

well as information. Dr. Ham has presented the voluminous material in such an understandable manner that the book is admirably adapted for use at the undergraduate level as well as in the medical school.

New features of this edition include a superb discussion of the modern concepts of the ultrastructure of protoplasm, including an excellent collection of electron micrographs; a section on microscopy, including treatment of phase contrast, interference, and electron microscopes; and discussion of work on tissue culture and transplantation of tissues. The text material has been brought up to date with considerable revision of the sections on basement membranes, blood clotting, cartilage, bone, and teeth. Throughout the text the inseparable unity of structure and function is emphasized. Each chapter has an excellent bibliography, with many references from the recent literature.

Ham is certainly to be commended for accomplishing the near-impossible—producing an up-to-date, accurate, comprehensive work so clearly written as to be readily understood by the biologist with a minimum of background.

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The Faunal Connections Between Europe and North America. Carl H. Lindroth. Foreword by P. J. Darlington. Wiley, New York; Almquist & Wiksell, Stockholm, Sweden, 1957. 344 pp. Illus. \$15.

P. J. Darlington, himself the author of a recent and very important general work on world zoogeography, has, I think, accurately summarized in his foreword the contribution of Lindroth's book. He says in effect that it has added significantly to our understanding of the content and history of the best-known northern faunas of the earth, those of Europe and eastern North America. Darlington observes, too, that its author is eminently qualified for his task, since he occupies the unique position of one having more first-hand knowledge of the beetle faunas of both continents than anyone else. This from one who is himself an eminent zoogeographer and outstanding student of Coleoptera should recommend the examination of the present book to any interested biologist.

According to Lindroth, his purpose in writing is to explain how species of certain animal groups came to occupy areas of both continents. In treating the problem he finds opportunity to discuss a number of contingent matters, some quite controversial, that have proved to be of enduring interest for the systematist and zoogeographer.

His most trustworthy materials certainly include the entomological records that he has personally amassed or for which he can vouch. Many of these are new. For animals other than beetles he generally utilizes information available in the literature or supplied by American and European specialists.

His survey of mammals, birds, fishes, many kinds of insects, spiders, myriapods, terrestrial isopods, gastropod molluscs, and lumbricid oligochaetes leads him to believe that not less than 5000 species of such organisms are known to be common to Europe and eastern North America. Of these, about 500 species are apparently indigenous to both, but these latter are largely or entirely circumpolar, or disjunct circumpolar, in distribution. Then how is the existing distribution of those remaining to be explained? Lindroth believes that introduction by human agency or by overseas dispersal (by flight, wind, on floating debris, and so on) can account for most of these.

He suspects that if continental drift ever occurred, it took place too long ago to have had any discernible effect upon the disposition of present-day faunas. In any event he suggests that modern distributions for the most part are understandable without our having to postulate a direct continental connection between Europe and America at some past time.

Similarly, even if there were good geological evidence for a complete trans-Atlantic land bridge, on the basis of existing distributions he feels it unnecessary to postulate one. At the same time his appraisal of the Greenland-Iceland faunas leads him to believe that a dryland corridor of dispersal probably connected them with Europe during the Pleistocene.

Of particular interest for those of us especially interested in soil animals is Lindroth's detailed analysis of the beetle-myriapod-isopod fauna of Newfoundland. He presents quite a plausible explanation for the surprising fact that the fauna of Newfoundland, which is geographically part of North America, is predominantly European. Lindroth learned that, as early as the 17th century, vessels had begun to sail with earthen ballast from southwestern England to Newfoundland where the ballast was discharged ashore and where fish and lumber were taken on for Continental and English ports. Since the ballast usually was carried westward to Newfoundland, and not eastward to Europe, we have a plausible explanation for the occurrence of so many European insects, myriapods, and isopods in both places without a comparable representation in both of New World species. Evidently Lindroth investigated this possibility with great care, supporting his theories

with information gleaned from old sailing records and with collections that he made at known ballast dumps around English and Newfoundland ports. Since ships laden with ballast and agricultural produce also sailed from Europe to the mainland of eastern North America and the Pacific Northwest, it is not difficult to find an explanation for the often spotty appearance of European species in each, especially where the climate is comparable to that of Europe.

Clearly Lindroth has gone to considerable pains to extract from his considerable direct knowledge of the Eur-American beetle faunas some cautious though warranted conclusions. One has the feeling that these first-hand data really form the nucleus of his thesis and that he explores the distributions of other animals to augment or fortify the former. A survey of such scope inevitably includes errors of omission and misidentification, especially since the author had to rely upon secondary sources of information for data on some of the insects and other animals. For instance, as a specialist in Myriapoda, I can say confidently that his list of Eur-American myriapods is neither complete nor entirely accurate. On the other hand, it seems to me that he could come to many or most of the same conclusions on the firmer ground of the Coleoptera alone. As Darlington points out, when Lindroth writes of Eur-American beetles, he has no peer.

The format of the book—its numerous good maps, graphs, and tables—assists the reader to gain a clear picture of the author's text. Following each chapter there is an extensive bibliography. Finally, it is a pleasure to say that Lindroth's writing is direct and lucidly uninvolved. He orders his arguments neatly. His style, plus the fine maps and other aids, makes reading this book quite a pleasurable as well as rewarding experience.

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Bergey's Manual of Determinative Bacteriology. Robert S. Breed, E. G. D. Murray, and Nathan R. Smith. Williams & Wilkins, Baltimore, ed. 7, 1957. xviii + 1094 pp. \$15.

The sixth edition of "Bergey" (1948) was one 1500-page volume. This edition appears in two volumes, the one indicated above and an *Index Bergeyana*, to appear later. The *Index* will include most of the "*species incertae sedis*," the literature index, and the host and habitat indices. (The "*species incertae sedis*" in the previous edition for Micrococcaceae alone numbered almost 800 and occupied 37 pages of text.) Space thus ob-