

electrical radiations, and shows that the solar phenomena may be similarly explained. The presence of helium as a prominent solar element is taken as evidence of the presence in the sun of the radio-active elements from which the β and γ rays may emanate. The monograph is published by W. P. van Stockum et Fils, The Hague.

PAPERS ON INVERTEBRATES.

IN the Records of the Indian Museum for May (vol. vi., part 2), Dr. N. Annandale describes certain curious masses dredged in the Bay of Bengal, which on examination proved to be sponges associated with gregarious molluscs of the family Vermetidæ, the latter being embedded in the former. The masses, which were in a bad state of preservation, are of two types, one consisting of shells with serrated ridges embedded in moderately hard black sponges, and the other of smoother shells associated with stony sponges, ranging in colour from red to yellow. The ridged shell is *Siliquaria muricata*, and the associated sponge *Spongorocites topsenti*. The second type comprises two molluscs, *Spiroglyphus cummingi* and *Siliquaria cochlearis*, the associated sponges being two forms of *Racodiscula sceptrifera*, which differ from one another in colour. When fresh, the masses of the second type must have had a brilliant appearance, the sponge being red or orange, the shells pink, and the soft parts of the molluscs yellow. Both the two sponges associated with the three Vermetidæ are found elsewhere growing alone.

In two issues of the Proc. U.S. Nat. Mus. (Nos. 1823 and 1826), Mr. Paul Bartsch catalogues the recent and fossil representatives of the molluscan genera Cerithiopsis and Bittium from the west coast of America; and in No. 1820 of the same serial Messrs. Dall and Bartsch describe several new shells from Bermuda, including some of the aforesaid Cerithiopsis.

Variation in certain Jamaican species of land-snails of the genus Pleurodonta (or Pleurodonta) forms the subject of a paper by Mr. A. P. Brown in the Proceedings of the Philadelphia Academy for February, 1911. Variation in the height of the spire indicates two waves of migration into the district from the north, the first being probably represented by an extinct race from near Somerset. In analogous cases the variation in the height of the spire has been attributed to difference of atmospheric pressure according to altitude, tall-crowned forms being found high up, and *vice versa*. But, as Mr. Brown points out, this cannot be a *vera causa*, the diurnal oscillations in pressure at a given point being in some parts of the island more than equal to variation due to altitude. Moreover, in one at least of the mountain forms, increase in spire-height is accompanied by a diminution in the size of the shell. In the author's opinion, such variations are mainly controlled by local differences in humidity.

In the same serial for March, Messrs. Pilsbry and Ferriss continue their review of the land-shells of the south-western United States, dealing in this instance with those of the Grand Canyon and northern Arizona. The molluscan fauna of the Grand Canyon consists, with one exception, of northern Arizona types; but the canyon forms an impassable barrier to Oreohelix, of which distinct species are found on its two sides.

Certain features in regard to the vertical distribution in the San Diego area of the minute translucent crustacean *Eucalanus elongatus* (a relative of the better-known *Calanus finmarchicus*) are discussed by Mr. C. O. Esterly in vol. viii., No. 1, of the Zoological Publications of the University of California. Despite considerable hourly variation in the numbers taken in plankton, it does not seem that the species performs diurnal vertical migrations; and the reason for the numerical variation is therefore still unknown. The author is led to suggest that diurnal vertical migrations may have in part a protective object in many species, seeing that *Eucalanus* is adapted in other ways to life in the plankton.

How much remains to be done in connection with South African earwigs is made evident by the fact, as recorded by Dr. M. Burr in vol. x., part i., of the Annals of the South African Museum, that out of nineteen species from the districts south of Rhodesia, no fewer than seven proved to be new. One of these is assigned to Apterygida,

a genus, as now restricted, previously known only by *A. alpipennis* of Central Europe.

The lug-worms (Arenicolidæ) of South Africa are discussed by Dr. J. H. Ashworth in vol. xi., part i., of the same serial. The special interest of this article is the record of the rediscovery of *Arenicola loveni*, a species hitherto known solely by a specimen from Natal preserved in the Riksmuseum at Stockholm, and described by Kinberg in 1866. An examination of the internal organs of this specimen, supplemented by others recently obtained by Dr. Gilchrist at Saldanha Bay, Cape Colony, shows that the reference of the species to the typical genus is correct.

The one article in vol. iv., No. 7, of Records of the Indian Museum is devoted to the description, by Mr. E. Brunetti, of nearly fifty new Oriental flies of the group Nemocera.

To *Biologisches Centralblatt* for July 1 the Rev. Father Wasmann contributes the first part of a critical review of Escherich's "Termitenleben auf Ceylon."

