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## The present knowledge of *Protura*

**Abstract.** Actually, more than 660 species of *Protura* is known. The knowledge of the *Protura* of different regions of the world is very unequal and mostly poor. The author estimate that not more than 10% of the existing species were described till now.

Only 20 species (and one subspecies) of *Protura* is known from the Korean Peninsula. The fauna is insufficiently known, comparing to China were more than 150 species, and Japan more than 50 species are recorded.

**Key words:** *Protura*, world

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*Protura*, the order of *Arthropoda* of the unclear systematic position, were described in 1907 by the eminent Italian entomologist, Silvestri (SILVESTRI 1907). The description was based on the single genus with one species, *Acerentomon doderoi* SILVESTRI, 1907. Soon afterwards, the second Italian zoologist, BERLESE (1909), has published the large monograph of the group. He called it "*Myrientomata*" underlaying (supposed by him) the transitory position between Myriapods and Insects.

Till the beginning of the 30ties *Protura* were supposed to be extremely rare. Only the broad using of the different types of photoelectors for the study of the soil fauna allow to find that this group is more widely distributed and much common that it was supposed by the first investigators. Actually we know that they are living in the most of the types of soils (with exceptions of the soils extremely wet, or intense cultivated). They were found in the all areas of the world, with exception of the nival areas of the polar regions and permanent snow zones of the mountains.

We can follow the development of the knowledge of *Protura* thanks many indexes, lists and catalogues published by different scientists. The number of the known species grew up as follows:

- 1907 (SILVESTRI) – 1 genus, 1 species
- 1909 (BERLESE) – 3 genera, 11 species
- 1927 (STACH) – 6 genera, 29 species
- 1932 (MILLS) – 7 genera, 43 species
- 1950 (ROSAS COSTA) – 9 genera, 100 species
- 1955 (PACLT) – 8 genera, 110 species (+ 8 dubious sp.)
- 1964 (TUXEN) – 16 genera, 148 species

Actually (end of 1995, own data) – 66 genera, 662 species.

The arising of the number of known species was not only result of the discoveries of the new materials. The development of the methods of research grew up too. The mile stones of this process was describing the taxonomical role of chaetotaxy by IONESCO (for example: IONESCO 1933) and discovery of the system of taxonomically important sensilla on the first tarsus by CONDÉ (1945). The summing up of the first stage of the researches on *Protura* is the monograph of TUXEN (1964) – the “holy book” of all researchers working on this group.

During the last ten years some new characters (as the head chaetotaxy, distribution of glandular pores, length and shape of some setae) were introduced. Their taxonomical meaning (as species or generic characters) in many cases is established. One can suppose that they are very important for phylogenetical consideration too. Unfortunately, they are described only in few genera and species (for example: BERNARD 1990, SZEPTYCKI 1984, 1988, 1991).

The knowledge of *Protura* of the most of the world regions is insufficient and unequal (Table I). The zoogeographical pattern of the group illustrate rather the distribution of taxonomists than the distribution of animals. More than half of the species (actually 358) are known of the typical series only.

A few systematic monographs of *Protura* were published. They concern the world (TUXEN 1964), Europe (NOSEK 1973), Japan (IMADATÉ 1974), Australia (TUXEN 1967) and New Zealand (TUXEN 1986). Only some regional catalogues, check-lists etc. were published till now as for example that of Houston 1994 (Australia), SZEPTYCKI & WEINER 1990 (Poland), LEE & RIM 1988 (Korea), IMADATÉ 1994, 1995 (Japan).

The revue of the data of the whole world shows us that any zoogeographical syntheses are premature. The fauna of only few areas (as Japan and Poland) and some points (as for example She-Shan Hills near Shanghai long time studied by YIN, or some national parks in Poland) are better known. “Better” does not mean “good” since in all mentioned areas the discovering of the new species is probable in the high degree. After my estimation, no more than 10% of the living *Protura* is actually described.

