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Book Review

LINDROTH, C.H. 1963. The ground-beetles of Canada and Alaska. Part 3. Opuscula Entomologica, Supplementum XXIV, pp. 201 - 408, Figs. 102-207. Zoological Institute, University of Lund, Lund, Sweden. Price - 35 Swedish crowns.

This portion of this work, the second to be published, includes the last part of the taxonomic treatment of the genus *Trechus*, and a revision of the bembidiine genera *Asaphidion* Gozis (three species), *Bembidion* Latreille, and the monotypic genus, *Phrypeus* Casey. The treatment of *Bembidion* occupies 200 of the 207 pages. This volume is based on an examination of the relevant material stored in the major European and North American museums and private collections, and on the extensive collections of Lindroth.

As in part 2, Lindroth provides for each species a succinct synonymy, a synoptic description, and data on type locality, ecology, and geographical distribution.

The text is straight-forward, simple English. The resulting clarity of expression illustrates very well the author's thorough knowledge of his subject.

The illustrations are excellent, and those of the entire insects are among the best ever executed of carabid beetles. For many of the species, the internal sac of the male genitalia, with its complex folds and peculiarly shaped sclerites is illustrated, in the infolded position. Also provided are simple, clear-cut line drawings of various other structures. All drawings were made by the author himself.

The treatment of the genus *Bembidion* is the dominant feature of this volume. The 193 species, 31 of which occur in the United States only (excluding Alaska), are arrayed in 48 groups. An additional six extra-limital species are included in the key to species, but are not treated elsewhere in the text. For each group, a brief diagnosis is given, as well as the subgeneric name that would apply if the author chose to use the category subgenus. Twenty-five new taxa are described, of which four are ranked as subspecies. Of the new species, the type localities of six are in the United States (excluding Alaska). Although the work deals primarily with the Canadian and Alaskan fauna, Lindroth treated all of the known North American species for a number of the species groups.

Bembidion has long been regarded as the most difficult and complex genus of carabids in North America, and the justification for this opinion is perhaps best illustrated by the large number of synonyms listed - 165 - of which 159 were proposed by one author, Colonel Thomas Lincoln Casey. (By way of contrast, 21 Casey species are recognized as valid, and his names are also used for another two species, as a result of the first-used names being junior homonyms). The synonymy is based upon study of the type specimens by Lindroth, and the facts should settle any doubt about the value and quality of Casey's work in the Carabidae. Hayward's revision of 1897 (Trans. Amer. ent. Soc., vol. 24) was also grossly inadequate. Lindroth's extensive knowledge of the European

species of *Bembidion*, plus his thorough familiarity with Netolitzky's fine study are factors which contributed in an important way to the success of the study of the North American species. Thanks to this revision, it is now a relatively simple task to determine any specimen from Canada or Alaska.

The two keys for identification (one to species groups, and one to the species) are easy to use. This statement is based on personal experience gained by identifying several thousand specimens, representing a substantial portion of the species. Each couplet in the keys consists of a pair of clear-cut alternatives, and there are no complicated "either-or" statements. One of the features facilitating use of the long key to species (225 couplets) is that the numbers of those couplets which set off a large number of species are in bold face. In spite of these good features I have three criticisms to make regarding the keys: a. no attempt was made to relate directly the species-group key to the species key; b. names of authors of species were not given in the key; c. page references to the text were not given for the Canadian and Alaskan species. However, these are minor points, and the last one is largely taken care of by the number which is assigned to each species in both key and text.

In a key of this length, it is almost impossible to avoid errors, and it is with regret that the following omissions of species are noted: 64. *nigrum* Say; the species of the *incretatum* group-103 *incretatum* LeConte, 104. *immaturum* Lindroth, and 105. *graciliforme* Hayward; and *humboldtense* Blaisdell, p. 305.

The fact that only a few subspecies were described or recognized may suggest that the author is unaware of current taxonomic theory. Such, however, is not the case. Lindroth notes carefully geographical variation where he finds it, but he describes as subspecies only those populations which are clearly geographically isolated from their closest relatives, and which differ markedly from them. He avoids naming populations which are segments of clines, and thus avoids proposing a lot of trinomials which will subsequently have to be synonymized.

A search through the work for indications of modern techniques of analysis will prove fruitless. One does not find complex graphs, charts, or long tables, and only very few simple statistical parameters are indicated. However, the study does not suffer from this seeming lack. This seems to me to show that a major attribute of a good taxonomist is the ability to interpret correctly carefully chosen, accurate observations. This is not to say that the study of the genus cannot be pursued profitably with more sophisticated techniques, but rather that I doubt that such techniques would have provided, at the present level of understanding, much more than Lindroth was able to state using the methods of analysis that were in use in the time of Linnaeus. This illustrates that the difference is unimportant between 'modern' as opposed to 'old fashioned' taxonomy; the distinction should rather be made between 'good' and 'poor' taxonomy.

Regarding classification of *Bembidion*, I think the author is mistaken in using only a single infra-generic category, namely 'group'. In a genus of this size, several infra-generic categories are required to point out the similarities and differences among the species: subgenus, species

group and sub-group, at least. However, Lindroth states that such a classification should be proposed on the basis of a study of the world fauna, and perhaps he is right.

The work has, so to speak, opened the door to the study of North American *Bembidion*. It provides a basic classification, which can be easily modified, as required. It shows clearly how diverse the genus is. The task of completing the revision of the North American species will be a pleasure. Because of the marked ecological specialization of many of the species, the genus should provide valuable material for the study of the origins of adaptations. Also, the numerous species and their wide distribution in North America, should provide fertile ground for the development of zoogeographic studies. And, returning to description of structures, one should remember that the immature forms are virtually unknown. Lindroth has provided an excellent platform from which to launch further studies, and it is to be hoped that such studies will be made in the near future.

Carl Lindroth brought to this work a feeling for these fascinating little creatures which is best described as deep affection. And this, combined with unrivalled knowledge, superb talent, and hard work on the part of the author, has provided us with the finest taxonomic treatment of a group of carabid beetles ever produced.

George E. Ball