rings of Saturn. The rings differ from those of Saturn in that they were not equatorial but their center was in high northern latitude and their larger dimension was parallel to the surface of the globe. The water was frozen.

These rings gradually disintegrated into a general cloudiness. The individual particles of ice fell upon the earth as salt hail. Continental glaciers of the Pleistocene would be made of this salt hail. The copious falls of hail would be due to causes outside the area of meteoric precipitation. Such salt ice would melt at a lower temperature than fresh ice and give a greater melt volume for a given amount of transferred solar heat.

Incident to the salt content, glacial till would deliquesce and assume from the practically fluid condition its characteristic flat surface. Salt outwash water and the rivers flooded with it would kill vegetation. The exposed bare soil would be taken up by the wind and deposited as the extensive deposits of loess.

On the return of the abstracted water the oceans would regain their normal level and the present ocean currents would be set up. Normal rain would wash the salt from the land and return it to the ocean. During the abstraction the land bridges obtained.

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SOIL CORROSION

IN the present commendable movement toward the conservation of the nation's soil resources major emphasis is rightly being placed on the losses through the action of physical forces, that is, on the wastage of soil through erosion by wind and water. However, in some sections of the country soil deterioration through losses of soil organic matter, lime and plant nutrients caused by chemical actions is more important than that effected by the physical forces of erosion. The visible effect of soil degradation through chemical action is usually less spectacular than that caused by physical erosion, but it is not less real in respect to the productivity of the land. In New England, the Atlantic and Gulf Coastal Plains and other sections of the United States there are certain soil types which, on account of their high permeability, or methods of management, or both, suffer greater losses through chemical actions than by physical forces. Chemical actions which may cause soil deterioration include, among others, oxidation, hydration, carbonation and solution, all of which are, up to a certain point, helpful and desirable in the soil economy, but when unduly accelerated by certain practices or conditions are wasteful. It is in the interest of conservation in its broad interpretation to cause a reduction where possible in soil losses through chemical action and a replacement of unavoidable losses by the use of soil amendments. Soil deterioration or wastage through chemical action may be expressed by the word *corrosion,* in contrast with soil wastage by physical forces, or *erosion. Corrosion* is already in use by geologists to some extent to express virtually the same idea as that suggested.

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SCIENTIFIC BOOKS

ANIMAL GEOGRAPHY

Ecological Animal Geography. By RICHARD HESSE, W. C. ALLEE and KARL P. SCHMIDT. New York: John Wiley and Sons, 1937, pp. xiv + 597. Price, $6.00.

ANIMAL geography has been a favorite subject for research and discussion for many years, but Hesse's "Tiergeographie auf oekologischer Grundlage," which was published in 1924, was the first serious attempt to apply ecological methods, principles and facts to the study of animal distribution on a world-wide scale. Previous neglect to apply such methods and principles to the problem was due in part to the scarcity of knowledge regarding animal ecology and in part to the fact that the literature was widely scattered and difficult to obtain.

The present work is not a mere translation of Hesse's original volume, but all parts of it have been thoroughly revised and brought up to date; this revision was made necessary by the great advances that have taken place in animal ecology since 1924. Much new material has also been added, and many American examples have been used to illustrate the various ecological problems that are discussed.

The book is divided into 28 chapters, of which several of the early ones (pages 1–145) are devoted to a discussion of general subjects, such as the problems and relations of ecological animal geography, the conditions of existence, the effect of environment on distribution, barriers, geographic isolation and biotopes and biocoenoses. The later chapters, arranged in three sections (pages 146–556), deal specifically with marine, fresh-water and terrestrial animal communities and the environmental factors which affect them.

In the section on marine animals, the various chapters deal with the physics and chemistry of ocean waters, the biotic divisions of the ocean and the geographic divisions of the pelagic communities of the sea; in the latter chapter the authors discuss the tropical and polar marine communities, especially of the plankton, in relation to the differences in physical environment.

