a central body, but he finds that there are several details that are difficult to explain which will perhaps be cleared up when more material has been collected.

THE WAVE-LENGTHS OF CERTAIN IRON LINES.—It is important for the accurate determination of wave-lengths in a spectrum to have available a large number of standard wave-lengths well distributed over the whole length of the spectrum. The work which the Solar Union initiated in this respect has been most valuable, and the task of determining more constants and of securing greater accuracy is no light one. By the aid of a grant of the Martin Kellogg fellowship in the Lick Observatory and of the generosity of MM. Buisson and Fabry, who placed the necessary apparatus and also constant help and advice at his service, Mr. Keivin Burns has been able to make a series of interference measures of standards in the iron spectrum between the limits λλ5434A and 8824A. The results of this research are recorded in Lick Bulletin, No. 233, and, in addition to the international standards already determined between the above-mentioned limits, he has added another one hundred and nineteen lines in regions which were lacking in international standard lines. Small discrepancies in different measures of some standard lines have led to the consideration of their variability of wave-length. Mr. Burns has had access to the manuscript of Dr. Goos, in which a special study has been made of the source of this variability, and he agrees entirely with the view, namely, that "Dr. Goos insists on the necessity of determining exactly what conditions the arc is to used." In this journal for September 11 last, further details will be found regarding the specified conditions for the determinations of further standards which were recommended by the committee of the Solar Union on standard wave-lengths at the recent meeting in Bonn.

THE ANTIQUITY OF MAN IN SOUTH AMERICA.[1]

THE problem of the antiquity of man in South America has given rise to many papers and much discussion in various languages, and it became necessary for a trained anthropologist and geologist to study on the spot the human remains and the exact mode of their occurrence. Dr. A. Hrdlička was undoubtedly the anthropologist best fitted for the investigation, as he has an unequalled knowledge of the physical anthropology of the American Indian and had already summarised his own investigations on the antiquity of man in North America in Bulletin 33 of the Bureau of American Ethnology (1907), where he states his conclusion that "no human bones of undisputed geological antiquity are known," and that the remains exhibit a "close affinity to or identity with those of the modern Indian."

Mr. Bailey Willis, of the U.S. Geological Survey, who had done important work on the loess and related formations in North America and China, accompanied Dr. Hrdlička to Argentina in May, 1910. The Argentine men of science received them very cordially, and facilitated their work. Most of the specimens they were to examine had been described by Prof. F. Ameghino, to whose energy and enthusiasm South American palæontology owes so much, and it must have saddened his last hours to know—if indeed he admitted it—that zeal is a poor substitute for knowledge when the details of human anatomy are in question.

Mr. Bailey Willis gives an excellent account of the geology of central eastern Argentina, more especially of the Pampean terrane, which is a remarkably uniform deposit of fine-grained earth, probably an eolian formation of desert plateau origin, transported by rivers to the lowlands, but during arid episodes the alluvium was partially converted into eolian loess. There is no evidence at present that man lived during Pampean times, but his remains have been found in the Upper Pampean and Post Pampean, also mainly eolian loess formations, which lie in hollows sculptured in the surface of the Pampean, also in many cases there is a distinct unconformity beneath the deposits of the Upper Pampean. A great deal has been written about the *tierra cocida*, or burnt earth which occurs in the Pampean terrane at various horizons; many of these may have been due to the burning of grasses, but there is nothing to connect the burnt earths of the Pampean with man.

Messrs. F. E. Wright and C. N. Fenner present details of their petrographic studies of specimens of the loess, tierra cocida, and scoriæ. They state that many specimens of tierra cocida are so large and compact that one is forced to assume long-continued and confined heating at a fairly high temperature, such as would be encountered near the contact of an intrusive igneous or volcanic mass, but not beneath an open fire made of grass or small timber.

Dr. Hrdlička discusses the peculiar stone industries of the Argentine coast. Ameghino considered that the "split-stone" industry "is in certain respects more primitive than that of the eoliths of Europe," referring it to the Middle Pliocene, and that it was preceded by a "broken-stone" industry. Dr. F. F. Outes denied the distinctiveness and great antiquity of these techniques, and Hrdlička confirms him. Dr. W. H. Holmes supplies a valuable critical study of the stone implements collected by the expedition, which should be read by European archæologists, as it contains information of general interest.

