Ber. nat.-med. Verein Innsbruck	Suppl. 10	S. 237 – 241	Innsbruck, April 1992

8th International Congress of Myriapodology, Innsbruck, Austria, July 15 - 20, 1990

Millipedes from Anthropogenic Habitats in Hungary

(Diplopoda)

by

Zoltán KORSÓS

Zoological Department, Hungarian Natural History Museum, Baross u. 13, H-1088 Budapest, Hungary

Abstract: 27 localities, mainly in and around Budapest, were surveyed for their synanthropic millipede fauna. From the 27 species found, four are new to the fauna of Hungary [*Cibiniulus phlepsii* (VERHOEFF), *Cylindroiulus latestriatus* (CURTIS), *Mesoiulus paradoxus* BERLESE, *Dorypetalum degenerans* (LATZEL)]. Six major habitat-groups were distinguished, each having its characteristic species assemblage.

1. Introduction:

Zoogeographical analyses of the millipede fauna of different countries or other geographical units often include additional information on the ecological character and the habitat demand of the species (cf. ENGHOFF 1974, DZIADOSZ 1966, MEIDELL 1979, LOKSHINA 1960, KEVAN 1983). From these articles and the major handbooks (BLOWER 1985, SCHUBART 1934) one can learn which species are "cosmopolitan, ubiquitous, anthropochore or synanthropic", i.e. in their dispersal and habitat selection various human activities play an important role. Though to different extent, such species are *Oxidus gracilis, Choneiulus palmatus, Nopoiulus kochii, Blaniulus guttulatus, Cylindroiulus truncorum, C. arborum, C. parisiorum.* Some species (e.g. *Cylindroiulus latestriatus*) are synanthropic in one area (GROMYSZ-KALKOWSKA & TRACZ 1983, BLOWER 1985) and not in the other (ENGHOFF 1974). Others (e.g. *Polydesmus complanatus, Megaphyllum unilineatum, Brachyiulus bagnalli*) are widely distributed everywhere, hence in anthropogenic habitats too.

Relatively few works discuss especially the synanthropic millipedes (a.o. BIELAK 1964, HEYDEMANN 1960, JEDRYCZKOWSKI 1982) and I know only one (MARGÓ 1879), which deals with the diplopod fauna of Budapest. It only enumerates four species, incl. *Megaphyllum unilineatum* and *Polydesmus complanatus.*

2. Material and Methods:

27 localities were surveyed for millipedes. Three of them were in hothouses, 16 in the city of Budapest, 7 in the vicinity of it, and one in a holiday center on the southern shore of the Lake Balaton (Fig. 1). The animals were singled; each locality was visited several times during the year, and the most successful collectings were carried out at the end of winter and in the spring: from February till May. All the collected specimens are deposited in the Diplopoda collection of the Zoological Department, Hungarian Natural History Museum, Budapest.

3. Results:

27 millipede species were collected altogether, this is 37,5 % of the total 72 diplopod species presently known from Hungary. Four of them (*Cibiniulus phlepsii* (VERHOEFF, 1897), *Cylindroiulus latestriatus* (CURTIS, 1845), *Mesoiulus paradoxus* BERLESE, 1886, *Dorypetalum de-*

