

out the forty years the work has been in the hands of students of physics, it has remained the pet child of its creator, and every page bears evidence of the care he bestowed on it. In the work of revision for the present edition, Kohlrausch was assisted by a number of his former pupils, now distinguished for their researches in special branches of the subject, so that it embodies the experience of the leading physicists in Germany. As an example of a section of the book only possible under a system of collaboration of this kind, that on radio-activity, by Prof. E. Dorn, may be mentioned as of special value. As a result, we have a book thoroughly up-to-date, which, as a work of reference for the physical laboratory, stands in a unique position, both on account of the large amount of valuable matter it contains, and for the completeness of its references.

In the second place, the author gives us in the preface a glimpse at the physical laboratories of Germany fifty years ago. There were then about two dozen professors of physics, a dozen assistants, and possibly about two dozen senior students engaged in research in the whole of the country. Apparatus was scanty, and had to be purchased out of a very meagre annual grant. A new professor who could bring with him his own apparatus, was regarded as a special windfall. Systematic instruction in practical physics was given at Königsberg, Berlin, and Heidelberg Universities only, but the need for better organisation of the universities in this respect soon became pressing, and was met by the appointment, in the later 'sixties, of a number of professors who had received their practical training in the above laboratories under Neumann, Magnus, and Kirchhoff. The change which has come about since then is remarkable. There are now many single laboratories in which a greater number of senior students are engaged in research than were so occupied in the whole of the laboratories of the country half a century ago.

*The Schoolmaster's Year-book and Directory, 1910.*

A Reference Book of Secondary Education in England and Wales. Pp. lxxi+448+700. (London: The Year-book Press, c/o Swan Sonnenschein and Co., Ltd., 1910.) Price 7s. 6d. net.

This is the eighth annual issue of what has become an indispensable source of information to the educational worker. It consists of three parts, containing respectively general information, alphabetical lists of secondary schoolmasters, and a list of secondary schools. We are able to say from experience that the educational particulars provided by this work are accurate and up-to-date. Among new features of the book this year are important alterations in the section dealing with county and borough education authorities. It is interesting to note that the directory now contains more than 14,000 names, and that the list of secondary schools numbers about 1500. Altogether, the book deserves a wide circulation.

*Egypt and the Egyptians.* By the Rev. J. O. Bevan. Pp. xxii+224. (London: George Allen, 1909.) Price 5s. net.

This is a compilation of miscellaneous information about "Egypt and the Egyptians, their History, Antiquities, Language, Religion, and Influence over Palestine and Neighbouring Countries," written in old-fashioned style. It has no particular plan, and meanders about from one subject to another, but not unpleasantly. Sir G. H. Darwin, who disclaims "anything more than the superficial knowledge of Egypt which is open to any hurried tourist," has done Mr. Bevan the honour of writing a preface to his little book, which will no doubt give considerable pleasure, and convey a good deal of information and instruction to many readers.

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## LETTERS TO THE EDITOR.

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of NATURE. No notice is taken of anonymous communications.]

### The Term "Radian" in Trigonometry.

DR. THOMAS MUIR, in his letter in NATURE of April 7 (p. 156), corrects the misapprehension implied in the "New English Dictionary," viz. the supposition that the word "radian" was first introduced in the "Treatise on Natural Philosophy" by Thomson and Tait.

Dr. Muir says he used the word in 1869 in St. Andrews, and goes on to say that it was after conversation with my father, the late Prof. James Thomson, in Glasgow, that the word was finally adopted in 1874.

I should like to point out that my father adopted the word some years before he came to Glasgow and before he met Dr. Muir. I have a memorandum in my father's writing saying that this name was proposed by him in July, 1871, and it appears in the printed examination questions set by him in the general class examination in Queen's College, Belfast, on June 5, 1873, and published, I believe, in the college calendar.

I well remember several conversations between my father and Dr. Muir with regard to the use of this and other words, but "radian" had already been adopted publicly by my father, and apparently had been already independently used by Dr. Muir.

JAMES THOMSON.

22 Wentworth Place, Newcastle-on-Tyne, April 12.

### The Yellow Colour in the Stoat's Skin.

In her letter to NATURE of March 24 Miss I. Sollas remarks on the "canary-yellow" colour "in members of the stoat family when the winter whitening is incomplete," adding, "there can thus be little doubt that the yellow body produced artificially in the fur of the albino rat is a substance similar to the yellow pigment of the stoat's winter coat. . . ." I do not know whether it has been recorded, though I should have thought so, that a stoat's fur of the purest white will, after exposure to light in a museum case for a time, varying with the intensity of the light, invariably turn distinctly yellow—fainter, however, than "canary-yellow." I have made no chemical or microscopical examination of fur so yellowed, but the usual reason assigned for the change is the absorption by the hairs of a small amount of fat out of the skin, induced by the light and heat of summer. I understand, also, that ermine kept in a dark chamber or box the temperature of which is high will also turn yellow. Stoats in this part of the country often become white early in the season before any real cold weather has occurred.

HENRY O. FORBES.

The Museums, Liverpool, April 12.

### Transit of Halley's Comet across Venus and the Earth in May.

I BEG to direct attention to the following:—

It is my intention, at Kaafjord, in Finnmarken (in the north of Norway), together with my assistant, Mr. O. Krogness, to take magnetic and atmospheric observations during the period May 7 to June 1 next in connection with the transit of Halley's comet across the sun's disc on May 18–19.

