ISSN 1063-0740, Russian Journal of Marine Biology, 2006, Vol. 32, No. 2, pp. 137–139. © Pleiades Publishing, Inc., 2006.
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HISTORY OF SCIENCE

Sven Ekman: On the 130th Anniversary of His Birth

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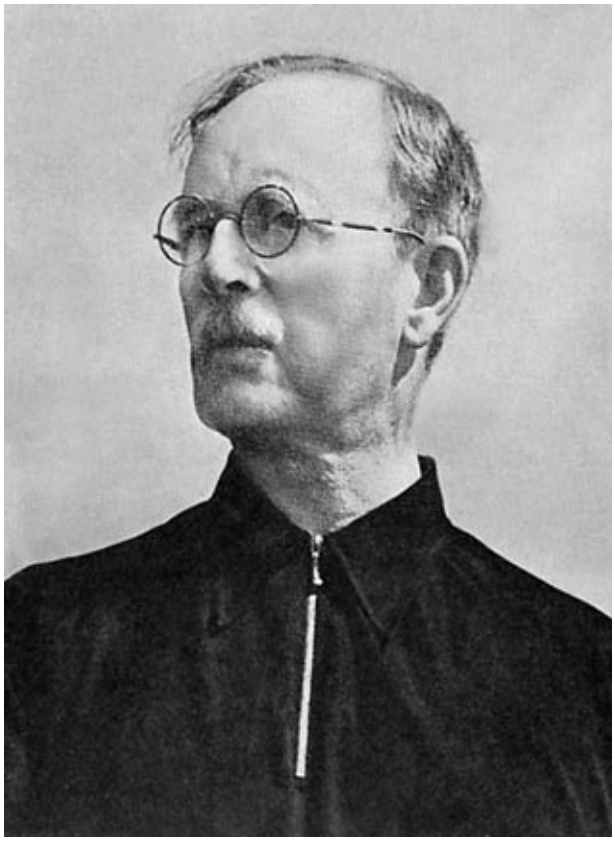
Received November 18, 2005

Abstract—This paper provides a brief review of the biogeographic concepts of the renowned Swedish biogeographer, zoologist, and limnologist Sven Petrus Ekman (1876–1964). He was the author of the first systematized treatise on historical marine biogeography (Ekman, 1935, 1953), in which he formulated the concept of the relict nature of contemporary tropical biotas derived from the Paleogene biota of the Tethys. Ekman (1915, 1920, 1935) proposed a biogeographic definition of the term "relict": *a species (or genus, etc.) is relic to a region if it is isolated here from the main center of distribution and if its presence can only be explained by the fact that either it or its ancestral form were left behind under different environmental conditions than at present.*

DOI: 10.1134/S1063074006020118



May 31, 2006, marks the 130th anniversary of an outstanding Swedish biogeographer, zoologist, and limnologist, Sven Petrus Ekman. Although Ekman provided a significant contribution to many branches of biogeography, only a few papers dealt with the analysis of his creative heritage [5, 21] and none of these papers were published in Russian. In my opinion, this occasion deserves attention as a reason to characterize briefly the major biogeographical concepts of this scientist.

Ekman lived his entire life in Uppsala. In 1895, he graduated from the university there; in 1904, he earned a Ph. D. degree; during the years 1904–1909, he worked as an Associate Professor; in 1927 he became a Professor in zoology; and, in 1964, he died, also in Uppsala.

As a zoologist, Ekman primarily specialized in studies of freshwater and brackish water crustaceans (Cladocera, free-living Copepoda, and Phyllopoda), although marine biologists throughout the world know him, first of all, as the author of "Tiergeographie des Meeres" ("Marine Zoogeography"), which was the first systematic treatise on historical marine biogeography. Better known is the English edition of this book [20]. On the title page, it is noted that Elizabeth Palmer made the translation from Swedish, implying, therefore, the existence of a preceding Swedish edition. However, this is not true. The first edition of the book was published in 1935 in German [18], whereas the English edition of 1953 was the second, supplemented and corrected authorized edition, the manuscript of which was submitted to the Editorial Board in London in Swedish. Briggs ([9], p. 4) pointed out that the edition of 1953 provided almost nothing new compared with the publication of 1935. This is definitely not true, if one checks, for instance, the significantly supplemented list of references. Ekman is also known as the editor of the Swedish edition of the extremely popular "Brehms Thierleben" ("Brehm's Life of Animals") by Alfred Brehm.

In discussing the biogeographical concepts of Ekman, one should keep in mind that he followed an absolutely faulty idea about the possibility of polytopic ("parallel") speciation as the result of similar changes in the environment [12]. In particular, the scientist was

disposed to explain in this way the presence of some forms of Arctic origin in the Caspian Sea [14], as well as the origin of some amphitropical (bipolar) geographical ranges ([20], p. 241). However, in the latter case, Ekman ([20], p. 251) clearly distinguished the concepts of "taxonomical bipolarity" and "bipolarity of analogous phenomena", i.e., what we would designate in our days as "bionomical bipolarity" [1, 2, 6].

Ekman [13, 15, 18] provided a truly biogeographical interpretation of the concept of "relict," which was previously considered mostly as a taxonomical category [24]: as groups that earlier on demonstrated great species diversity, but now consisted of relatively few species (see [3, 26]). According to Ekman (cited from [20], p. 130), the decisive criterion that determines the relict nature of a certain organism is its distribution pattern: "a species (or genus, etc.) is a relict in a region if it occurs there in isolation from its main center of distribution and if its presence can only be explained by the fact that it or its ancestral form was left behind there under different natural conditions than exist at present." In a similar way, Ekman [13] modified the concept of "pseudorelict" [25] designating the latter as taxons, which are not relicts in a certain area, but which populated this area under natural circumstances different from modern conditions. Relicts and pseudorelicts were opposed by Ekman to autoimmigrants, which were able to populate a certain area under modern natural circumstances.

Developing a hypothesis of Arambourg [7, 8], Ekman [16–18, 20] advanced a harmonious concept that the core of the modern tropical biogeographical provinces, Indo-West-Pacific, East-Atlantic, West-Atlantic and East-Pacific is composed of the relicts of Palaeogenic biota of the Tethys Sea. Although Briggs [9–11] was inclined to consider the Indo-Malayan Region (the area between the Philippines, Malacca Peninsula, and New Guinea, where the maximum species diversity of marine animals is concentrated) of the Indo-West-Pacific Province as the primary diversification center of modern tropical biotas, the concepts of Ekman are adequately explained by the model of a climatically dependent "diversity pump" [27] and corroborated by the fact that most superspecific taxons of the Indo-Malayan Region have their ancestors in Palaeogenic biotas of the Mediterranean (see [23]).

Ekman discussed numerous theoretical problems of biogeography. In particular, to compare regional faunas, he proposed a new qualitative index that later on was called Ekman's index [19] and was a modification of the Jaccard similarity index [22] (see [4]).

ACKNOWLEDGMENTS

This project was supported in part by the Far East Division of the Russian Academy of Sciences (grant no. 05-III-A-06-051).

The author is deeply indebted to colleagues from the Zoological Institute, Russian Academy of Sciences, Drs. S.D. Stepan'yants and I.S. Smirnov for bibliographic consultations.

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