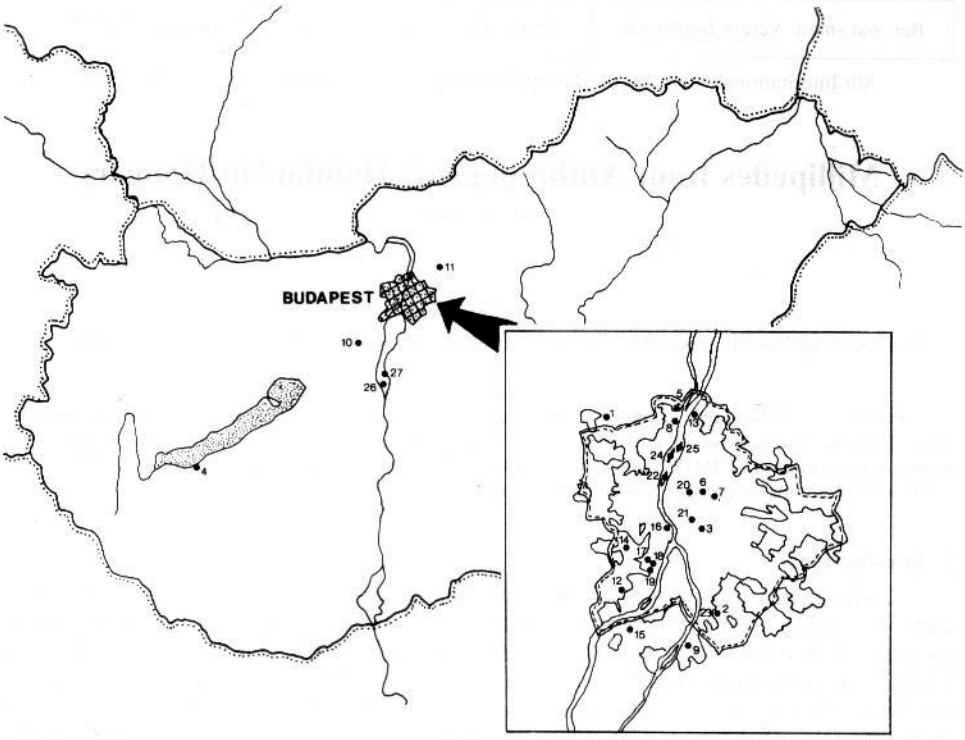

Fig. 1: Sample plots in Hungary. For explanation of locality numbers see Table 1.

generans (LATZEL, 1884)) proved to be new to the fauna of Hungary. *Dorypetalum degenerans*, which is the first occurrence of a callipodid millipede in Hungary, is treated in detail elsewhere (KORSÓS, in prep.). Among the others, there were also several interesting species, distribution and/or status of them being not yet clarified in Hungary: *Brachyiulus bagnalli, Ophyiulus pilosus, Oxidus gracilis, Brachydesmus dadayi* etc. The species and their distribution among the localities investigated are summarized in Table 1.

The 27 localities were divided into 6 groups on the basis of their ecological character, vegetation, and degree of anthropogenic influence. The six groups are: 1. hothouses; 2. city gardens, close surroundings of houses; 3. secondary disturbed woods; 4. city groves, cemeteries, suburb gardens; 5. large park forests, with horticulture; 6. flood forests of the Danube in and around Budapest. The six groups are characterized by increasing millipede diversity (Fig. 2).

Figure 3 depicts the frequency distribution of the species against the localities. It gives some information about the ecological demand and tolerance of the species, through their distribution in the different habitats. For example, *Brachyiulus bagnalli* occurred in 18 localities out of the 27, i.e. this species has a wide ecological spectrum, it survives almost everywhere except hothouses. On the right part of the diagram (Fig. 3), low bars appear from two possible reasons: 1. strongly specialized, synanthropic species with narrow ecological tolerance (e.g. *Cylindroiulus parisiorum, C. truncorum, Oxidus gracilis*) or 2. more or less native species, hardly adapted to human activities (*Cylindroiulus horvathi, Megaphyllum projectum kochi, Leptoiulus* sp.). In Fig. 4, the frequency distribution of the species are detailed according to locality-groups.

Table 1: Species composition of millipedes in 27 synanthropic habitats in Hungary.