In vol. xxxiii., No. 4, of Notes from the Leyden Museum Dr. R. Horst revises the characters of the genus *Notoptygos*, typified by an amphinomid worm from St. Helena described by Grube in 1855. The special feature of the genus is the dorsal position of the vent, some distance in advance of the terminal segment. Shortly afterwards Grube referred to the same genus a Costa Rican annelid, mentioning the presence of two dorsal cirri. In 1857 Kinberg, who was apparently unacquainted with the account of this second species, diagnosed the genus as having a single cirrus, making no mention of the dorsal position of the anus. He also referred two annelids, respectively from Tahiti and Panama, to the new genus *Lirione*, on account of the presence of a pair of dorsal cirri. Apparently the single cirrus specimens, which were from St. Helena, did not belong to *Notoptygos*, of which *Lirione* is now shown to be a synonym. The genus is now known from St. Helena, Costa Rica, Florida, Bermuda, Malaya, the Amirante Isles, and Australia.

In No. 1846 of the Proceedings of the U.S. National Museum Mr. E. Kirk discusses the relationships, classification, and genealogy of certain "Eleutherozoic Pelmatozoa," in other words, of free-living echinoderms of the cystid and crinoid groups. "With the possible exception of the Holothuroidea, we may hold," writes the author, "that such eleutherozoic echinoderms as are known to us have been derived from stazoic ancestors. . . . In the case of the eleutherozoic forms we have one newly acquired set of tendencies superimposed upon another set. These secondary tendencies, induced as they are by a form of life widely at variance with that under which the first set operated, tend to vitiate the force of many of the primary tendencies, if not indeed to nullify some of them. . . . Such being the case, one's efforts to establish relationships among these aberrant forms are apt to be unsatisfactory at best. In many cases, however, the eleutherozoic Pelmatozoa stand so near the point of inception of their several lines that the problem is not greatly complicated by the presence of altered or superimposed structures." Nevertheless, the classification and grouping adopted in the paper are admittedly artificial and arbitrary.

THE FOSSIL ELEPHANTS OF RUSSIA.¹

ALTHOUGH a fine series of elephant remains from Tiraspol, Government of Kherson, preserved in the Geological Museum of Moscow University, forms the basis of Madam Pavlov's monograph, the author has examined several other collections, such as one from Kouialnik, near Odessa, and a second at Kief. The Tiraspol elephant has been identified with that form of the mammoth distinguished, on account of the thicker plates of its molars, as *Elephas trogontherii*, and characteristic of the horizon of the Cromer Forest-bed. Madam Pavlov finds, however, that in the Tiraspol molars the plates are still thicker, and accordingly regards them as representing a new species—*E. wüsti*, or *wuesti* as it

¹ "Les Éléphants Fossiles de la Russie." By Marie Pavlov. Pp. iii+60+3 plates. Nouveaux Mémoires de la Société Impériale des Naturalistes de Moscou, tome xvii, livraison 2. (Moscow, 1910.)

should be spelt—which is considered to connect the typical mammoth by means of *E. trogontherii* with the broad-plated *E. meridionalis* of the Val d'Arno and Forest-bed. Two molars from Tiraspol are stated to approximate respectively to those of *E. armeniacus* and *E. antiquus*, but it is scarcely likely that three more or less closely allied forms occur in one deposit. *E. trogontherii* is recorded from Nijni-Novgorod, *E. meridionalis* from Kowialnik, and the typical *primigenius* from a prehistoric station at Kievo-Kirilovskaia. Finally, a molar from Tiraspol and a second from Bessarabia are respectively compared with those of the Siwalik *E. hysudricus* and *E. planifrons*.

The important part of Madam Pavlow's paper is, however, contained in the discussion as to the mutual relationships of the various species and races. After noting the resemblances between *hysudricus* and *meridionalis* on one hand and *antiquus* and *namadicus* (which some naturalists regard as inseparable) on the other, the author suggests that *meridionalis*, by an increase in the number and degree of compression of its molar plates, passed by means of *wüsti* and *trogontherii* into the mammoth, which died out without descendants. On the other hand, a thin-plated phase of the *meridionalis-hysudricus* group appears to have given rise to *antiquus* and *namadicus*, while the latter in turn produced the modern Indian elephant. The idea that *antiquus* was the ancestor of the living African elephant is considered improbable.

The main objection to these views appears to be the phylogenetic separation of the Indian elephant from the mammoth, the two being closely connected by the so-called *E. armeniacus*, which was probably the animal hunted by Thothmes III. in Mesopotamia. Moreover, the suggestion that *E. namadicus* (= *antiquus*) was the parent of the Indian species is unlikely on account of the peculiar form of the forehead in the extinct species. That the *meridionalis-hysudricus* line gave origin to the Indian elephant, and that the mammoth branched off from the same stock, perhaps, as Dr. Andrews has suggested, by way of *armeniacus*, is a far more probable supposition, and one that fits in with all the facts. In regard to the African elephant, there is a general tendency to connect it with *antiquus*, Dr. Andrews even going so far as to suggest ("Guide to Elephants in Brit. Mus.," p. 42) that the narrow-toothed form of the latter may have been the actual ancestor, or at all events nearly related to the ancestor, of the existing species, although in a previous passage (p. 39) he states that *antiquus* is unlikely to have given rise to descendants.

