

called by the villagers, will not suffer the like fate. The Italian Alpine Club, will, we may trust, interest themselves in this matter. P. L. SCLATER.

Hotel du Parc, Lugano, October 21.

Who discovered the Teeth in Ornithorhynchus?

AS Dr. Hart Merriam's letter on the above subject in your issue of the 7th inst. (p. 11) will be read by many who have not access to Sir Everard Home's "Lectures on Comparative Anatomy," allow me to point out that the description and figures in that work referred to by Dr. Merriam have no bearing whatever upon the very interesting discoveries recently made. They represent, not the real teeth of the young animal discovered by Mr. Poulton, and fully described by Mr. Oldfield Thomas, but the well-known horny plates which functionally take their place in the adult, and which are called "grinding teeth" by Sir Everard only in a very general sense. W. H. FLOWER.

British Museum (Natural History), November 9.

THE account of the teeth of Ornithorhynchus, given by Sir Everard Home in "Lectures on Comparative Anatomy," vol. i. p. 305, explanatory of Tab. lix. vol. ii., referred to by Mr. Hart Merriam in your last issue (p. 11), shows, even more clearly than the figures, that the *true* teeth had not been noticed at that time (1814). The passage is as follows:—"In the posterior portion of the mouth, both in the upper and lower jaw, are placed grinding teeth with broad flattened crowns, four in number, one on each side of each jaw. *They are composed of a horny substance* (the italics are my own), only embedded in the gum, to which they are connected by an irregular surface in the place of fangs. When cut through, the substance appears fibrous, like that of nail; the direction of the fibres being perpendicular to the crown, similar to that of the horny crust of the gizzard. The teeth in the young animal are smaller, and two on each side, so that the first teeth are probably shed, and the two small ones replaced by one large one."

It is perfectly evident that here no reference is made to the *true* teeth, and, moreover, the figure of the two smaller "teeth" of young specimens represents merely the immature horny plates. The honours, therefore, still remain with Mr. Poulton and Mr. Oldfield Thomas. OSWALD H. LATTER.

Anatomical Department, The Museum, Oxford,
November 8.

On a Mite of the Genus *Tetranychus* found infesting Lime-trees in the Leicester Museum Grounds.

ABOUT the 13th of last September my attention was called to the strange appearance of a row of lime-trees standing in front of the School of Art buildings in Hastings Street. On examination I found that the whole row, with, I think, only one exception, were almost entirely devoid of leaves, the trunks and branches being covered with a fine web, very closely spun, giving them the appearance of being coated with a thin layer of ice, this glazed look being specially noticeable when standing in such a position as to catch the reflected rays of the sun. At first sight I imagined that I was examining the work of a spider, though I was unable to recollect any whose webs would accord with the character of those under observation. However, a close inspection revealed the webs to be tenanted by an innumerable number of yellowish or orange-coloured mites which were in some places associated together in dense masses or clusters, and more or less abundant over the whole of the trunks and branches.

These mites appeared, on being subjected to a careful microscopical examination, to be identical with *Tetranychus tiliarum*, Mull., a species which it seems that Claparède considers to be only a variety of *T. telarius*, the common "red spider." However that may be, they are at any rate closely allied forms—members of the family *Trombididae*, which possess, as one of their distinguishing characteristics, a pedipalpus with a claw and a lobe-like appendage. In the genus *Tetranychus* the palpi are chelate, the mouth is furnished with a barbed sucking apparatus for the extraction of plant juices, and spinning organs are usually present. It is needless to comment upon their destructiveness to vegetation, for most keepers of gardens and hothouses are familiar with their ravages in one

direction or another, and the difficulty experienced in thoroughly extirpating them.

In connection with the species which forms the subject of the present communication, I notice that Murray, in his work on the "Aptera," says: "It occasionally occurs in such numbers as almost to denude the trees of their foliage; and it has been noted that the stems and branches of such trees seemed covered with a bright glaze. Can this be a fine web?" It was so, most certainly, in the present instance, which afforded me a most favourable opportunity for examination. Again, it appears that the mites are normally found on the under-surface of the leaves, which they cover with a fine web of silk, on which (to again quote Murray) "they are sometimes crowded together in vast numbers; for example, we have seen them so thick on the leaves that they looked as if they were not merely sprinkled with a yellow orange-coloured powder, but as if it was actually in parts heaped up on them, so that none of the green colour of the leaf was visible." Their presence is of course highly injurious, causing the leaves to shrivel and drop; and it seems to me that the fact of their occurrence on the bare bark of the trunks was attributable to the death of the leaves causing them to retreat to that position, uncongenial though it would seem to be. Such trees as preserved their foliage presented no abnormal appearance on the branches, &c., notwithstanding which, in one or two instances, I believe the parasites were present on the leaves, though seemingly not in such extraordinary profusion.