It is conceivable that the tail of the comet may consist chiefly of electrical corpuscular rays; and, if this be so, we should expect that these rays, owing to earth-magnetism, would be drawn in, in the Polar regions, in zones analogous with the aurora zones, assuming the tail of the comet to be of sufficient length to reach the earth.

These rays will then, in such a case, exercise, amongst other things, magnetic influences and electric inductionary effects, especially strong in the Polar regions, and it is particularly such effects we are desirous of tracing. The tail of the comet, if it should consist, as above assumed, of such radiant matter, will alter its shape at a very considerable distance from the earth, and we may expect to

see similar formations of light to those which occur during my experiments with cathode rays around a magnetic terrella.

In my work, "The Norwegian Aurora Polaris Expedition, 1902-1903," descriptions will be found in several places of these phenomena, but to elucidate the subject here I append a few new illustrations, which show very plainly the shape of these formations of light.

Figs. 1 and 2 show how the rays are drawn in in belts around the magnetic poles of the terrella, corresponding

February, p. 57), and it is not impossible that indications of an alteration in those parts of the comet's tail nearest the planet may be noticeable.

We may then possibly expect to find traces of the rays being drawn in towards the polar regions of Venus in a manner similar to that demonstrated by the experiment shown in Fig. 4, or a more or less distinct bending of the comet's tail, assuming Venus to be magnetic.

The probability of such being visible must, however, be admitted to be small, as the central line or the tail, if it



FIG. 1.



FIG. 2.

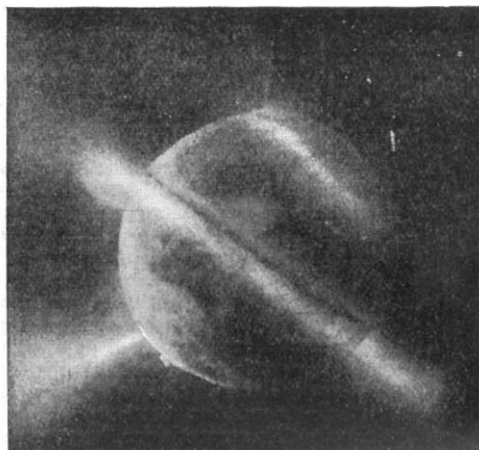


FIG. 3.

with the polar-light zones on the earth. They are taken looking along and perpendicular to the magnetic axis. Fig. 1 shows the spiral rings of light around a magnetic north pole, corresponding to the south pole of earth magnetism. We find these belts of light sometimes, as here, with a tolerably even strength of light like a continuous band, and at other times we find the rays concentrated in three limited streaks, with well defined positions around the magnetic poles of the terrella.

Fig. 3 also shows an equatorial ring. This phenomenon of light is magnificent, but unstable; it is difficult to produce; it may suddenly appear and suddenly vanish, as the rays which run round the terrella at the equator are difficult to obtain sufficiently concentrated for the rarefied gas to illuminate them. At the lower part of Fig. 3 and on Fig. 4 a characteristic pointed tongue of light will be seen, which is drawn in, and shows the manner in which the rays here come into the terrella. The magnetic equator is indicated on the terrella by a dark line.



FIG. 4.

It may now be imagined that analogous formations of light may be observable around the earth of the rays from the comet's tail on May 18-19. The downward rays in the Polar regions will, it is true, be difficult to observe in northern parts owing to the northern declination of the sun, but in Antarctic regions there may be more hope of doing so, and the phenomenon would then probably appear somewhat similar to the aurora australis. At night, in low latitudes, one may conceive the possibility of a ring like the equatorial ring being observable.

About May 2 the comet will be in the vicinity of Venus (see *Bulletin de la Société astronomique de France*,

is directly away from the sun, will be at a considerable height above the planet; but I desire, nevertheless, to direct the attention of astronomers to these conditions, as Venus, if as strongly magnetised as our earth, must be expected to exercise a noticeable influence on the tail of the comet at a distance of several million kilometres, especially if the rays in the tail are easily deviated by magnetic force.

This phenomenon may, in case it is present, be determined by astronomical observations of the comet's tail and Venus in the period May 1-3, and I beg, therefore, to ask astronomers, in the interests of science, to make arrangements for the necessary observations, if possible, and to favour me with a short account of the results.

KR. BIRKELAND.

Universitetets Fysiske Institut, Christiania,  
March.

#### Neutral Doublets at Atmospheric Pressure.

In his papers on magneto-cathode rays, Prof. Righi assumes the presence of neutral doublets, formed of a positive and negative ion in more or less stable combination. Sir J. J. Thomson has independently put these in evidence very clearly in his experiments on positive rays. Working independently, we have made some observations which point to the existence of such doublets at atmospheric pressure. Ionised gas is drawn through two insulated metal tubes; along the axis of each a thick insulated wire electrode is fixed. These wires can be connected in turn to a Dolezalek electrometer, and the current between tube and electrode measured. The ionised gas is produced by splashing mercury, or by heating lime or aluminium phosphate on a strip of platinum foil. With a certain blast, in one case, the current reached its saturation value on the first electrode with a voltage of 320, being then 130 in arbitrary units. Raising the voltage to 656 did not increase this by one division; the extreme readings at the intermediate voltages were 128 and 130, so that the observations were quite regular. Nevertheless, with 656 volts on the first electrode a current can be detected at the second, this in some cases amounting to as much as 10 per cent. of the original.

Lime gives a large excess of negative, mercury and aluminium phosphate of positive, ions, but in each case