

ments flying into space with accelerating speed. The dissipating force, as indicated by the great prominence, lies at the surface of the sun, and may be localised in a very restricted area. The main stem consisted of a stream of rapidly moving gas, which was brilliantly luminous when it formed a continuous column, but so soon as the continuity was broken by the stoppage of the supply of gas from the chromosphere, the separate detached masses faded very rapidly. The rapid fading is probably to be explained by the extremely low density of the gas involved. Mr. Evershed argues that the density is so small that the gas can have no temperature in the ordinary sense; its emissive power will thus be dependent only on absorption of photospheric radiation, which is apparently insufficient to maintain luminosity at great heights. A remarkable feature of the great eruption was the practically simultaneous fading of the entire prominence.

COLOURS OF STARS IN GALACTIC CLOUDS.—In continuation of his work on the colours and magnitudes of stars in clusters, Dr. Harlow Shapley has determined the colours and magnitudes of 300 stars in the galactic clouds surrounding the cluster Messier 13 (*Astro-physical Journal*, vol. xlv., p. 64). A wide range of colour is apparent among these stars, and the distribution of spectral types among the 14th magnitude stars appears to be much the same in this distant galactic region as in the immediate vicinity of the sun. Stars of all colours are included in each interval of magnitude, and so far as colour is an index of intrinsic luminosity, this may be accepted as an indication of considerable difference in the distances of such stars. The wide dispersion in magnitude of both blue and red stars suggests that the extent of the stellar clouds in the line of sight is relatively very great, possibly greater than the distance to the nearer boundary. The cluster Messier 11 proves to be a physical group in the midst of the star-clouds, which on their own part have the general appearance, and some of the properties, of an enormous, but definitely outlined, physical system. There is as yet no certain evidence of the existence of dwarf stars either in the cluster or in the galactic clouds. The cluster stars are probably giants in luminosity, and the distance of the group is of the order of 15,000 light-years.

GERM-CELLS AND BODY IN INHERITANCE.

IN NATURE for March 15 of this year (pp. 55-56) some account was given of a summary of Dr. Raymond Pearl's researches on the progeny of alcoholised fowls. A later and much fuller description of this important work has now appeared in the *Journal of Experimental Zoology* (vol. xxii., 1917, pp. 125-86, 241-310), under the title of "The Experimental Modification of Germ-cells." This paper is divided into three sections, the first of which describes the general plan of the experiments, and the second the effect upon the domestic fowl of the daily inhalation of ethyl alcohol and other substances, while the third discusses the effect of parental alcoholism and certain other drug intoxications on the progeny. The general results of the experiments have already appeared in NATURE (*loc. cit.*). Dr. Pearl alcoholised his fowls by inhalation because the birds refused to drink alcohol, even if highly diluted; Prof. Stockard had previously found it impossible to administer alcohol to guinea-pigs satisfactorily by the stomach, and had therefore also adopted the inhalation method. While the progeny of Stockard's guinea-pigs had been as a rule weakly and deformed, the offspring of Pearl's treated fowls were stronger, though less numerous, than those of his "controls."

In the case of the birds the effect of the alcohol on the germ-cells seems therefore to have been selective, whereas with the rodents it was utterly deleterious. A possible cause of the difference, which does not seem to have occurred to Dr. Pearl, may be the great contrast between the respiratory mechanism in birds and in mammals; the residual air in the lungs of the latter might be expected to increase the effect of the inhaled poison. Further, the excessive degradation of the offspring of Stockard's guinea-pigs suggests that the germ-cells of those animals are peculiarly sensitive to adverse influences.

The temptation to argue from these divergent results to the terribly practical problem of alcoholism in the human race is great, and Dr. Pearl does not altogether resist it. Clearly, however, the effect of the inhalation of ethyl alcohol by a Plymouth Rock hen, or even by a guinea-pig, cannot be closely compared with the effect of alcohol swallowed by the whisky- or beer-drinker. The latter effect can be studied elsewhere than in biological laboratories.

Another aspect of the affection of germ-cells is illustrated for plants by Mr. S. Ikeno's "Studies on the Hybrids of *Capsicum annum*," part ii., "On Some Variegated Races," in a recent number of the *Journal of Genetics* (vol. vi., No. 3). A variegated race of this species appeared in 1913 by mutation, producing, exclusively by self-fertilisation, plants which have always variegated foliage, but which differ widely in the intensity of the variegation. Self-fertilised flowers on green branches of a variegated plant yield variegateds, in the majority of which the variegation is slight. By hybridising variegated with green the degree of variegation in the offspring is diminished. Variegation is transmissible in either the male or the female line, but the transmission "is not through the nucleus, but through the cytoplasm; especially the plastids contained therein may be regarded as organs of transmission," and the author believes that some cytoplasm containing plastids may be introduced by the male gamete into the zygote. Analogous cases of plant-inheritance have been previously discussed by Correns, Gregory and others. Variegation depends upon the presence of plastids which have no power of forming chlorophyll, which may, indeed, be regarded as diseased, so that though the character is due to a kind of infection suffered by the germ-cells, it is not strictly blastogenic.

The same part of the *Journal of Genetics* contains a paper by Dr. R. Ruggles Gates on "Vegetative Segregation in a Hybrid Race of *Oenothera* (*O. rubricalyx* × *biennis*)," in which somewhat similar questions are raised. The bud-colour character shows Mendelian segregation, which may reasonably be considered dependent on normal chromosome distribution in meiosis. But in the size of petal there is a range of variation that suggests "somatic variation and segregation . . . determined by diversities appearing in nuclear or cytoplasmic material during somatic mitoses." Here, therefore, we have another example of the necessity for clearing issues in the study of inheritance.

The broader aspects of evolution are discussed by Dr. Raymond Pearl in an article entitled "The Selection Problem" (*American Naturalist*, vol. li., 1917, pp. 65-91). Insisting on the necessity of experimental proof and the determinative action of germinal characters, he concludes that "natural selection is no longer generally regarded as the primary, or perhaps even a major, factor in evolution." Yet, in stating that "natural selection is, from the point of view of modern genetics, a somatic theory," he surely goes far beyond the available evidence, and seems to ignore the principle that characters of selection-value must be re-

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 interesting 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 British, German, and American charts on the several journeys. In most areas the errors are less than 1°, 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.

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AMERICAN FOSSIL VERTEBRATE ANIMALS.

A PAUSE in the discovery of strange new forms of extinct vertebrate animals in North America has afforded 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 furthering 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 differentiation 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