Dugès, writing of *T. telarius*, states his belief that that species passes the winter under stones, and instances the finding of several active individuals so situated in a garden near Paris in the month of October. Regarding this point I may say that my specimens of *T. tiliarum*, which I placed in a box immediately after removal from the trees, speedily ensconced themselves in the most convenient nooks and crannies, in which they spun fine webs. It may be worth noting that the days on which my observations were made were warm and damp, with scarcely any wind, quite typical early autumn days in fact.

F. R. ROWLEY.

Leicester Museum.

Retarded Germination.

I SHALL be much obliged to any of your readers who can give an explanation of the probable cause of the above phenomenon, which I have remarked this year. I sowed a number of patches of seeds of various hardy annuals in the garden in the last week of April; about half of them came up after the usual interval, strongly and regularly. Such were *Calendula Pongetii*, *Convolvulus minor*, *Lavatera trimestris*, *Collinsia bicolor*, *Iberis* white and red, *Specularia perfoliata*, *Linum rubrum*, &c., &c. Then there were some of which a few scattered seedlings made their appearance at this time, and after an interval of about six weeks the greater part of them also came up; among these were *Eutoca viscidula*, *Nigella damascena*, *Sphenogyne*, and *Clarkia pulchella*. Thirdly, there were some of which I quite despaired; mignonette, however, appeared thinly about the end of June, and at intervals till August; and in the middle of June a few plants (in proportion to the seed sown, a few) of *Linaria bipartita*, *Madia elegans*, and *Xeranthemum* came up—one consequence being that the last named has not yet flowered. Some of the seeds were obtained this spring from seedsmen, some were my own collection of the last year or two—of the latter were *Calendula*, *Lavatera*, *Convolvulus*, *Specularia*, *Eutoca*, *Nigella*, *Sphenogyne*, and mignonette—so that cannot be said to give any clue. The conditions for germination and growth were favourable, and the season also. I have never remarked before any annuals so long in appearing above ground; though in some herbaceous plants I have noticed it, e.g. *Gaillardia*, *Myosotis alpestris*, and *Anemone coronaria*. E. A.

Herefordshire, September 19.

The Relation of the Soil to Tropical Diseases.

AS a humble subscriber to and student of NATURE, will you bear with me while I ask your help, as shortly and plainly as I can? I am in a very secluded corner of one of the Native States of Rajpootana, and I am collecting facts and making observations on the relation of the soil to tropical diseases; my ambition being to discuss it not so much from a statistical and geographical standpoint, as from the geological, in its chemical and biological

aspects; though, as I conceive, the geographical, climatological, and geological elements in the problem are not to be arbitrarily distinguished. Now I am far away from all books of reference, and it is of course essential that I make myself acquainted with what has already been done in these subjects, and I venture to ask for any hints as to the bibliography of them. Can you tell me if anyone has done for geology what Hirsch, of Berlin, has done for geography (in his work on the distribution of disease)? Is there any authority on the chemistry of soils, and what I roughly call their physiology and pathology, their structural and functional changes under influences—climate notably—and their own intrinsic, and the deeper geological interactions?

A. ERNEST ROBERTS.

Meywar Bheel Corps, Kherwara, Central India,
September 9.

The Earthquake of Tokio, April 18, 1889.

DR. VON REBEUR-PASCHWITZ's letter, which appeared in *NATURE*, vol. xl, p. 294, is of special interest to us in Japan, countenancing as it does the conjecture that the very peculiar earthquake felt and registered here on April 18 was the result of a disturbance of unusual magnitude. It was my good fortune on the day in question to be engaged in conversation with Prof. Sekiya in the Seismological Laboratory at the very instant the earthquake occurred. We at once rushed to the room where the self-recording instruments lay, and there, for the first time in our experience, had the delight of viewing the pointers mark their sinuous curves on the revolving plates and cylinders. At first sight it seemed as if the pointers had gone mad, tracing out sinuosities of amplitudes five or six times greater than the greatest that had ever before been recorded in Tokio. There was not much sensation of an earthquake; indeed, after the first slight tremor that attracted our attention, we felt nothing at all, although in the irregular oscillations of the seismograph pointers we had evidence enough that an earthquake was passing. Very few in Tokio were aware that there had been an earthquake till they read the report of it in the next day's papers. Thus the motion, though large, was too slow to cause any of the usual sensations that accompany earthquakes, and suggested a distant origin and a large disturbance, with a consequent wide extension of seismic effect. Excepting the slight tremors recorded at Potsdam and Wilhelmshaven, there has been, so far, no evidence of any such far-reaching action.