The poor knowledge of the local faunas results mostly of the difficulties in the determining of *Protura*. Such characters as the pattern of sensilla on the first tarsus or the shape of the genital armature are in many case slightly

visible, and, worse, they are commonly not a specific characters, but rather characters of the groups of species. The chaetotaxy of body is in some degree variable, and in many cases is identical in many species. Many important characters, as for example the length of individual setae, the head chaetotaxy, the porotaxy, and other are lacking in the older descriptions. It is partly result of the fact, that many characters in the materials preserved during the longer time in the alcohol are obscure or invisible.

Table I. Actual (end of 1995) knowledge of *Protura*

Area	No of genera	Endemic genera	No of species	First record
Europe (incl. Poland)	15	5	157	SILVESTRI 1907
(Poland)	10	–	61	DAMPF 1911
Temperate Asia (former Soviet Union)	9	3	13	MARTYNOVA 1970
China	32	8	156	CHOU 1950
Korea	10	1	20	IMADATÉ 1966
Japan	25	3	64	ESAKI 1932
America N. of Panama	24	4	88	SILVESTRI 1909
South America	13	2	37	SILVESTRI 1938
Africa and Madagascar	18	1	56	WOMERSLEY 1931
Near East	5	–	8	CONDÉ 1954
India & Indian Oc.	11	–	30	SCHOEPOTIEFF 1909
South East Asia	7	–	45	BERLESE 1912
Australia, N. Zealand, Oceania	15	1	56	DAKIN 1926

The actual systematic on the generic and family level is far from perfection. Many of genera are diagnosed on the base of unimportant characters, while many characters of the great importance are omitted. To the last group of the characters (in the suborder *Acerentomoidea* which I know a little better) belong:

1. the position of seta P3 on abdominal tergites. This character was described first time by IMADATÉ 1964, and afterwards forgotten (it was not used in the generic descriptions of Tuxen, Nosek and Yin). The Imadaté's distinction between "*Acerella*" and "*Acerentulus*" groups of genera is probably the most important distinction in the suborder under question.

2. the head chaetotaxy – nobody take attention on it till now, but after my preliminary observations there are distinct (and probably very important) differences between the genera of *Protentomidae* s. l. and between the genera of both mentioned groups of Imadaté.

3. the shape of the accessory setae on the body, especially in the meso- and metanotum. After my experience it can be a good character for the group of genera which are probably phylogenetically related.

4. the porotaxy (distribution of glandular pores) of body – in my former papers I have described some differences in it and now I suppose that it has

great value for generic classification. Unfortunately, the lack of comparative data do not allow the more synthetic approach (SZEPTYCKI 1995).

There are no good systematic of *Protura* on the family level. The propositions of Yin (YIN 1984; YIN & XUE 1993) is very interesting, but should be checked. The system of former *Protentomidae* s. l. introduced by TUXEN et YIN (TUXEN & YIN 1982) is only preliminary one, but can be a good basis for the future discussion.

As it was told, *Protura* are still a group poorly known. The classic set of the taxonomical characters (as used in the monographs of TUXEN, NOSEK and IMADATÉ) is not sufficient for any synthetic approaches, including those based on the cladistic analysis.

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STRESZCZENIE

[Tytuł: Obecna znajomość *Protura*]

Na świecie do końca 1995 roku opisano ponad 660 gatunków *Protura*, lecz znajomość poszczególnych regionów jest bardzo nierówna i na ogół bardzo słaba. Autor ocenia, iż dotychczas poznano nie więcej niż 10% istniejących gatunków.

Z Półwyspu Koreańskiego wykazano dotychczas 20 gatunków i jeden podgatunek. Świadczy to, że fauna tego obszaru jest bardzo słabo poznana – z Chin znanych jest ponad 150 gatunków, z Japonii ponad 50. Dla porównania – ze stosunkowo dobrze zbadanej Polski wykazano dotychczas 61 gatunków.