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# *Collembola Poduromorpha* of Korean Peninsula – current status of the research.

**Abstract**. The status of the exploration of *Collembola Poduromorpha* of the Korean Peninsula is described, in connection with the biogeographical distribution of species.

**Key words**: *Collembola*, *Poduromorpha*, Korean Peninsula, biogeographical distribution

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## INTRODUCTION

The present research in species biodiversity follows two mainstream trends. The first one is a mere listing of species – should it be plants or animals; the other consists of researching the genetic diversity. The acquiring of species composition, their classification, consisting of determination and describing of species is often an introduction to further studies, nevertheless an extremely important one. The research composition of local fauna is a means for a better acquaintance of a certain taxonomic group or its biogeographical distribution. *Collembola*, although first recorded by Linnaeus, are still not very well known, and the faunistic studies prevail over the molecular research. On the other hand, the Korean Peninsula is a throughout interesting field of research, for until the 50s it had stayed almost unexplored.

The collembolan fauna of the Korean Peninsula was formed by all the environmental changes, although the species belonging to *Poduromorpha*, mostly soil dwellers, were subject to a much slower reassembly.

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It is difficult to determine the migration routes into the Korean Peninsula, because during the whole Tertiary, and most of the Quaternary periods, migrations in two directions took place in this region: one from the depth of the continent to the present islands (including Japan), and back.

## COLLEMBOLAN FAUNA OF KOREAN PENINSULA

LEE (1973) collected bibliographic data concerning all previous elaborations of the Korean collembolan fauna and assembled the list of species, of which 16 belonged to *Poduromorpha*.

Since then the number of *Poduromorpha* species known from the Korean Peninsula increased to 122, of which the most numerous group is *Neanuridae* (73, species), 26 species belong to *Onychiuridae*, and 21 species are *Hypogastruridae*, *Odontellidae* and *Brachystomellidae* are represented by one species each. These species were reported and described mostly in the following publications: LEE (1974a, 1974b, 1980a, 1980b, 1981, 1982, 1983a, 1983b), LEE & KIM (1984, 1994, 1995a, 1995b), LEE & THIBAUD (1975, 1987), LEE & CHOE (1979), LEE & PARK (1986), KIM & LEE (1995), THIBAUD & KIM (1995), THIBAUD & LEE (1994), DEHARVENG & WEINER (1984), NAJT & WEINER (1985, 1992), WEINER & NAJT (1985a, 1985b), WEINER (1986, 1989a, 1989b, 1994), WEINER & SZEPTYCKI 1997. Some more species are mentioned in these publications, but not yet described because of the insufficient material (e.g. *Paleonura* sp.n). Part of the materials in collection of the Institute of Systematics and Evolution, Polish Academy of Sciences in Kraków is currently under study or awaits its turn.

## BIOGEOGRAPHICAL ANALYSIS

Among the above mentioned 122 species, 92 are known only from the Korean Peninsula. One should not regard them as endemites, though, because the collembolan fauna of the adjacent regions is barely known. Northern China and Primorskij Kraj still await a broader study. From the whole China only 30 species of *Poduromorpha* are known, and from the Russian far east (Magadan, Primorskij Kraj, Sachalin, Kurile Islands) 51 species - in relation to the area size of these regions, this probably is a tiny fraction of the fauna. Well studied is the fauna of Japan, including 130 species of *Collembola Poduromorpha*.

Biogeographically the Korean Peninsula belongs to the Palearctic region, namely to the Sino-Japanese subregion – province, according to the map used by CHRISTIANSEN & BELLINGER (1995). More precise, however, seems to be the attribution to the Chino-Himalayan region, Chino-Korean Province, as in MROCZKOWSKI (1968).

Among 24 species known also from outside Korea, several groups (or biogeographic elements) can be distinguished.

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Group I: five cosmopolitic or subcosmopolitic species: *Hypogastrura manubrialis* (TULLBERG, 1869), *Ceratophysella armata* (NICOLET, 1842), *Pseudachorutes parvulus* (BÖRNER, 1901), *Micranurida pygmea* (BÖRNER, 1901), *Mesaphorura yosii* (RUSEK, 1967).

