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Synopses on Palaearctic Collembola¹
Introduction

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Zusammenfassung

Übersichten über paläarktische Collembolen

Kleinarthropoden haben mit der Entwicklung der Bodenökologie enorme wissenschaftliche Bedeutung erlangt. Das gilt besonders für die Ordnung der Collembola (Springschwänze, flügellose Urinsekten). Die ökologischen Bearbeiter sind jedoch in der Regel nicht in der Lage, den heutigen Stand der weit verstreuten taxonomischen Literatur zu überblicken. So können sie gewöhnlich nur zwischen den zwei Möglichkeiten wählen, kein solches Thema zu bearbeiten oder auf veraltete Bestimmungsschlüssel zurückzugreifen. Auf diese Weise kommen nicht zutreffende Mitteilungen zur Verbreitung und Ökologie von Arten zustande, die dem Ergebnis schaden und aus der Literatur kaum auszumerzende Fehlmeldungen zur Folge haben.

Um dem Abhilfe zu schaffen wird hiermit begonnen, unter dem Titel »Synopses on Palaearctic Collembola« eine lose Reihe von kritischen taxonomischen Übersichten über einzelne Familien, Unterfamilien oder Gattungen von Collembolen zu publizieren. Sie sollen auf dem aktuellen taxonomischen Niveau sein und ausreichend mit Abbildungen zur Orientierung für den Nichtspezialisten versorgt werden. Außer in Englisch können sie in deutscher oder französischer Sprache erscheinen, sollten dann aber mit englischen Fachglossaren und einem englischen Schlüssel ausgestattet sein, um eine internationale Anwendbarkeit zu erleichtern.

Mitarbeiter des Staatlichen Museums für Naturkunde Görlitz legen nachfolgend den ersten Synopsis-Teil für die Unterfamilie Tullbergiinae vor. Zur Mitwirkung für weitere Großtaxa der Collembolen wird hiermit eingeladen.

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The recent accessibility of Collembolan taxonomic knowledge

During the last decades, springtails (Collembola) have become enormously significant in soil biology. Thousands of papers have been published using Collembola as indicators for various ecological purposes. All of them, or at least the overwhelming majority, bear the disadvantage of an out of date and often inaccurate knowledge of the taxonomy of this group of apterygote insects.

The trapping or extraction of springtails from soil cores can be easily achieved. The large number of individuals living in the very narrow spaces of the soil, together with their nutritive and locomotory activity, are convincing arguments for the importance of these soil dwelling insects in nearly all soil ecological processes. Unfortunately, the highly complicated taxonomy of the Collembola badly opposes a practical application of Collembola as soil ecological indicators.

An essential part of this problem is linked with the difficult access to critical and up to date surveys of the taxonomy or at least to determination literature. Not taking into account checklists lacking keys for determination, the »newest« European fauna of Collembola are the famous works of STACH (1947–1963), GISIN (1960), and PALISSA (1964). In order to use more recent information, many workers consult the identification key of FJELLBERG (1980) for Norwegian Collembola. An interesting comparison but not a concrete help for the Palaearctic Region, is represented in the taxonomic analysis of the Collembola of North America (north of the Rio Grande) by CHRISTIANSEN & BELLINGER (1980). Quite recently, ČERNOVA and her team published, in 1988, a very accurate review of the families and genera of the fauna of the former Soviet Union, unfortunately only in Russian. Nevertheless, there has been remarkable progress in Collembolan taxonomy in general and for the Palaearctic Region in particular. However, the immense bulk of special publications is only known to a few specialists.

The result of this situation can be seen in the recent soil ecological literature dealing with Collembola. There is considerable confusion in the species-related data concerning the distribution, ecology, and behaviour of Collembola. Resulting from this, it is becoming more and more difficult to reconstruct a real picture of the up to date knowledge of the ecological or ecophysiological characterization of a concrete species.

Surely, this difficulty is not only caused by personal ignorance, but also more or less by the peculiarities in the specific behaviour of many Collembola. Since the description of the phenomena of ecomorphosis, neutralization, cyclomorphosis, or epitoky of some Collembolan taxa on the one hand, and the different behaviour of specimens of apparently the same species under different conditions on the other, specialists have become more and more precautions in judging the relation between taxonomical morphospecies, ecotypes, and classical biospecies.

