the critical position ν times per second. The probability that M particles should be in the unstable region simultaneously is $(k\nu)^{M}$, or if only relative position is involved $(k\nu)^{M-1}$, where k of course defines the size of the critical region. One would therefore expect a relation between the average life of an atom and the energy of its particles of the form

$$\lambda = (k\nu)^{M-1} = \left(\frac{k}{h} E\right)^{M-1},$$

where λ is the radio-active constant. According to Geiger the range in air is given by the formula

$$R = \frac{v^3}{1{,}24 \cdot 10^{27}} = 4{,}05 \cdot 10'' E^{\frac{3}{2}}.$$

Introducing this value one finds

$$\lambda = (2{,}77 \cdot 10^{18} k)^{\frac{2}{3}(M-1)} R^{\frac{2}{3}(M-1)}$$

or

$$\log \lambda = \tfrac{2}{3}(M-1)(\log k + 18{,}44) + \tfrac{2}{3}(M \quad 1) \log R.$$

Putting $M = 85$, which would be the average value for radio-active substance, one finds the approximate formula $\log \lambda = 56(\log k + 18, 44) + 56 \log R$. Geiger found empirically $\log \lambda = -36, 7 + 53{,}3 \log R$. According to this k would be about 10^{-19}, *i.e.* of about the order $1/\nu$. In any case the close agreement between the theoretical and observed values of the coefficients of log R would seem to show that the original hypothesis is correct in its main outlines, *i.e.* that integration occurs upon the fortuitous coincidence of n events, the probability of which is proportional to $E = h\nu$, and that n is of the order of the atomic number M. One cannot say as yet though whether the n particles, the relative positions of which determine the stability are the positive particles or the electrons.

Mr. van den Broek's formula

$$\frac{(\lambda_{Th})^2}{\lambda_{Ra}\lambda_{A}} = 4{,}5^{M-82}$$

would reduce to

$$\frac{(E_{Th})^2}{E_{Ra} \cdot E_{Ac}} = 4{,}5^{\frac{M-82}{M-1}} \quad \text{or} \quad \frac{(\nu_{Th})^2}{\nu_{Ra} \cdot \nu_{Ac}} = 4{,}5^{\frac{M-82}{M-1}}$$

The simplest interpretation of this would be that the atoms of corresponding elements of the different series are geometrically similar and differ only in their linear dimensions. A change of the attractive force with the nuclear charge is obviously probable, and Mr. van den Broek's formula will certainly be of the first importance when we attempt to determine the function representing the nuclear forces in terms of the charge and perhaps also of the distance.

F. A. LINDEMANN.

Berlin, July 26.

Circulatory Movements in Liquids.

FROM a manuscript by Christiaan Huygens, containing the description of his microscopical observations in the year 1678, I quote the following passages:—

"5 Sept. Et ayant mis de petites goutes rondes de cette urine sur le talc" (we read at another place: "ayant pris de cette eau et mis dans le microscope entre le verre et le talc"), "Je remarquay avec le microscope que ces œufs, et sans doute la liqueur mesme avec eux, avoient un mouvement continuel par lequel ils montoient dans le milieu AB de la goute et puis descendoient par les deux costes CD, et montoient ensuite encore par AB, et ainsi toujours, car je suivois ces graines, et vis que c'estoient les mesmes qui montoient et descendoient.

"Cette continuation de mouvement est estrange et ressemble a celle de la matiere qui passe a travers l'aimant" (according to Huygens's theory of magnetism, which will be published in one of the volumes of his "Œuvres Complètes"). "Je mis par 3 fois des gouttes nouvelles et vis toujours la mesme chose. Les jours suivants ce mouvement n'estoit pas si manifeste.

"9 Sept. Dans du jus de resins blancs, et noirs, mis en expérience le jour d'auparavant, rien de vivant, mais bien de parties grasses et heterogenes, par lesquelles je remarquay le mouvement dans ce jus que j'avois vu dans l'urine le 5 Sept.

"10 Sept. Jus de resins rien de vivant. Le mesme mouvement y estoit.