Group II: a holarctic element, including: *Hypogastrura distincta* (AXELSON, 1902) (= *Hypogastrura itaya* KINOSHITA, 1916), *Ceratophysella bengtssoni* (ÅGREN, 1904), *Anurida tullbergii* SCHÖTT, 1891), *Micraphorura absoloni* (BÖRNER, 1901);

Group III, a palearctic element – *Choreutinula inermis* (TULLBERG, 1871);

Group IV: nearctic element – *Pseudachorutes saxatilis* MACNAMARA, 1920;

Group V: species occurring also in the Russian far east: *Hypogastrura longimucrona* LEE & CHOE, 1979, *Ceratophysella liguladorsi* LEE, 1974, and species reported also from China, Japan and Nepal: *Ceratophysella duplicispinosa* YOSII, 1954, *Deutonura abietis* (YOSII, 1969) (Japan), *Pseudachorutes kangchenjungae* YOSII, 1966, *Pseudachorutes longisetis* YOSII, 1961 (Japan), *Granurida tuberculata* YOSII, 1954 (Japan), *Protaphorura yagii* (KINOSHITA, 1923) (Japan);

Group VI: northern-amphipacific element: *Mitchellania horrida* (YOSII, 1960), *Deutonura frigida* (YOSII, 1969), *Psyllaphorura uenoi* (YOSII, 1954), *Allonychiurus flavescens* (KINOSHITA, 1916);

Group VII: species distributed in Far East and other regions: *Ceratophysella communis* (FOLSOM, 1897), reported also from Mexico and Argentina, *Vitronura giselae* (GISIN, 1950) reported from Switzerland, Mexico and Kenia;

Group VIII: Australian element, connected with sea-coasts: *Pseudanurida glauerti* (WOMERSLEY, 1933).

Obviously, taxonomic positions of a part of the species listed here need to be verified because of the progress in Collembolan systematics (e.g. *Crossodonthina delamarei* Lee, 1973 appeared to be a synonym of *Crossodonthina koreana* YOSII & LEE, 1963). The same concerns the species reported from Korea as *Onychiurus izuruensis* YOSII, 1956 and *Psyllaphorura uenoi* (YOSII, 1954).

The species composition of the adjacent regions suggests that some other genera should also be represented in Korea. So far no species have been reported from Korea belonging to the genera *Typhlogastrura* BONET, 1930, *Mesogastrura* BONET, 1930, *Schaefferia* ABSOLON, 1900, *Ceratrimeria* BÖRNER, 1906, *Oudemasia* SCHÖTT, 1893, *Axenyllodes* STACH, 1949, *Cephalachorutes* BEDOS & DEHARVENG, 1991, *Stachorutes* DALLAI, 1973, *Kalaphorura* ABSOLON, 1901 and *Probolaphorura* DUNGER, 1976. Subfamily *Tullbergiinae* is hardly represented in Korea. On the other hand, the genus *Hymenaphorura* BAGNALL, 1949 (*Onychiurinae*) is represented by at least one species (WEINER & SZEPTYCKI 1997). Some of the species known so far from Korea only are being found also in other localities. For example *Philotella* NAJT & WEINER, 1985 has been found in Ural (KNISS & THIBAUD 1996). The subfamily *Caputanurinae* created for the species occurring in Korea includes currently two genera with seven species. One representative of the genus *Caputanurina* LEE, 1983 has been found in Primorskij Kraj (POTAPOV in litt.).

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## CONCLUSIONS

According to these findings, the fauna of *Collembola Poduromorpha* of the Korean Peninsula may be defined as a Far-Eastern-Palearctic, belonging to the Chino-Korean province.

The oldest elements of the Korean fauna may be the species of the genera *Morulina* BÖRNER, 1906 and *Ussiaphorura* MARTYNOVA, 1979 (WEINER in litt.). The *Morulina* species occur mainly in the mountains of temperate Holarctics, and also in the Arctics, except for the arctic Scandinavia. The arctic localities only marginally intrude the area of the ancient pleistocene continental glacier. These data suggest that only a part of the arctic localities may be related to the holocenian faunal migrations, while the stands at lower latitudes within Holarctics (as in Korean Peninsula) are much older, and perhaps related to the northern coast of the Thetis Ocean.

The disjunctive range of the subfamily *Tetradontophorinae*, most probably due to the continental glaciation, suggests that this may also be one of the oldest elements in the Korean fauna. Four monospecific genera belong currently to this subfamily: *Tetrodontophora* REUTER, 1892, occurring in Europe, *Homaloproctus* BÖRNER, 1909 known from Japan, *Ussiaphorura* known from Primorskij Kraj (Priamurie) and from Korea (WEINER in litt.) and *Lophognathella* BÖRNER, 1908, occurring in Japan and in North America, which may be the effect of migration during oceanic regressions.

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STRESZCZENIE

[Tytuł: *Collembola, Poduromorpha* Półwyspu Koreańskiego – stan zbadania]

Przedstawiono stan zbadania fauny *Collembola Poduromorpha* Półwyspu Koreańskiego, z uwagami na temat rozmieszczenia zoogeograficznego gatun-

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ków. Jest to fauna dalekowschodnio-palearktyczna z areału chińsko-koreańskiego. Obecnie, z tego obszaru podawane są 122 gatunki, z których najliczniejszą grupę stanowią gatunki należące do rodziny *Neanuridae*.

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