The greater part of the book consists of a discussion by Dr. Hrdlička of the human remains; his system is to note the history and earlier reports, then to give the result of his own examination, and to conclude with critical remarks. He first deals with the dolichocephalic skulls found in the caves at Lagoa Santa, Brazil, and states that there is no evidence that they belonged to a race which lived contemporaneously with the extinct species of animals found in the same caves. Similarly the Carcarañia, Rio Negro, Saladero, Fontezuelas, and other remains have no solid claims to geological antiquity. The *Homo caputinclinatus* and *H. sinemento* of Ameghino prove to be skulls of ordinary Indian type, with no title to antiquity; the same holds good for *H. (Prothomo) pampaeus*, despite Ameghino's statement that it is the "earliest human representative—if not even a predecessor of man." Concerning the fragmentary calvarium, *Diprothomo platensis*, of reputed Lower Pliocene origin, Hrdlička supports Schwalbe's statement that "all the features dwelt upon by Ameghino are referable to a *wholly false orientation* of the specimen." Bailey Willis cannot give his support to the statement that the calvarium was really dug out of undisturbed ancient Pampean. Finally, the atlas and femur of *Tetraprothomo argentinus*, of supposed Upper Miocene age, have been subjected to a searching analysis by Hrdlička, with the result that there is nothing to distinguish the former from the atlas of a modern Indian, and the femur is that of a carnivore, probably of an extinct form of one of the Felidæ. Bailey Willis "does not consider the age of the so-called Monte Hermoso formation [in which the remains were found] definitely established," nor does he "attach any significance to

[1] "Early Man in South America." By Ales Hrdlička, in collaboration with W. H. Holmes, Bailey Willis, Fred E. Wright, and Clarence N. Fenner. Pp. xv+405+68. (Smithsonian Institution, Bureau of American Ethnology, Bulletin 52. Washington, 1912.)

the occurrence of burnt earth as an evidence of man's existence in the Miocene (?) 'Monte Hermosean.'" "The conclusions of the writers with regard to the evidence thus far furnished are that it fails to establish the claim that in South America there have been brought forth thus far tangible traces of either geologically ancient man himself or of any precursors of the human race." A. C. HADDON.

PAPERS ON INVERTEBRATES.

UNUSUAL interest attaches to the description by Dr. A. Brinkmann, in the *Bergens Museum Aarbok* for 1912, part 3, of a new genus and species of deep-sea nemertine worm—*Bathynectes murrayii*—which differs from all previously known forms in the external position of the male genitalia. A single example was obtained so long ago as 1895, while sixteen others were collected by the *Michael Sars* in 1910. The length of females ranges from 43 to 61 mm., with a breadth of from 7·5 to 10 mm., but males are considerably smaller. Although the new organism, of which figures are given, represents an entirely new type, it forms in some degree a connecting link between Planktonemertes and Nectonemertes.

In connection with the above may be noticed a paper by Dr. M. v. Gedroyc, in *Bull. Ac. Sci. Cracovie* for February, 1913, on certain new European leeches, referred to the genera Trocheta and Hæmentaria, special interest from a distributional point of view attaching to the second determination, owing to the fact that while the genus was originally described from South America, it is now known to occur in the United States, Canada, Lapland, and Poland.

The death-feigning instinct (*Katalepsie*) among stick-insects (Phasmidæ), as exemplified by the species *Cerausius morosus*, forms the subject of a very interesting article by Mr. Peter Schmidt in *Biol. Centralblatt* of April 20. These insects, it appears, are extremely prone to assume the cataleptic phase, and may do so in almost any pose—sometimes lying flat on one side, with the limbs and antennæ stretched out parallel with the body, sometimes with the legs straddled outwards and the head and thorax raised, and at other times standing on the head. As these insects are specially modified to imitate vegetation, it seems that the cataleptic condition is another adaptation—of the muscular and nervous structures—to the same end.

