characteristics of the new species make their appearance seem not without significance. In some there is an immediate and complete obliteration of the *Lamarckiana* characters, while in others, as in the 'atavism' of *O. nanella,* the new characters replace those of the old only at a later period of development. Such cases as that of *Trifolium,* in which there was a working back into the embryo of the divided condition of the leaf as the number of leaflets characteristic of the mature plants increased offer suggestion for an important phase of statistical investigation. Investigations of the seedlings of some of the teratological 'varieties' may be expected to yield results of great interest, especially when taken up from the experimental and historical point of view.

The chief object of the study of seedling stages, phylogeny, is dependent for its realization upon the validity of the recapitulation theory. In many cases this seems to hold, but, as pointed out above, a broad, comparative investigation of minor groups is imperative. Results of importance are assured. Developmental stages in the same group will generally show either a close similarity or present a series of perplexing differences. The conclusion in the one case will be that community of descent or identical environmental conditions are responsible. In the other case —and of this a considerable number of striking illustrations might be cited—polyphyletic origin of groups hitherto supposed to be monophyletic must be assumed, or the differences must be accounted for on the ground of adaptation or mutation and the importance of ontogeny as a key to phylogeny greatly restricted. With reference to seedling stages the statement that ontogeny recapitulates phylogeny must be made with great reserve. Doubtless it has here an evolutionary significance, but its application is a matter of serious import. It seems to me that in vast numbers of cases, the sweeping back of later developed characters in the nature of adaptations to environment or otherwise has obliterated ancestral features, especially the superficial ones, to such an extent that an attempt to reconstruct the phylogenetic tree is quite out of the question.

In the examination of seedling stages, experimental morphology may find, as we have already suggested above, a fertile field for research in the determination of the degree of plasticity of juvenile and adult types. Some structures seem to be merely the result of the direct environmental influence, but others can not be modified by the changing of conditions. Some characters seem to be well fixed, while others are apparently merely the product of immediate influences of the environment. While phylogeny is the chief end, experimental morphology may find in seedling stages material of value for use in the formulation and solution of some of its fundamental problems.

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Current Notes on Meteorology.

Cyclonic and Anticyclonic Temperatures.

A very useful summary of 'Various Researches on the Temperature in Cyclones and Anticyclones in Temperate Latitudes' has been prepared by H. Helm Clayton, of Blue Hill Observatory, and is published in *Beiträge zur Physik der freien Atmosphäre,* Vol. I., No. 3, 1905. It is probably known to men of science generally that one of the most interesting of present-day problems in meteorology concerns the origin of the cyclones and anticyclones which are such characteristic phenomena of the prevailing westerly wind belts, and constantly impress themselves upon us by reason of their control of our weather changes. Mr. Clayton presents an outline of the work of Hann, Dechevrens, Berson, Teisserenc de Bort, Rotch and others, including his own important results; points out the contradiction which exists between the conclusions of those who believe that cyclones are colder than anticyclones and those who find them to be warmer, and gives it as his opinion that both sets of investigators may be partly right. The author calls attention to the fact that those who have found the cyclone colder have considered the temperature in relation

to pressure without regard to time, while those who find the cyclone the warmer have, with one exception, considered the temperature with relation to the time of maxima and minima of pressure. A treatment of the data used by Teisserenc de Bort according to the method adopted by Clayton, leads the latter to results exactly the opposite of those obtained by the former.

In order to explain the results found at Blue Hill, Clayton has adopted the hypothesis that there are two causes for areas of low pressure: (1) an area of cold which contracts the air and tends to cause cyclonic circulations in the upper air, and (2) an area of warmth which expands the air and tends to cause cyclonic circulations in the lower air. These two cyclones are not necessarily connected. Both affect surface pressures, and both probably usually exist simultaneously within a few hundred kilometers of each other, and may form part of one system. The warm-air cyclone of the surface has hitherto received the most attention. In this somewhat complex relation of upper and lower cyclones, as hypothecated by Clayton, we may find a satisfactory adjustment of conflicting views.

METEOROLOGY AT COLORADO COLLEGE, COLORADO SPRINGS.

METEOROLOGY is developing under favorable auspices at Colorado College, under the direction of Professor F. H. Loud. The observatory building, erected in 1894, was the gift of Henry R. Wolcott, Esq., of Denver. There is a full equipment of meteorological instruments, some of which are exposed on the flat roof of the observatory, while others are placed on the roof of a neighboring building, east of the observatory and on higher ground. Tri-daily eye observations are made, and from the self-recording instruments the conditions at the end of each hour during the twenty-four are determined. Monthly and annual summaries for 1904 are contained in the *Semi-Annual Bulletin of the Colorado College Observatory* (*Colo. Coll. Studies;* Gen. Ser., No. 16; Science Ser., Nos. 39–41; Vol. XI., pp. 119–190; April, 1905). In addition, Professor Loud discusses the topography of the district, the diurnal changes of atmospheric conditions (illustrated by curves) and the cold wind of October 24, which came at the time of the usual morning increase of temperature and gave a daily maximum at 4 A.M. This wind, which was observed by two parties at high altitudes, began with a shallow flow of cold air from the north, in front of an approaching anticyclone. The cold stratum seems to have run beneath the quiet air of the region, lifting it and giving rise to a thin stratum of cloud which resulted from condensation by reason of ascent. Sometimes these conditions give rise to a slight fall of snow. A paper on 'The Evolution of the Snow Crystal,' by John C. Shedd, embodies some results of studies made during the winter of 1901–02 at Colorado Springs. The author believes that the primitive crystal is, for the tabular form, of the 'fern stellar' type, *i. e.,* open in structure and with many branches, while for the columnar form it is the hollow column; that the solid tabular, solid columnar or granular forms are the final forms to which all others tend, and that there are two general processes of transformation from primitive to final forms. One process is that of accretion, and the other is that of transformation, in which the losses and gains result in a change in form, but not necessarily in amount of material.

