their quickly altering enclosures of a constantly changing number of the earth's lines of magnetic force, while thus rapidly opening out or closing up. But the very short extent, not probably much exceeding some few feet or yards, which the swiftest moving part of such a circuit, in meteor-nuclei of various sizes, would embrace, and again the oft-proved weakness of the earth's magnetic field for exciting such induced electric currents, scarcely allow us to expect that any very high voltages would be attained in even the most select cases and the most favourable choices of conditions of such meteoritically produced air-circuits. The hottest, and therefore also probably the best conducting portion of each current's path, compressed against the meteorite's front surface, would also not, presumably, be that in which the heat and light producing action of the current would be strongest, since this would rather be used up in producing brush and glow discharges through the more resisting portion of the circuit in the outer air. The interior parts themselves of stony meteorites, when they have fallen, have not been found, by either sight or touch, to furnish any proofs of having been much heated, but intense effects of heat and fusion on the outer surfaces of fallen meteorites are always very obvious.

While nothing seems to point to any very easily discernible actions of electric currents immediately around a meteor's head, unless we may ascribe to electric agency the occasional production of an "aura" of sparks, or of a misty envelope of light enshrouding it, the stream of heated dust and vapours which travel in a meteor's wake, extending to considerable widths and lengths, as may be often noted, is perhaps a more visibly displayed, and a more evidently and distinctly active scene of luminous discharges of induced electric currents: for the accumulated flow behind the meteor-head resembles in some degree a columnar, vaporous follower of the meteorite itself, left to pursue its course along the meteor-track when the nucleus has disappeared. Being thus virtually a shooting-star of a long-extended shape, but of too dwarfed velocity to raise itself by heat to incandescence, the same induced electric currents as were above inferred to be developed in the meteor's head would here continue to evince themselves along the column by glow discharges in the vapours and the outer air, so long as sufficiently swift flow of the vapours can be persistently maintained through the retarding resistances of the opposing atmosphere. Thus a fairly intelligible *raison d'être* by electric current interventions may not impossibly have been incidentally divulged, by means of the recourse proposed by Mr. Brown to magneto-electric actions, of the long-enduring light-streaks left along the paths of all the swifter class of shooting-stars and larger meteors; the real *modus operandi* of those streaks having always presented to meteor observers a mysterious question for discussion, never admitting hitherto of satisfactory solution by known experimental illustrations, or of any quite surely sound elucidation by less trustworthy conjectures. A. S. H.

A R re Game Bird.

I THINK it is worth recording that on Thursday, October 5, Sub-Lieut. H. R. Sawbridge, R.N., shot a quail, *Perdix coturnix*, on Lopham Fen, close to the rising of the waters, the common source of the Waveney and the Ouse, near Diss, Norfolk.

The bird, either a hen or a young male, was very fat—a beautiful little specimen.

The last quail known (by me) to have been shot in this neighbourhood was in the 'fifties of the last century, by Mr. Henry Button, of this parish.

I understand that this bird was much more frequently found in the middle of last century in the neighbourhood of Great Yarmouth, and that, as a rule, it was found singly, as this was, in the autumn.

It is being preserved by Mr. Cole, of Norwich. What was a little foreign bird like this doing singly and alone on our eastern counties' heaths and fens?

Is it a case of lost or strayed, or what is it?

It would be interesting to know whether other specimens of the quail have been heard of inland in the eastern counties of late years. JOHN S. SAWBRIDGE.

Thelnetham Rectory, Diss, Norfolk, October 16.

PHYSICAL LABORATORIES IN GERMANY.[1]

THE Director-General of Education in India has just published a valuable work in a report by Prof. Küchler, of the Presidency College, Calcutta, on physical laboratories in Germany. It forms one of a number to be included in a volume of the series of occasional reports.

Prof. Küchler "was placed on special duty to inquire into (1) the methods adopted at the universities and polytechnics of Berlin, Munich, Vienna, and other prominent universities and technical institutions in Germany with regard both to the ordinary study of physical science and to the character of the investigations and the system pursued in the case of students who are entering upon a course of independent research. (2) The construction and equipment of modern German laboratories, the special merits of scientific instruments of German manufacture, and the facilities for standardising these instruments which are offered at central institutions in Germany."

In the course of his tour, lasting more than six weeks, the principal universities and technical schools were visited, and the report sums up the information in a useful manner. It is naturally divided into two sections corresponding to the two parts of the reference; the first deals with the methods of study, the second treats of the construction, methods of equipment, &c., of the laboratories. The training of the university undergraduate of necessity differs from that of the pupil of the high school, and both methods are described at some length. Attention is directed to the importance of the set lecture in the scheme of education; the number of lectures given during the session in a university such as Berlin is very considerable, and each lecturer has the use of a properly equipped lecture-room and apparatus. The importance of the organised teaching of practical physics, for medical students, chemists, and engineers, in addition to the professed physicist, is now realised in Germany, and in an appendix, which, however, is not printed in the report, details of the practical instruction at some of the universities and technical colleges are given. In view of the large number of students in some of the German universities, the numbers attending practical classes, as given on p. 7, seem small. At Berlin there are 140 students in two divisions, each under three assistants. The average number of students in the charge of a single assistant comes to twenty-two or twenty-three, which is probably about the same as in one of our well organised English courses.

Students who propose to take a degree in physics work usually for two years at a dissertation. Prof. Küchler specially directs attention to the fact "that students are discouraged from commencing the final stages of their labours before they have been thoroughly trained in practical manipulation and have carefully gone through a complete course of laboratory work such as is represented, say, by Kohlrausch's very elaborate handbook." This fact is sometimes conveniently forgotten by those who urge the adoption of the introduction of research work at an earlier stage in our English training; the average number of these research students is said to be five or six, though, of course, at Berlin, as indeed at Cambridge, the number is much larger.

To illustrate the construction and equipment of the laboratories, Prof. Küchler has given in full the plans of a number of representative institutions, and these plans form a most valuable part of the report. They will enable a professor building or organising a

[1] A Report to the Director-General of Education in India by Prof. G. W. Küchler.