

wave marks should be noted with care. The direction of these features when successive beds show a degree of uniformity should be noted. Particular attention should be given to observing the amplitude of ripple marks, and whether they are symmetrical or asymmetrical. A great predominance of one or the other type of ripple mark may, as I have elsewhere shown,* afford conclusive evidence regarding the continental or marine origin of a set of beds. Mud cracks, rain drop impressions, and other features characteristic of the intertidal zone, should be looked for with the greatest care by the collector.

It is true that the literature treating of fossils seldom gives much data of this kind. The palaeogeographer in making use of fossils in drawing the boundaries of ancient seas, has had but little data of this class to curb his imagination or stay his hand. Structural features of comparatively recent origin have too often assumed for him a significance which they did not possess, while the really significant features indicating proximity to a shore line were neglected because unrecorded by palaeontologists and geologists.

The observation and record of the physical characters which have just been enumerated are of the utmost importance in connection with the collection of certain classes of fossils, like the eurypterids and certain fishes whose normal habitat is still a subject of discussion. It is to the careful study of the physical features of the beds enclosing such fossils that we must look for the solution of the problems relating to the character of their habitat.

Zoology gave to the world the hypothesis of evolution, but its demonstration and its actual history is the province of palaeontology. It is the privilege of the collector of fossils to assist in discovering the actual course which the steady upward trend of life has followed through the geologic ages. For the study of problems relating to orthogenesis, saltation and other elements in evolution, fossils offer a great advantage over living animals and plants. The time element in the latter is an undetermined factor, while in the geological section its value may be determined. Zoologists are too little acquainted with the excellent results which have been attained in this field through the work of such men as Waagen on mutation, Hyatt on the cephalopods, and Beecher on the evolution of spines. Only very well preserved material can be utilized in studies of this class. The collector of perfectly preserved fossils derives an added pleasure from his work through knowing that it may be of value in contributing to the solution of some of the most fundamental problems of the organic world.

*Recent and Fossil Ripple Marks (in Press).