NEOLITHIC DEW-PONDS.

A RECENT study of 'Neolithic Dew-ponds and Cattle-ways,' by A. J. and G. Hubbard (London, Longmans, Green and Co., 1905), brings out some interesting evidence of the construction of dew-ponds by the early inhabitants of Great Britain. The process of construction was as follows: An exposed position where springs were absent was selected, and the hollowed surface was covered over with straw or some other non-conducting material. Over this was spread a thick layer of clay, strewn with stones. Condensation during the night from the lower air on the cold surface of the clay provided the water-supply for the pond. Springs and drainage from higher ground were avoided, because running water would cut down into the clay surface

and wet the straw. Some of these ponds, of very early date, perhaps Neolithic, are still in working order.

PILOT CHARTS OF NORTH ATLANTIC AND NORTH PACIFIC OCEANS.

THERE is much of interest to teachers of physiography and of meteorology on the monthly pilot charts of the Atlantic and Pacific Oceans issued by our Hydrographic Office. So far from containing only information for the use of mariners, there is a large amount of material which may easily be employed in school and college teaching. For example, the conditions of prevailing winds and calms; the limits of the trades; the interaction of general and local winds near the coasts of continents and islands; the distribution of fogs and many other subjects of direct meteorological interest are discussed, as well as charted, on these publications.

SUICIDE AND THE WEATHER.

M. DENIS has recently published a study entitled 'Le Suicide et la Corrélation des Phenomènes moraux en Belgique' (*Mem. Acad. roy. Belg.*), in which the relation of suicide and the weather is considered. At Brussels the number of suicides increases up to July and August, and the minimum is usually in December (*Ciel et Terre,* Vol. 26, 1905, No. 6). R. DEC. WARD.

RECENT VERTEBRATE PALEONTOLOGY.

PARTIES are now in the field from the Carnegie Museum, the Field Columbian Museum and the American Museum of Natural History. From the last institution three parties have been sent out, one to continue the work of excavation in the 'Bone Cabin' Quarry in search especially for additional skulls of dinosaurs; the second to the Bridger Eocene basin, in order to verify the stratigraphic exploration which has been done there and to complete our knowledge of certain little known forms; the third to the Laramie or Upper Cretaceous of northern Montana in search of dinosaurs. In the absence of Professor Bashford Dean in Japan, his assistant, Mr. Hussakof, is exploring several of the type localities of Devonian fishes.

Much activity is also being displayed in the arrangement of the collections in the various museums. Mr. J. W. Gidley, who resigned his position in the American Museum for an appointment as preparator in the National Museum, is completely overhauling and cataloguing the rich National Museum collection. In the Carnegie Museum the specimens are temporarily withdrawn from exhibition pending the completion of the new building. In the American Museum of Natural History the skeleton of the little Bridger armadillo *Metacheiromys* has just been placed on exhibition, while the skeletons of the Pampean horse *Hippidium,* of the Jurassic carnivorous dinosaur *Allosaurus* and of the Pleistocene mammoth *Elephas columbi,* are being prepared for mounting. Mr. Richardson, who prepared such an admirable model of *Stegosaurus* for the National Museum exhibit at the St. Louis exposition, is now preparing for a life-size reproduction of *Allosaurus* after a model by Knight from the skeleton in the American Museum of Natural History.

The principal researches in this museum at the present time are the following: Dr. O. P. Hay is monographing the Testudinata on a grant from the Carnegie Institution. Dr. E. C. Case is writing a memoir upon the Permian Pelycosauria, especially the great fin-backed lizards *Naosaurus* and *Dimetrodon,* fine specimens of which are preserved in the Cope collection in this museum; the drawings for this memoir are being made from a grant from the Carnegie Institution. Dr. W. D. Matthew has been revising the Bridger fauna, especially the Carnivora and Insectivora. Mr. Barnum Brown has completed a description of an important Pleistocene cave fauna of Arkansas. Volume II. of 'The Fossil Vertebrates in the American Museum of Natural History' has recently been issued, including forty-four collected bulletins, from 1898 to 1903, by Osborn, Wortman, Matthew, Hay, Granger, Gidley, Loomis, Brown, Lull, Gregory.

The status of the U. S. Geological Survey monographs at present is as follows: The monograph on the Ceratopsia by the late Mr. J. B. Hatcher will be published first. The