LETTERS TO THE EDITOR.

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The Inheritance of Acquired Characters.

IT may be of interest to your readers to know that two guinea-pigs were born at Oxford a day or two before the death of Dr. Romanes, both of which exhibited a well-marked droop of the left upper eyelid. These guinea-pigs were the offspring of a male and a female guinea-pig, in both of which I had produced for Dr. Romanes, some months earlier, a droop of the left upper eyelid by division of the left cervical sympathetic nerve.

This result is a corroboration of one series of Brown-Séquard's experiments on the inheritance of acquired characteristics. A very large series of such experiments are of course needed to eliminate all sources of error, but this I unfortunately cannot carry out at present, owing to the need of a special farm in the country for the proper care and breeding of the animals.

LEONARD HILL.

Physiological Laboratory, University College, London, October 18.

"Rhynchodemus Terrestris" in Ireland.

IT is now nearly twenty-five years ago since Sir John Lubbock discovered this Land-planarian for the first time in England. Although it is very doubtful whether the two other species, viz. *Geodesmus bilineatus* and *Bipalium kurense*, can be looked upon as truly indigenous in Europe, it is not so with *Rhynchodemus terrestris*.

Since Müller's original discovery of this worm in 1774 in Denmark, it has been taken in the Balearic Isles, near Lille, and on the Mediterranean coast in France, and near Würzburg in Germany. Finally, Sir John Lubbock speaks of it as having been found in Shropshire and Kent in England. More recently Mr. Harmer discovered it near Cambridge, and I have now to add a new locality, having received some specimens from Blackrock, near Dublin.

R. T. SCHARFF.

October 22.

Dr. Watson's Proof of Boltzmann's Theorem on Permanence of Distributions.

IN working over Dr. Watson's proof of Boltzmann's H-theorem (Watson, "Kinetic Theory of Gases," second edition, p. 43), it appeared that, probably through a slip, the reasoning given depends on an assumption palpably absurd, *i.e.* that the function whose vanishing defines the beginning or end of an encounter between a molecule belonging to a set with m degrees of freedom and one belonging to another set with n degrees of freedom *is a function of the coordinates of the last molecule only*, the one belonging to the n set. For while he takes the number of molecules of the n set whose momenta and coordinates lie between

$$p_1 \text{ and } p_1 + dp_1 \;\ldots\; q_n \text{ and } q_n + dq_n$$

as

$$f(p_1 \ldots q_n)\, dp_1 \ldots dq_n,$$

he also takes $q_n = 0$ as the condition of encounters between those molecules and others from a set whose coordinates are

$$P_1 \ldots Q_m.$$

I do not know Boltzmann's proof, but while I suppose it is all right, I find it very hard to understand how any proof can exist. *A priori* the only physical property assumed in Watson's proof is that

$$dp_1 \ldots dq_n = dp_1' \ldots dq_n',$$

together with the fact that the number of molecules about a configuration $p_1 \ldots q_n$ is

$$f(p_1 \ldots q_n)\, dp_1 \ldots dq_n;$$

and therefore it would, if true, apply to a system obtained by reversing the velocities when the permanent configuration had been very nearly reached. Such a system would retrace its path and go further and further from the permanent configuration.

Hence it would appear as if the whole conception of Dr. Watson's proof was founded on a mistaken idea of what can be proved, and that all that any proof could show is that, taking all the values of $\frac{dH}{dt}$ got from taking all the configurations which approach towards a permanent configuration of the molecules, *and* the configurations which recede from the permanent configuration (obtained by reversing velocities), and then striking some kind of average among them, the average $\frac{dH}{dt}$ would be negative.

Will some one say exactly what the H-theorem proves?

EDWD. P. CULVERWELL.

Trinity College, Dublin, October 12.

The Meteor-Streak of August 26, 1894.

SINCE the publication of my paper in NATURE of September 27, in which I discussed observations of the fireball of August 26 and its drifting-streak, I have received many additional descriptions which show that some of the earlier reports were not very accurate. The results I derived for the direction and rate of motion of the streak have therefore to be considerably amended to agree with the new materials.

From all the data I find that the height of the streak was fifty-four miles above a point seven miles north-east of Denbigh. From thence it travelled horizontally to south-east, passing successively over Ruabon, Denbighshire, and Wem and Wellington, Shropshire, finally becoming extinct six miles west of Wolverhampton, at just about the same height as at first. It traversed sixty-one miles in thirty minutes, which is equivalent to 176 feet per second.