Locality-Groups	I			II							III					IV				V				VI			
Localities:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
1. *Polyzenus lagurus* (L.)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-	-	-	-	-	-	+
2. *Blaniulus guttulatus* (BOSC)	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-	-	-	-	-	-	-
3. *Proteroiulus fuscus* (AM STEIN)	-	-	-	+	-	-	-	+	-	+	-	+	-	-	-	-	-	+	-	+	-	-	+	-	-	-	+
4. *Choneiulus palmatus* (NEMEC)	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-
5. *Nopoiulus kochii* (GERVAIS)	-	+	-	-	-	-	+	-	-	+	-	-	-	-	-	-	+	-	-	-	-	+	-	+	-	-	-
6. *Cibiniulus phlepsii* (VERHOEFF)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-
7. *Nemosoma varicorne* C.L. KOCH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+
8. *Ophyiulus pilosus* (NEWPORT)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	+	+	+	-	-	+	-
9. *Leptoiulus* sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	-	-
10. *Cylindroiulus horvathi* (VERHOEFF)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-
11. *Kryphioiulus occultus* (C.L. KOCH)	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-
12. *Cylindroiulus arborum* VERHOEFF	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-
13. *C. parisiorum* (BRÖLEMANN et VERHHOEFF)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	-	-	-
14. *C. truncorum* (SILVESTRI)	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
15. *C. latestriatus* (CURTIS)	-	-	+	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	+	-	+	-	-
16. *C. boleti* (C.L. KOCH)	-	-	-	+	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-	-	-	+	+	+	-	-	-
17. *Mesoiulus paradoxus* BERLESE	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	+	+	+	-	+	-	-	-	-	-	-	-
18. *Brachyiulus bagnalli* (BRÖLEMANN)	-	-	-	-	+	+	+	+	+	+	-	-	+	-	+	+	-	+	-	+	+	+	+	+	+	+	+
19. *Megaphyllum unilineatum* (C.L. KOCH)	-	-	-	-	+	-	-	+	-	-	+	-	+	+	+	-	-	-	-	-	-	-	+	+	-	-	+
20. *M. projectum kochi* (VERHOEFF)	-	-	-	-	-	-	-	-	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-
21. *Dorypetalum degenerans* (LATZEL)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	-	-	-	-	-	-	-	-
22. *Craspedosoma rawlinsi* LEACH	-	-	-	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	+
23. *Oxidus gracilis* (C.L. KOCH)	+	-	+	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24. *Brachydesmus dadayi* VERHOEFF	-	-	-	-	-	-	-	+	-	-	-	+	-	-	-	+	-	-	-	-	-	-	-	-	-	+	-
25. *B. superus* LATZEL	-	-	-	-	-	-	-	-	+	-	-	-	-	+	-	-	+	+	-	-	+	-	-	+	-	+	+
26. *Polydesmus complanatus* (L.)	-	-	-	+	+	-	-	-	-	-	+	-	+	-	+	-	-	-	-	-	-	-	+	+	+	+	-
27. *P. denticulatus* C.L. KOCH	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	+	+	+

1 Solymár; 2 Soroksár-1; 3 Füvészkert; 4 Balatonfenyves; 5 Békásmegyer; 6 Columbus utca; 7 Vezér út; 8 Csillaghegy; 9 Dunaharaszti; 10 Baracska; 11 Gödöllő; 12 Kamaraerdő; 13 Káposztásmegyer; 14 Budai-h; 15 Szigetszentmiklós; 16 Gellérthegy; 17 János-kórház; 18 Városmajor; 19 Farkasrét; 20 Városliget; 21 Népliget; 22 Margitsziget; 23 Soroksár-2; 24 Óbudai-sziget; 25 Népsziget; 26 Makád; 27 Szigetbecse.

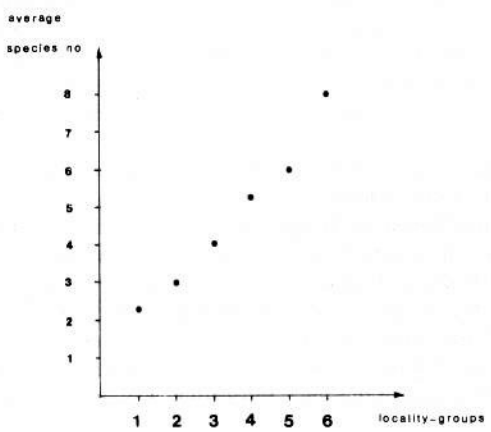

Fig. 2: Average species number of the different locality-groups (for group numbers see Discussion).