My object in writing this note, however, is to correct an error of calculation which Dr. von Rebeur-Paschwitz has unwittingly made. He has assumed that Tokio standard time is mean local time. On the contrary, the standard time for all Japan is the mean solar time for longitude 135° E.,—that is, nine hours in advance of Greenwich mean time. Hence, instead of the Tokio earthquake having preceded the German disturbance by 1h. 4'3m. it preceded it by only 45m. This correction increases the velocity of transmission to 3060 metres per second. We must assume, then, either that large disturbances in the heart of the earth travel with exceptionally high speeds, or that the origin of the disturbance was a considerable distance from Tokio. The latter assumption seems sufficiently satisfactory, if in other respects Dr. von Rebeur-Paschwitz's views meet with approval.

CARGILL G. KNOTT.

Imperial University, Tokio, Japan, September 25.

A Brilliant Meteor.

YESTERDAY evening, November 4, at 7.55 p.m., I was fortunate enough to observe a very brilliant meteor. It became visible almost exactly at the zenith, or a little west of it, and moved, as nearly as I could judge, due east, magnetic; it remained visible for about from one to two seconds, disappearing, finally, rather low down on the eastern horizon. For the first half of its journey it was of a dazzling white brightness, and then it suddenly became a dull red spark. The light emitted from it when brightest reminded me of the light from an arc lamp, and was very much brighter than any of the fixed stars.

As it was so short a time in view, and there were no stars visible, I could only approximately estimate its point of appearance and path. There were a few clouds about, mostly in the west, and the moon was behind them.

WARWICK SCHOOL, November 5.

PAUL A. COBBOLD.

ON THE HARDENING AND TEMPERING OF STEEL.¹

II.

THE following considerations appear to have guided Osmond in beginning his investigations (see *ante*, p. 16). Bearing in mind the fact that molecular change in a body is always accompanied by evolution or absorption of heat, which is, indeed, the surest indication of the occurrence of molecular change, he studied with the aid of a chronograph what takes place during the slow cooling and the slow heating of masses of iron or steel, using, as a thermometer to measure the temperature of the mass, a thermo-electric couple of platinum and of platinum containing 10 per cent. of rhodium, converting the indications of the galvanometer into temperatures by Tait's formulæ.

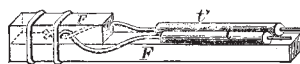


FIG. 5.

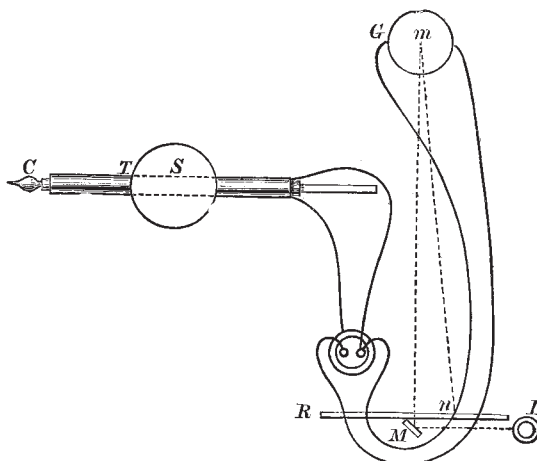


FIG. 6.

FIGS. 5 and 6 show the actual mode of conducting the experiments. F (Fig. 5) is a piece of steel into which a platinum-rhodium couple, t, t' , is fixed. It is inclosed in a glazed porcelain tube and heated to bright redness in the furnace, S (Fig. 6). This tube, T, may be filled with any gaseous atmosphere. C is a bulb filled with chloride of calcium. The metal under examination is slowly cooled down. The wires from the thermo-couple pass to the galvanometer, G. The rate of cooling of the mass is indicated by the movement of a spot of light from the galvanometer mirror at M, on the screen, R, and is recorded by a chronograph. The source of light is shown at L; M is a reflector.

In the next diagram (Fig. 7) temperatures through which a slowly-cooling mass of iron or steel passes, are arranged along the horizontal line, and the intervals of time during which the mass falls through a definite number (6'6) of degrees of temperature are shown vertically by ordinates. See what happens while a mass of electro-deposited iron (shown by a dotted line), which is as pure as any iron can be, slowly cools down. From 2000° to 870° it falls uniformly at the rate of about 2.2° a second, and the intervals of temperature are plotted as dots at the middle of the successive points of the intervals. When the temperature falls down to 858° , there is a sudden arrest in the fall of temperature, the indicating spot of light, instead of falling at a uniform rate of about 2° a second, suddenly takes 26

¹ A Lecture delivered on September 13, by Prof. W. C. Roberts-Austen, F.R.S., before the members of the British Association. Continued from p. 16.