The beetles, spiders and scorpions, earwigs, and flies collected during the Abor Expedition of 1911–12 form the subject of four articles by specialists in part 2 of vol viii. of Records of the Indian Museum, a number of new forms being described. In vol. iii., part 4, of Annals of the Transvaal Museum, Mr. L. B. Prout and Mr. E. A. Meyrick respectively describe new local Geometridæ and Micro-Lepidoptera.

We have received a copy of a concise "Synopsis of the Classification of Insects," drawn up by Prof. Maxwell Lefroy, and published by Messrs. Lumley, of Exhibition Road, at the price of one shilling. The arrangement of the orders is the one adopted by Messrs. Sharp and Shipley, and a brief, but apparently sufficient, definition is given of each order and family. The lack of an index is a decided drawback to the value of the work.

To the May number of *The Entomologist's Monthly Magazine* the Hon. Charles Rothschild contributes a note on the extremely rare bugs of the genus Cacodemus, which are parasitic on Old World bats. Three species are mentioned, one from South Africa, a second from India, and a third of which the home is at present unknown. Mr. Rothschild, it may be added, employs the name Clinocoridæ for the bugs, whereas Prof. Lefroy, in the synopsis just mentioned, uses Cimicidæ. R. L.

THE BRITISH ASSOCIATION AT BIRMINGHAM.

SECTION D.

ZOOLOGY.

OPENING ADDRESS BY H. F. GADOW, F.R.S., PRESIDENT OF THE SECTION.

"ADDRESS your audience about what you yourself happen to be most interested in, speak from the fullness of your heart, and make a clean breast of your troubles." That seemed good advice, and I shall endeavour to follow it, taking for my text old and new aims and methods of morphology, with special reference to resemblances in function and structure on the part of organs and their owners in the animal kingdom. First, however, allow me to tell you what has brought me to such a well-worn theme. Amongst the many impressions which it has been my good luck to gather during my travels in that enchanting country Mexico are the two following:—

First, the poisonous coral snakes, Elaps, in their beautiful black, red, and yellow garb; it varies in detail in the various species of Elaps, and this garb, with most of the variations too, occurs also in an astonishing number of genera and families of semi-poisonous and quite harmless Mexican snakes, some of which inhabit the same districts. A somewhat exhaustive study of these beauties has shown incontestably that these often astoundingly close resemblances are not cases of mimicry, but due to some other cooperations.

Secondly, in the wilds of the State of Michoacan, at two places, about twenty and seventy miles from the Pacific coast, I myself collected specimens of Typhlops which Dr. Boulenger without hesitation has determined as *Typhlops braminus*. Now, whilst this genus of wormlike, blind little snakes has a wide circumtropical distribution, *T. braminus* had hitherto been known only from the islands and countries of the Indian Ocean basin, never from America, nor from any of the Pacific Islands which possess other kinds of Typhlops. Accidental introduction is out of the question. Although the genus is, to judge from its characters, an especially old one, we cannot possibly assume that the species *braminus*, if the little thing had made its way from Asia to Mexico by a natural mode of spreading, has remained unaltered even to the slightest detail since that geological epoch during which such a journey could have taken place. There remains the assumption that amongst the of course countless generations of Typhlops in Mexico some have hit off exactly the same kind of permutation and combination of those characters which we have hitherto considered as specific of *braminus*, just as a pack of cards may in a long series of deals be dealt out more than once in the same sequence.

The two cases are impressive. They reminded me vividly that many examples of very discontinuous distribution—which anyone who has worked at zoogeography will call to mind—are exhibited by genera, families, and even orders, without our knowing whether the groups in which we class them are natural or artificial. The ultimate appeal lies with anatomy.

Introduced to zoology when Haeckel and Gegenbaur were both at their zenith, I have been long enough a worker and teacher to feel elated by its progress and depressed by its shortcomings and failures. Perhaps we have gone too fast, carried along by methods which have yielded so much and therefore have made us expect too much from them.

Gegenbaur founded the modern comparative anatomy by basing it upon the theory of descent. The leading idea in all his great works is to show that transformation, "continuous adjustment"