4. Discussion:

The increase of the average species number according to the major locality-groups (Fig. 2) correlates to the decreasing effect of anthropogenic activities. A hothouse is, in a European environment, much more "artificial" in many respects than a large forested city park.

The six major locality-groups have characteristic species assemblages.

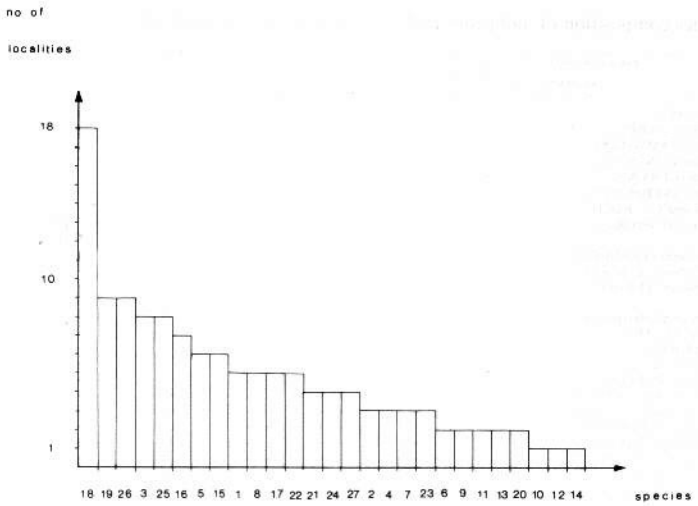

Fig. 3: Frequency distribution of 27 species in the different habitats.

1. Hothouses of horticultural and botanical gardens: *Choneiulus palmatus, Oxidus gracilis, Cylindroiulus truncorum.* They may rarely occur outdoors as well, but together they characterize the hothouses.

2. Closed city gardens, surroundings of houses: *Brachyiulus bagnalli, Proteroiulus fuscus.* These species are not really characteristic; they are, however, more abundant in these localities. This kind of habitat has a poor, not conspicuous millipede fauna. Total species number is relatively high (13), but this is due to accidental occurrences: average species number is quite low (i.e. 3, see Fig. 2).

3. Secondary or planted forests, sometimes close to agricultural fields: *Megaphyllum unilineatum, M. projectum kochi, Cylindroiulus boleti.* These species could be remnants of the natural forest fauna.

4. City groves, cemeteries, suburban gardens: *Polyxenus lagurus, Mesoiulus paradoxus. Dorypetalum degenerans* is confined to the four localities in this group. Its occurrence is, however, rather due to other reasons than synanthropic connections; position of the localities (on the right, hilly side of the Danube) and soil factors (limestone base) may cause the distribution.

5. Large parks with regular gardening activities: *Cylindroiulus latestriatus, Ophyiulus pilosus.*

6. Flood forests of the Danube on islands and banks of the river in Budapest, occasionally visited by inhabitants: *Polydesmus denticulatus, Nemasoma varicorne, Cibiniulus phlepsii.* This habitat has the most diverse millipede fauna (total species number 18, mean 8). It may be due to the transporting and altering power of the river, to steadily changing microhabitats, and to irregular human influence.

Summarizing this survey, the anthropogenic habitats, at least in Hungary, are rich as regards their species composition, and promising as regards faunistic novelties. This is backgrounded, of course, partly by the insufficient investigation of the Hungarian millipede fauna. On the other hand, a short comparison to a natural forest on the Eastern Hungarian Plain shows another possible reason. The several thousand years old Bátorliget Nature Reserve only enlists six diplopod species in its richest forest habitat (LOKSA 1953). Surely part of the explanation for this is that urban biotopes and their continuously changing conditions offer more diverse microhabitats than a steady climax forest community. This latter is, however, more stable, and does not need any anthropogenic influence to maintain its fauna for another ten thousand years.

