are formed, the various segregates reproduce vegetatively, and may come to occupy large areas. Their differences, no matter how minute, are faithfully perpetuated, so that if one defines a species as a segregated type existing in nature, there may be hundreds of species of these plants. Similarly, the most minute mutations may be perpetuated, so that the segregates appear to the botanist as a crowd of excessively "difficult" species. To further complicate the matter, those "species" may apparently arise many times, in different places. "In asexual or self-fertilizing forms any gene combination is at once fixed and isolated from others, and is ready to undergo the process of testing by natural selection" (p. 319). With regard to populations, it is pointed out that isolated groups tend to be differentiated, and good reasons are given why this should be so. It is justly remarked that few if any species occupy the whole of their recorded range. They actually exist in more or less isolated colonies, where conditions are favorable to them. Thus there is a tendency to the development of local races, some of which perish while others amalgamate with adjacent races. It would probably be of value to determine, in the case of isolated races or species, whether they represent the remnants of a once widely distributed and continuous population, or whether they were colonies arising from some chance migrants. But these discussions are endless, and are cited now only to illustrate the character and value of the work reviewed.

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HERPETOLOGY

Snakes Alive and How They Live. By CLIFFORD H. POPE. Viking Press, 238 pp., illus., 1937.

THE need for popular scientific books written by competent authorities, preferably by specialists in the subjects treated, is only too well known. For the most part, the specialists either are too busy with their technical interests (or worse, with a burden of routine), or they are unable to set forth their interests in popular language. This results in a "lag" in the popular books, which ordinarily are several years behind the state of knowledge reflected in the technical literature. The present book about snakes essentially eliminates this lag. It is by a well-known specialist on the natural history of reptiles (he is the author of the monumental "Reptiles of China," published by the American Museum of Natural History), and in what is so fortunately the fashion among American museum zoologists, he has combined wide field experience with detailed laboratory studies. The book resulting is admirable from every standpoint. It is readable, and can be offered to a child or an interested amateur, with the assurance that their attention will be held. It is thoroughly reliable and up-to-date in its information, notably on such subjects as breeding habits, the development of the senses and hibernation, in which important recent advances in knowledge are incorporated. Much of this "up-to-date" information will interest professional zoologists. Thus we find the extraordinary observations of Woodward on the African night adder, which produces successive clutches of fertile eggs after removal of the male; this is in agreement with the process of fertilization in turtles, which does not seem to have attracted the attention of modern students. The interesting results of studies on the sense of smell and of the unknown function of the facial pit in the pit vipers, on which experiments have been in progress in the American Museum of Natural History, are reported by Mr. Pope from personal knowledge of the experiments and of the experimenters. The accumulated field observations on hibernation, which are highly interesting, are especially valuable, since they can not fail to stimulate much desired further observation.

Through the informal account of much of Mr. Pope's personal experience the book bears an unmistakably personal stamp, reflecting his own vivid interests. Large parts of the general chapters, however, are necessarily a compilation from a multitude of sources. On these pages, Mr. Pope mentions so many of his colleagues by name, in connection with their special interests, that the reader acquires a wide acquaintance with the modern herpetological group. The book is strongly to be recommended to school and public libraries, and it will be a valued addition to the shelf of every one interested in natural history, whether his interests be technical or amateur.

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SPECIAL ARTICLES

TROPOSPHERIC RADIO WAVE REFLECTIONS

THE brilliant auroral display observed by Mr. Ernest Cherrington, Jr.,[1] at the Perkins Observatory of the Ohio Wesleyan and Ohio State Universities during the night of August 1 and 2, 1937, has been found to check excellently with a very unusual set of observations of the reflection of radio waves from the troposphere (the C region).[2] Observations of the C region

[1] Ernest Cherrington, Jr., SCIENCE, 86: 2229, 265, September 17, 1937.

[2] R. C. Colwell and A. W. Friend, *Nature*, 137; 782, May 9, 1936; R. A. Watson-Watt, L. H. Bainbridge-Bell, A. F. Wilkins and E. G. Bowen, *Nature*, 137; 866, May