In the fresh-water section the physical and chemical factors of the environment are presented, such as the temperature, heat budgets, light penetration and oxygen tension of lake waters. These are followed by a discussion of the animal communities of running and standing waters. In the latter attention is given to the various types of lakes as well as to the life of the different zones, such as the forms that live in the shallow water, on the bottom and in the limnetic region. The unique and interesting faunas of Lake Baikal and Tanganyika receive special mention. Running waters offer a different set of environmental conditions from standing waters, and their animal communities are correspondingly different in many respects.

The third section deals with the distribution of land animals, including the various kinds of communities such as those found on dry land, in forests, in swamps, on islands and in alpine, polar and subterranean environments. The final chapter considers some of the effects of man on the distribution of other animals; the effects of deforestation, cultivation of the land, intentional and unintentional transportation of animals, as well as the pollution and artificial modification of lakes and streams, are discussed in this connection.

The book is well written and the text is illustrated with 135 figures. Extensive bibliographies are given at the ends of the various chapters. It is a very welcome addition to the literature dealing with animal distribution from an ecological standpoint.

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BIFURCATION IN SERPENTS

Axial Bifurcation in Serpents. By BERT CUNNINGHAM. Duke University Press, Durham, N. C. 1–91, fig. 1, pls. i–xii. $2.50. 1938.

MOST herpetologists are aware that for many years past dicephaly in reptiles has been one of Professor Cunningham's interests. In the present volume he brings together all the reliable records of dichotomus snakes that he has accumulated, together with the results of his own examinations and x-ray studies of much of the existing material. Grouping this material principally into three sections—those exhibiting cephalic, anterior and posterior dichotomy, he proceeds to deal with it chronologically.

Some of the citations in the historical section are very entertaining, as for example: "Also this yeere (1349) in the countie of Oxforde, nigh unto a towne called Chippingnorton, there was found a serpent having two heads, and faces like women, one being shaped after the newe tyre of that time; another after the manner of Flinder-mouse or Batte" (p. 14).

It was a surprise to this reviewer to learn that for snakes as many as 170 to 225 cases of such monstrosities are on record. Rhyne's account in 1680 of Javan two-headed nakes (p. 14) should, however, surely be referred to some such species as *Cylindrophis rufus* or *Maticora intestinalis,* which carry their tails poised like a head and in some instances have them appropriately colored.

The whole work bears such evidence of care and thoroughness that reviewers will be hard put to it to find flaws in its presentation. One might point out that the "*Coluber natrix,* taken near Drakensburg" (p. 25), if the identification is correct, is not "probably South Africa" (whose mountains are spelt Drakensberg), but Drakensburg in Hanover, Germany, where *N. n. natrix* is a common species. Similarly, as *N. s. fasciata* does not occur in Nicaragua, there is something amiss.

The concluding chapter consists of a summary and discussion as to the causative factors of dichotomy. Dr. Cunningham rejects shock or sudden change of temperature as the probable cause, considering that additional embryonic discs on a single yolk, or multiple organization centers originating from different egg nuclei, are more likely to furnish the correct explanation.

A good index and an extensive bibliography are included. An index or appendix in the nature of a systematic catalogue with modern nomenclature would have been an asset, but Professor Cunningham has furnished reasons (p. 67) for its omission. Many of the 134 figures are excellent photographic reproductions of prints from early works.

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SPECIAL ARTICLES

THE RESPONSE OF THE MYASTHENIC STATE TO GUANIDINE HYDROCHLORIDE

DALE, Feldberg and Vogt[1] in 1936 demonstrated that acetylcholine is liberated when a motor nerve to a striated muscle is stimulated and concluded that acetylcholine is essential for the transmission of motor impulses. Loewi and Navratil[2] had previously shown that physostigmine inhibits the action of enzymes which are normally present in body fluids and which hydrolyze acetylcholine to choline and acetic acid.

[1] H. H. Dale, W. Feldberg and M. Vogt, *Jour. Physiol.,* 86: 353, 1936.

[2] O. Loewi and E. Navratil, *Pflug. Arch. f. d. gesamt. Physiol.,* 214: 678 and 689, 1926.