garded, by all who believe the Darwinian factor to be operative in organic evolution, as transmissible. In a later number of the American Naturalist (vol. li., pp. 250-56) Dr. W. H. Longley has criticised Dr. Pearl's argument, expressing the opinion that "neither genetic research nor studies upon elimination closely limit the possibility that selection has played a very important part in evolution. . . . Recent field studies demonstrate novel facts of common occurrence which must apparently be ascribed to the action of this factor." G. H. C.

TERRESTRIAL MAGNETISM.

ON the occasion of the centennial celebration of the United States Coast and Geodetic Survey, held in April, 1916, Dr. L. A. Bauer delivered an address on the work done by the Survey in terrestrial magnetism, which has now been separately published. Dr. Bauer was himself in charge of the magnetic work of the Survey from 1899 to 1906, and was largely responsible for its greatly increased activity during the present century. Up to the end of 1915 the Survey had made magnetic observations at 5500 land stations, and its ships had taken many observations at sea, while five magnetic observatories were in constant operation. Magnetic charts of much increased accuracy had been published for the United States, and a reduced copy of the chart for 1915 is included in the publication. Dr. Bauer advocates the erection of a new magnetic observatory in the Panama zone, and the uninterrupted maintenance of the existing observatories for a number of years. He expresses some in-teresting opinions as to the relative importance of theory and observation, which, coming from a man of his great experience, deserve careful consideration. "All experience," he says, "tends to show that, instead of looking upon the establishment of a theory as the goal of an investigation, it should ever be regarded merely as a means to the goal, the advancement of human knowledge." He speaks with feeling of the "uselessness of empirical formulæ for the purposes of prediction" (of secular change), and his final advice to the superintendent of the Coast and Geodetic Survey is

"continued, unceasing, and intelligent observation." The annual report of the director of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington for the year 1916 extends to fifty pages. It mentions that vol. iii. of the researches of the department is nearly ready, and that it will contain the final results of the ocean magnetic work from 1905 to 1914, and preliminary results of a recent cruise of the survey ship *Carnegie*, extending from March, 1915, to September, 1916. The present publication gives a good many details of this cruise. The *Carnegie* sailed in the first instance from Alaska to New Zealand, then circumnavigated the south polar regions, the track lying mainly between 50° S. and 60° S., and finally returned from New Zealand to San Francisco. Tables give full particulars of the errors observed in the Tables British, German, and American charts on the several journeys. In most areas the errors are less than 10, but in several they are considerably larger. The largest errors were observed near 59° S., 110° E. They were as large as 10° , or even 12° , in the British and American charts, and still larger in the German. The land work done in the year includes observations in South Africa, South America, China, and Australasia. The department has taken steps for the erection of a magnetic observatory about 100 miles north of Perth, Western Australia. At the end of the report is a series of abstracts of recent scientific publications by the staff of the department, including several dealing with atmospheric electricity.

AMERICAN FOSSIL VERTEBRATE ANIMALS.

A PAUSE in the discovery of strange new forms of extinct vertebrate animals in North America has attorded an opportunity for obtaining more exact knowledge of some species hitherto known only by fragments. It has also given time for a more careful consideration of the habits and affinities of several problematical types which have previously been only hastily discussed. The American Museum of Natural History, New York, has been especially active in turthering such research, and has lately published in its Bulletin four papers of more than usual interest.

It has long been known that at the beginning of the Tertiary period there were very large and stout running birds both in Europe and in America. The greater part of a skeleton of a new species of Diatryma, which was found last year in the Lower Eocene of Wyoming, shows for the first time the true nature of one of these birds. The remains, as usual, are not sufficiently well preserved to exhibit all the features that are needed for an exact systematic determination; but, according to the studies of Messrs. Matthew and Granger, Diatryma is now proved to be more closely related to the South American crane-like bird, Cariama, than to any other known form. It can no longer be associated with the ratite birds, with which the first fragments were compared. The new species, Diatryma steini, must have been about 7 ft. high when standing, with a short and massive neck and an enormous head having a high compressed beak. It would, indeed, present much the appearance of the well-known Phororhachos from the later Tertiary formations of the Argentine Republic, which is also generally compared with Cariama. The discovery of such a bird in the oldest deposits of the Tertiary period shows how early must have been the differ-entiation of the birds into the groups which are familiar at the present day.

Of the Dinosaurian reptiles with hind limbs nearly like those of running birds, much has been learned by the discovery of nearly complete skeletons in the Upper Cretaceous of Alberta, Canada. Prof. H. F. Osborn therefore takes advantage of the opportunity of discussing these in connection with the skeletons of Ornitholestes from the Upper Jurassic of Wyoming, and of Tyrannosaurus from the Upper Cretaceous of Montana. He also publishes many beautiful drawings of osteological details. The forms previously known were obviously grasping flesh-eaters; but the new Struthiomimus has a small toothless skull shaped much like that of an ostrich. Prof. Osborn, indeed, thinks it most probable that this strange reptile had the same mode of life and habits as an ostrich.

Equally great diversity is being met with among the armoured and horned dinosaurs from the Upper Cretaceous of Alberta, but all the remains hitherto described are more or less fragmentary. A nearly complete skeleton of Monoclonius, now made known by Mr. Barnum Brown, is therefore of great interest and value. Compared with the hypothetical restorations of Triceratops, the body is shorter and deeper in the posterior dorsal region, while the feet are more digitigrade with toes turning outwards, the axis of the manus being through the second digit, that of the pes being between the second and third digits. There is no bony exoskeleton, but the epidermis is hardened into low, polygonal tubercles, which do not overlap.

The gigantic herbivorous dinosaurs such as Diplodocus present as many difficulties in nomenclature as whales, and Prof. Osborn, with the help of Mr. Charles C. Mook, is now attempting to decide which characters can best be used for the recognition of

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