This deduction differs from the previous one, which assumed the meteoric or cosmic cloud to have been rapidly ascending in the atmosphere during the time it remained visible. Mr. Wood, of Birmingham, obtained a similar result from the earlier observations. I feel certain, however, that no such upward movement of the cloud really occurred, but that it maintained, throughout its rapid drift to the south-east, a nearly uniform elevation of about fifty-four miles above the earth's surface.

Bristol, October 14. W. F. DENNING.

Flight of Oceanic Birds.

JUDGING from Mr. Kingsmill's photograph, it would appear that the bird is just in the position of the half-stroke of the wings when making a fresh start or a sudden spurt. While these birds generally sail about, yet at times they do flap their wings. The movement of the wings in all these oceanic birds is very deliberate. I might here be allowed to point out the interest attaching to such photographs as these; and as many have hand-cameras now, snap-shots of animal life at sea, or of any natural phenomena, would be valuable and interesting additions to our knowledge of sea life.

D. WILSON BARKER.

Greenhithe, October 13.

A LONG-PERIOD METEOROGRAPH.

IN order to obtain a record of the principal meteorological variations at the summit of Mont Blanc, M. Jules Richard, of the well-known firm of scientific instrument makers, has constructed for Dr. Janssen a meteorograph which will run through the winter and spring without being re-wound.

The instrument (Fig. 1) is set in action by a weight of about ninety kilograms, which falls from five to six metres in eight months. This weight moves a pendulum, which regulates the movement of the various parts of the apparatus. It was essential that the motion of the pendulum should not be greatly affected by considerable variations of temperature. A modified form of Denison's escapement was therefore adopted by M. Richard (Fig. 1, A.). An advantage of this escapement is that it only requires a very minute quantity of oil. Denison was unable to detect any variation in the uniform motion of the pendulum when the oil had frozen to the consistency of tallow.

All the movements of the meteorograph are given to the respective instruments through a horizontal shafts

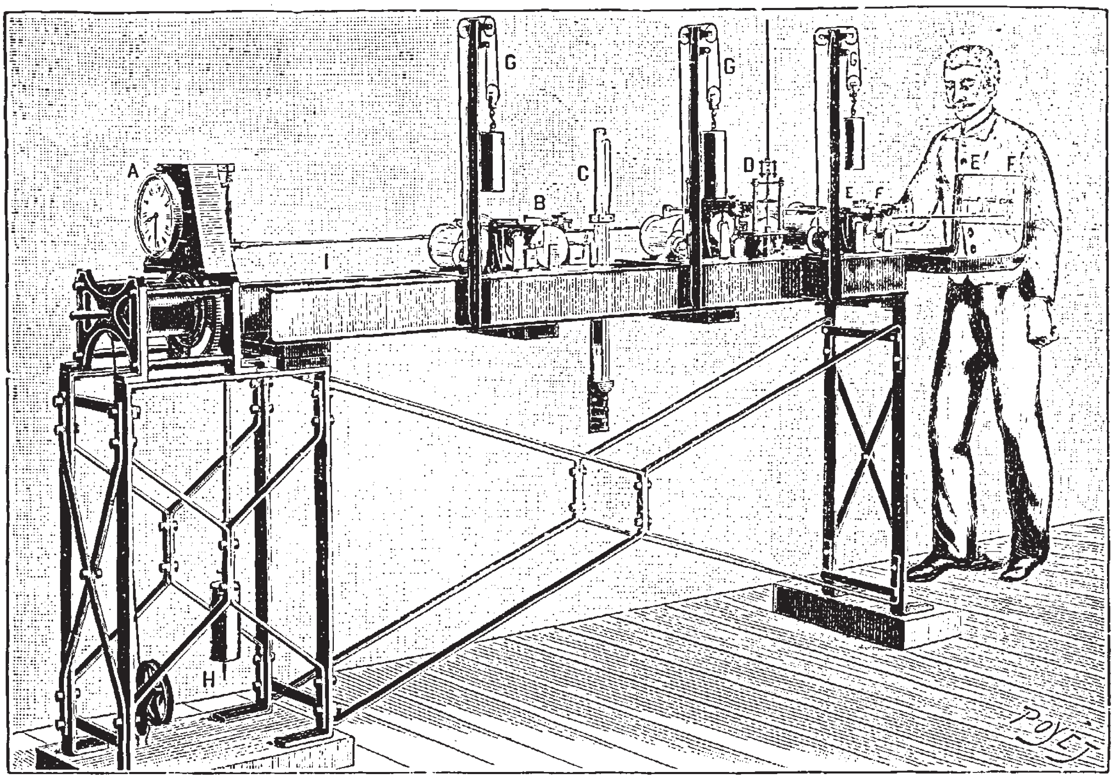

FIG. 1.—Long-period meteorograph for the Mont Blanc Observatory. A, clock to run eight months; B, barometric recording system: C, mercury barometer; D, registering anemometer and anemoscope; E, pen of thermometer; F, pen of hygrometer; E', reservoir of thermometer; F', hairs of hygrometer; G, G, G, counterpoises for ensuring the regular movement of the paper spindles; H, pendulum of clock; I, transmitter of the clock-movement to the different recording systems.