A conception of Synopses on Palaearctic Collembola

Today, in many European countries there is an increasing number of investigators and even teams studying Collembola in detail, including or preferring taxonomical work. As they are all confronted with the suffocating burden of unsolved taxonomical problems, none of these have offered a survey of the up to date knowledge. This risk will be undertaken here, based upon the results of the team of researchers involved in Collembolan taxonomy at the Museum of Natural History Görlitz. The aim cannot be a contemporary presentation of a whole »Fauna of the Palaearctic Collembola« but a series of critical and up to date contributions, presented as synopses of portions of this order of insects. We invite palaearctic collembologists to contribute to this series, in order to complete it within as few years as possible. Depending on the possibilities of each case, the contributions will deal with a family, a subfamily or even only a genus. Obtaining a distinct sequence will be neither possible nor necessary.

One of the most urgently needed reviews is that for the subfamily Tullbergiinae, because in this group a great deal of recent taxonomical work has been achieved. Therefore, the first edition, which

follows in this volume, is dedicated to this crucial group of Collembola (Subfamily Tullbergiinae by ZIMDARS & DUNGER). Furthermore other parts are in preparation. No revisor is as yet for the major parts of the Entomobryomorpha available. Colleagues able and willing to work out a current help will be most welcome.

As in other groups of animals, progress in using chemical and genetical methods for better characterizing Collembola taxa has been made. The application of such methods in ecological work will, however, be a matter of the future, if it is at all possible. As a consequence, the synopses will deal primarily with morphological characteristics. Results of other forms of taxonomic study can be only mentioned additionally. As far as possible, references to the ecological and geographical literature shall be given. As the interpretation of authors concerning the ecological behaviour of some species may essentially differ, for reasons of brevity an entire report can not be given here.

The following concept of the »Synopses of Palaearctic Collembola« can thus be presented: First, there should be an introduction to morphology, chaetotaxy, and other essential characteristics. This part may also be used to overcome linguistic barriers by listing the most important terms in English or other languages. Second, a detailed key should contain taxonomic, ecological, and geographical information as well as orienting figures. If the text can be not written in English, a short English version of the key should be added. A possible third part should consist of surveys in the form of indices, tabulating characters, and other information to avoid misunderstandings in the dichotomic keys or to provide other views of possible relationships. The closing part must concentrate on the literature, as far as it concerns information mentioned in the text.

As to the geographical delimitation, Palaearctis is chosen as the smallest natural unity of Collembolan distribution. Studies on the arctic fauna have shown, however, that there exists a direct link between species inhabiting the mostly northern parts of the Palaearctis and Nearctis. In studying the Palaearctic fauna, it seems thus to be essential to have at least general information about nearctic species. Therefore, for the »Synopses on Palaearctic Collembola« it is proposed that surveys of the holarctic genera and species should be added or, better, that these taxa be included into the determination keys. For genera, a worldwide key is desirable if possible, but this is not a *conditio sine qua non*.

There was an intensive discussion about permitting other languages beside English for the contributions to the Synopses of Palaearctic Collembola. A serious argument has been the long and predominant tradition of German in European Collembology, as well as the very important recent contributions from French, Italian, Spanish, Scandinavian, Czech, Polish, and Russian authors. Taking into consideration the above mentioned supports to overcome linguistic barriers, besides English the most broadly introduced Palaearctic languages - French and German - should be accepted. Because of the difficulty of transliteration, Russian will not be permissible.

Even though being compiled as accurately as possible, the Synopses can only give a description of the knowledge at the moment. It is inevitable that there will come the wish to make corrections and additions even in near future. The editor hopes, that supplements will be able in an adequate period and extent.

The »Synopses of Palaearctic Collembola« will be edited by the Museum of Natural History Görlitz as a part of the »Abhandlungen und Berichte des Naturkundemuseums Görlitz«. They can be ordered at any time from the library of the Saxonian State Museum of Natural History, Post Office Box 300154, D- 02806 Görlitz (Germany). As the senior member of the research team in Collembola of the Görlitz Museum, I would like to express the expectation that an important and most urgently desired contribution to the accessibility of Collembolan taxonomy can be offered during the next ten years. All possible contributors are invited to take part in this activity. There is no question that these efforts can not equal the famous works of GISIN or STACH. Such a recent work would require much time and a volume of nearly a thousand pages or more. Therefore, I consider it to be my duty to respect the old German adage »the sparrow in the hand is better than the pigeon at the roof«.

Finely, the possibilities of the modern utility of these keys must be mentioned. All of the edited parts of the »Synopsis of Palaearctic Collembola« can be aquired as discs for a word processing program. Concerning the computer assisted identification of Collembola as CHRISTIANSEN, BELLINGER & DA GAMA (1990) have presented for the genus *Pseudosinella*, there is no European centrale available at this time which can answer comparable questions for any genus of Collembola. As far as possible, computer determination aids should be included within the »Synopsis of Palaearctic Collembola«. Nevertheless, the possible identification of a species requires an evaluation of the ecological requirements of a species and therefore the consultation of a synopsis of the planned kind.

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