

clearly displayed, and, although more elementary in its treatment, the book is a worthy companion of Whittaker's well-known "History of the Theories of Elasticity and the Ether." An English volume of similar scope would be a very desirable addition to current text-books.

R. S. W.

#### LETTERS TO THE EDITOR.

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#### The Theory of Radiation.

THE natural unit of angular momentum postulated by Dr. Niels Bohr, of Copenhagen, in his researches on the theory of spectral lines actually exists. It is the angular momentum of the magneton. Rejecting entirely the idea of magnetic or electric substance, the magneton may be regarded as an inner limiting surface of the æther, formed like an anchor-ring. The tubes of electric induction which terminate on its surface give it an electric charge, the magnetic tubes linked through its aperture make it a permanent magnet.

I find that the angular momentum of any such system, whatever its shape or dimensions, about its axis of symmetry is  $(8\pi^2 V)^{-1} \epsilon \mu$ .  $V$  is the velocity of light,  $\epsilon$  the electric induction over the surface, and  $\mu$  the magnetic induction over the aperture. I shall consider elsewhere the applications to the theory of complete radiation, spectral series, and the asymmetrical emission of electrons in ultra-violet light. Only this need be mentioned. If an electron (charge  $e$ ) be thrown off from a magneton like a speck of dust from a flying wheel, then the angular momentum of the magneton changes by the amount  $-1(2\pi V)^{-1} \mu$ . This is therefore the angular momentum of the ejected electron about the axis of the magneton. Taking the velocity of ejection to be proportional to the angular velocity in the magneton, we have Ladenburg's result that the energy of the emitted rays varies as the frequency.

Dr. Bohr, by first insisting on the fact that Planck's  $h$  is an angular momentum, has done something of the greatest importance, whatever the ultimate fate of his particular interpretation. Dr. Nicholson has, I think, used the same idea.

G. B. McLAREN.

University College, Reading, September 20.

#### Stability of Aëroplanes.

IN his experiments on the resistance of the air to spheres, M. Eiffel showed that for a certain critical velocity for a given sphere the resistance suddenly fails. The critical velocity appears to be very different for different spheres; e.g. in his paper (*Comptes rendus*, December 30, 1912) the sudden change is shown to begin at velocities of 12, 7, and 4 metres per second for spheres of diameter 16.2, 24.4 and 33.0 cm. respectively.

Suppose we make a triangular frame with one of these spheres at each corner and allow the frame to fall from a height. It would appear that if the weights of the spheres were so adjusted that the frame would

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maintain a horizontal position for a part of its flight, it must reach some velocity at which the equilibrium of the resisting forces would be destroyed, and rotation would ensue, tending to make the frame take up a vertical position.

If such a law holds for bodies of other shapes than spheres, it would appear that an aëroplane would have a much better chance of being stable in winds of great variety of velocities, if the resisting surfaces were all of the same size and shape.

I do not know whether this case has already been dealt with by others, and I make the suggestion for what it may be worth.

G. A. SHAKESPEAR.

The University, Birmingham.

#### The Pancreatic Treatment of Tuberculosis and Malaria.

THERE are two points in Dr. Saleeby's remarks upon p. 61 of NATURE (September 18, 1913) which I should like to notice briefly. In my letter to you on the same page I did not refer to Baetzner's brilliantly successful results in the treatment of tuberculosis by pancreatic enzymes (*The Practitioner*, January, 1913, pp. 203-219), because after his prolonged investigations the thing is an *accomplished fact*, which cannot be disputed by any interested in its operative treatment. I am neither a medical practitioner nor the apostle of a new faith, but merely a scientific investigator. I foresaw, and foretold, the complete success of this treatment of tuberculosis in 1907; and with the fulfilment of this scientific forecast at the hands of Dr. M. A. Cleaves in that year and of Dr. W. Baetzner more recently, my concern with the matter has ended. Moreover, I have taught medical students for more years than I care to think of, and I know how hopeless it is to try to teach something new of a scientific nature to the medical profession.

As to the *sexual phases* of the life-cycle in malaria, they are of no practical importance at all in the treatment of malaria by enzymes. A reference to Major Lamballe's original manuscript shows that the presence of such *sexual* phases had been verified in several of his cases. Like all the clinical symptoms, such as in grave cases, delirium and coma, these sexual phases vanished and did not return, when the Fairchild injections of trypsin and amylopsin were administered. These sexual phases, the so-called "crescents," have a scientific interest, but scarcely a clinical importance, as Major Lamballe also recognises. The disease is not continued by them any more than cancer is continued by the cells, to which Prof. Farmer gave the name of "gametoid tissue." Probably they are got rid of by the leucocytes, but, in any case, in ordinary circumstances the pancreatic ferments would be devoid of action upon such *sexual* phases, as my experiments upon various non-pathogenic micro-organisms demonstrated (*vide* Beard, J., on the occurrence of dextrorotatory albumins in organic nature, *Biol. Centralblatt*, vol. xxxiii., pp. 150-170, 1913).

J. BEARD.

8 Barnton Terrace, Edinburgh, October 1.

#### Relative Productivity of Farm Crops in Different Countries.

IN view of the repeated statements that British farming is declining and that the world is threatened with a shortage of wheat supplies, the following extract from the results of an investigation into the facts regarding both these questions may be of interest. Lack of space precludes reference to the