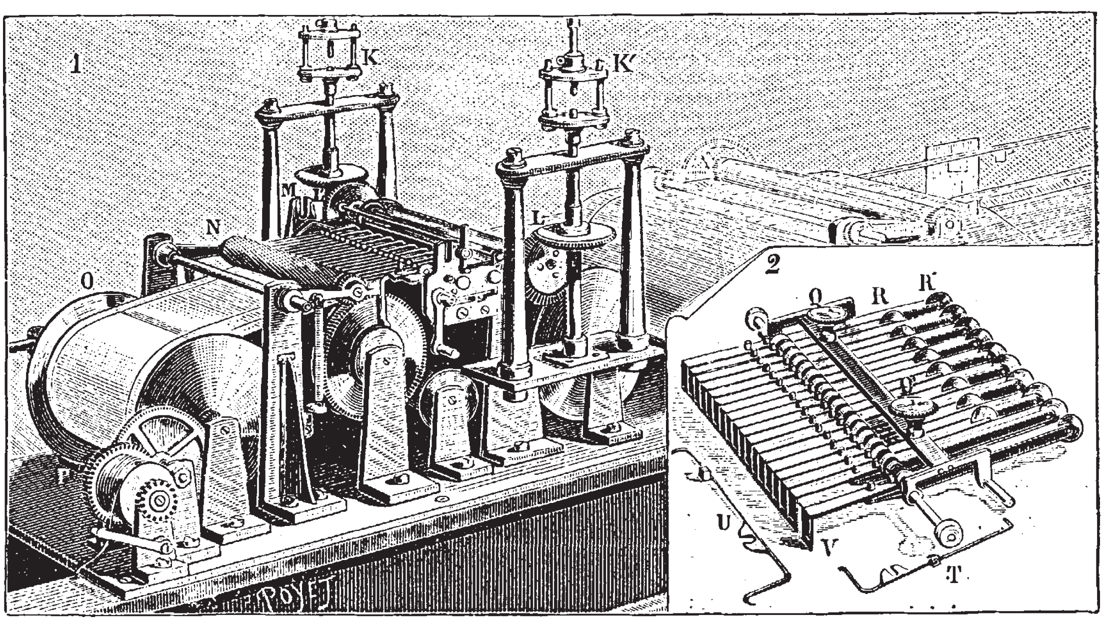

FIG. 2.—Details of the anemoscope-anemometer registering system shown at D in Fig. 1. No. 1. K', K, connections of the vane and anemometer with the registering system; L, cog-wheel for velocity of wind (anemometer); L', cog-wheel for direction of wind (anemoscope); M, group of recording pens; N, roll of paper: O, magazine for paper upon which records have been traced; P, system actuated by the counterpoise G, and serving to roll up the used paper. No. 2. General view of the writing system. Q, Q', buttons for lifting the pens; R, R', rollers actuated by the cog-wheels L and L'; T, detail of the pen-tube of the anemoscope; U, detail of the pen-tube of the anemometer; V, series of pen-tubes.

which is in connection with the pendulum. The shaft is completely rotated round its axis once in twenty-four hours, and this diurnal motion is communicated to the bobbins of paper belonging to the different registering instruments. The paper on these bobbins is unrolled with a different velocity for each instrument.

The instrument for registering variations of atmospheric pressure is shown at B, in Fig. 1. The marking needle records the movements of the mercury in the lower branch of a Gay-Lussac barometer having a very large cistern.

For recording variations of temperature, metallic reservoirs on the Bourdon system are employed, and for humidity a hair or Saussure's hygrometer is used. The velocity and direction of the wind are registered by a new arrangement devised by M. Richard, the principle being as follows:—A cylinder, carrying a certain number of cogs, arranged helically on its surface, is connected with a Robinson's anemometer, and acts by means of the cogs on an equal number of pens, each of which is lifted up in succession and made to mark the drum of paper so long as the cog acts upon it. For registering direction, the apparatus is provided with eight separate pens for the eight principal directions of the wind. For velocity, the cylinder carries ten cogs, which act successively on ten pens. Each pen is geared during one-tenth of a complete rotation of the cylinder, and, knowing the rate of movement of the cylinder, the velocity of the wind may be found from the length of the traces made by the different pens.