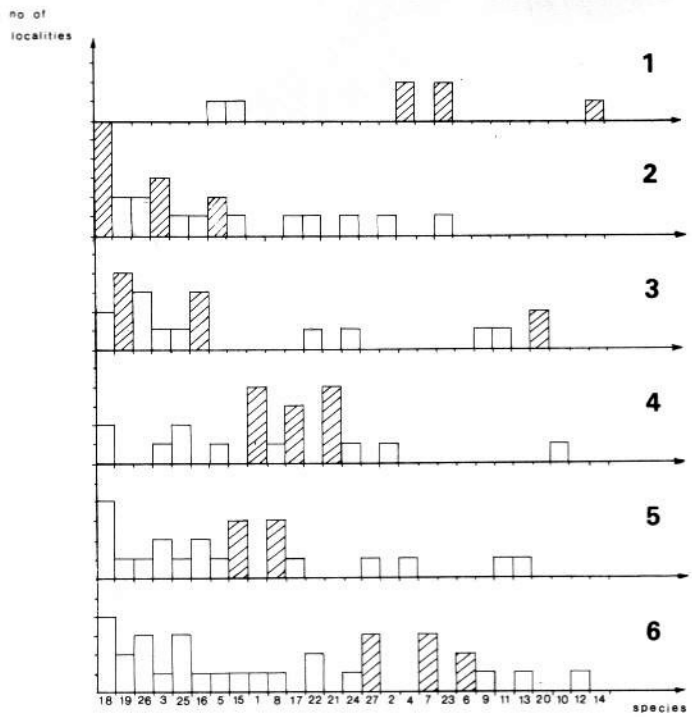

Fig. 4: Frequency distribution of the species according to the locality-groups. Hatched bars indicate the species characteristic for each group.

5. Literature:

BIELAK, T. (1964): Synantropic fauna of Diplopoda of Lublin. – Annls Univ. Marie Curie-Sklodowska, Lublin **19:** 199 - 133.

BLOWER, J.G. (1985): Millipedes. – Synopses of the British Fauna, 35: 242 pp. E. J. Brill, London.

DZIADOSZ, C. (1966): Materialien zur Kenntnis der Verbreitung der Tausendfüßler (Diplopoda) in Polen. – Fragm. faun., Warszawa **13** (1): 1 - 31.

ENGHOFF, H. (1974): On the distribution of millipedes in Denmark. – Ent. Meddr. **42:** 21 - 32.

GROMYSZ-KALKOWSKA, K. & H. TRACZ (1983): Thermal behaviour of *Proteroiulus fuscus* (AM STEIN) and *Cylindroiulus frisius* (VERHOEFF) (Diplopoda). – Ann. Warsaw Agricult. Univ. **30:** 27 - 34.

HEYDEMANN, B. (1960): Diplopoden eines Hamburger Müllplatzes. – Entom. Mitt. Hamburg **27:** 1 - 6.

JEDRYCZKOWSKI, W. (1982): Millipedes (Diplopoda) of Warsaw and Mazovia. – Memorabilia Zool. **36:** 253 - 261.

KEVAN, D.K. McE. (1983): A preliminary survey of known and potentially Canadian millipedes (Diplopoda). – Can. J. Zool. **61:** 2956 - 2975.

LOKSA, I. (1953): Millipede fauna of Bátorliget. – In: SZÉKESSY, V. (Ed.): Flora and Fauna of Bátorliget. – Akadémiai K., Budapest: 178 - 181 (in Hungarian).

LOKSHINA, I.E. (1960): On the Diplopod fauna of Moscow region. – Zool. Zh. **39:** 1737 - 1738.

MARGÓ, T. (1879): Budapest and surroundings in zoological respect. – Budapest: 116 - 117 (in Hungarian).

MEIDELL, B.A. (1979): Norwegian myriapods: Some zoogeographical remarks. – In: CAMATINI, M. (Ed.): Myriapod Biology. – Academic Press, London: 191 - 201.

SCHUBART, O. (1934): Tausendfüßler oder Myriapoda I. Diplopoda. – In: Die Tierwelt Deutschlands, **28:** 318 pp. Fischer, Jena.