While venturing to dissent in some degree from her theoretical views, I may conclude by expressing appreciation of the value of the work of Madam Pavlow, as it is only by means of such investigations that we can hope to solve the riddle of the elephants. R. L.

WORK OF THE PHYSIKALISCH-TECHNISCHE REICHSANSTALT IN 1910.

THE subjoined notes, based upon the annual report of the above institution for last year, indicate a few of the more important researches, &c., undertaken.

One of the chief researches was the joint work carried out at the Bureau of Standards, Washington, in conjunction with representatives of the English, French, and American standardising laboratories, the most important portion of this work being the determination of the value of the E.M.F. of the Weston normal cell. This was found to be 1.0183 international volts at 20° C. within limits of 1/10,000, agreement being secured in this respect among the countries mentioned. The value given has therefore been accepted in Germany as from January 1 last.

A research on the specific heat of gases at low temperatures by the continuous-flow method has been made. In using this method, a measured quantity of energy C^2R is conducted electrically to a gas passing through a tube at a constant rate of flow. If the temperature-difference dt between inflowing and outflowing gas is known when the stationary state has been attained, as also the quantity of gas Q flowing through the calorimeter in a certain interval of time, then $\frac{1}{J} \cdot \frac{C^2R}{Qdt}$ is the specific heat of the gas pro-

vided no thermal loss takes place, J being the mechanical equivalent of heat.

In the course of the ordinary conductivity tests on copper carried out during the last few years, it has been found that with great approximation proportionality exists between temperature coefficient and electrical conductivity, i.e. that a very approximate formula was $\alpha_{15} \cdot c_{15} = \text{const.}$ (α_{15} temperature coefficient, c_{15} specific resistance in ohms m/mm^2 at 15° C.). The mean value for all types of copper tested at the Reichsanstalt since 1905, for the constant, is $6.7 \cdot 10^{-5}$. The same relation seems to hold—of course, with other values for the constants—for aluminium and iron. A similar relation has been found by Dellinger at the American Bureau of Standards.

The investigation into the variation of wire resistances with atmospheric humidity has been continued, and further experiments made on coils hermetically sealed in accordance with the suggestion of the Bureau of Standards. Two coils were filled with petroleum and two with paraffin oil, and sealed up, measurements being made before and after sealing. The coils filled with paraffin oil have shown good constancy, while the petroleum-filled ones have not been so constant.

A comparison has been carried out between the German standard petroleum testers and four English testers, the result being that the flash-point as given by the English instruments is, on the average, 2° C. lower than with the German instruments, the same oil being used for both.

Some comparative tests have been made on Seger cones in the electric and the ceramic furnace, the results showing that the cones collapse in the ceramic furnace at much lower temperatures than in the electric furnace of the Reichsanstalt. A definite opinion as to the reason for this difference is not pronounced.

Investigations have been instituted into the change in length of hardened steel. The twenty sets of end rods, of 10, 25, 50, and 100 mm. length, forming the basis of the experiments, were again measured in November, 1910. The lengths of the great majority of test-pieces have become constant, four years after manufacture; the changes observed in the remainder are within small limits (fractions of a micron). The results are to be published shortly.

A series of tests have been made on the energy-loss in dielectrics. An experimental condenser was built up of ten plates of solid insulating material interleaved with copper-foil sheets, the capacity being from 0.004 to 0.01 mfd. A description of the method of testing is given, and the results up to now show that over a range of frequency 9 to 2000 periods the phase-variation in the case of some substances is only to a slight extent dependent on the frequency, while in the case of others the variation is considerable. Sometimes it was also noticed that the phase-difference depended on the voltage applied.

Numerous other researches more or less important in character were undertaken during the year, but space will not permit of describing them here. Those interested will find the report of the Reichsanstalt published in the *Zeitschrift für Instrumentenkunde* for April, May, and June.

E. S. HODGSON.

RECENT PUBLICATIONS OF ECONOMIC ENTOMOLOGY.

INSECT pests of trees and crops demand constant attention on the part of the expert, and a very voluminous literature is growing up round the subject. Few laboratories are more prolific in published papers than those of the Bureau of Entomology of the United States Department of Agriculture. Among recent papers, we note one by F. M. Webster on the alfalfa weevil (*Phytonomus murinus*, Fab.), a pest introduced from Europe or North Africa some six years ago, and now spreading somewhat widely in Utah, and another paper by the same author on the lesser clover-leaf weevil (*P. nigrirostris*, Fab.), an insect introduced probably fifty years ago, but not very common even yet; it suffers from at least two parasites, a small Tachinida and a fungus, *Empusa sphaerosperma*. The broad-nosed grain weevil (*Caulophilus latinasus*, Say) is described by F. H. Chittenden, and also the long-headed flour beetle (*Latheticus oryzae*, Waterh.); both are found