The descriptions beneath the accompanying illustrations, for which we are indebted to *La Nature*, tell the use of the different parts of the instrument. In spite of the many precautions which have been taken, Dr. Janssen recognises that the instrument is more or less tentative in character. But the question of long-period meteorographs for meterological stations at high altitudes is so important that the result of the experiment will be awaited with great interest.

NORTH AMERICAN MOTHS.[1]

MANY works on North American butterflies, and on some groups of moths also, have been published of late years, but the important family of the Noctuidæ has hitherto been much neglected. A great deal has been done in this direction, it is true, but the information is scattered broadcast through periodicals, and but little has been attempted to systematise it, the only existing guide being Grote's "List of North American Moths," which is limited to names of species, without even references to where they are described.

But to work at a group of insects without the aid of catalogues and monographs, is like attempting to study a language without the help of a grammar and dictionary. In the work before us, Prof. Smith has amply fulfilled the latter necessity, as far as regards the family of moths of which he treats. The Noctuidæ may be considered the most extensive family of the larger moths. We have 300 species in England, and Staudinger's last "Catalogue of the Lepidoptera of Europe, North Africa, Asia Minor, Siberia, and Labrador," published in 1871, enumerates 1040 species for those countries, and many have been added since; and although Prof. Smith does not number the North American species, an examination of his index yields upwards of 3000 species; and even after making the largest deductions for generic names and synonyms (perhaps too large an allowance), we may still fairly conclude that the Nearctic fauna considerably outnumbers the Palæarctic in this family, though it is not the case in the butterflies.

Prof. Smith has been accumulating materials for a monograph of the North American Noctuidæ for the last ten years. During the course of his studies, he visited London, and made a special study of the important series of type-specimens in the British Museum, which includes a large proportion of those described by Guenée, Walker, and Grote. Consequently he has been able to clear up a good deal of hitherto doubtful synonymy. He has also visited several of the more important museums on the continent, and of course the principal collections in North America had previously been examined by him; therefore his work is not a mere compilation (though even in this case it would have been of great value), but it represents a large amount of original study.

A rather important question discussed by Prof. Smith in his preface, is that of "types." He remarks:—"Dr. Hayen holds that every specimen named by an author of a species described by himself is a type. Mr. Morrison was yet more liberal, and marked as 'type' a number of specimens of species described by Mr. Grote, having presumably compared them with the actual type. Mr. Grote's practice seems to have been to mark all specimens before him when writing his original description, as 'type,' and I think Mr. Grote is right." Our own opinion is that greater precision is necessary, and that no specimen can be considered a type which was not before an author when he drew up his description. Even so, he should always label one individual specimen, which he considers to represent his species best, as "type," and, properly speaking, there cannot be more than two such "types" of a species, male and female. The remainder of the series should be regarded not as "types," but as "co-types," and specimens which are afterwards compared and considered to agree with them, whether compared by the author of the species himself, or by some other person, should simply be labelled "compared with type." Too much precaution cannot be exerted in these matters. Among other subjects noticed in the preface, are the contents of the various collections consulted by Prof. Smith, the dates of Hübner's works (in which he hardly seems to us to be fully acquainted with the published information), and explanations respecting the manner in which he has arranged the details of his book, in quoting references and localities, &c. All the species contained in the United States National Museum at Washington are marked with an asterisk. A useful index to authors and works cited follows the preface, and the general index, which closes the volume, fills twenty-six pages of small print in double columns.

Great differences of opinion exist between Prof. Smith and other American and European entomologists respecting the classification of the Noctuidæ, and sometimes also respecting the identification of various species cited. This is unavoidable, and in no way interferes with the value of his work. In most cases, Prof. Smith indicates where the type specimens of each species are to be found, and frequently adds valuable notes on identification and variation. Transformations are omitted, owing to the late Mr. Harry Edwards having issued a complete catalogue of the early stages of North American Lepidoptera (*Bulletin* No. 35 of the National Museum).

In conclusion, we may venture to express a hope that it may not be very long before Prof. Smith's promised "Monograph of North American Noctuidæ" is ready to see the light. A catalogue is good, but a monograph is better, and we shall be very pleased to see a work of such magnitude and importance carried to a successful conclusion.

W. F. KIRBY.

[1] *Bulletin* of the United States National Museum, No. 44. A Catalogue, bibliographical and synonymical, of the Species of Moths of the Lepidopterous Superfamily Noctuidæ, found in Boreal America, with critical notes by Dr. John B. Smith, Professor of Entomology in Rutger's College. (Washington, 1893.)