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Chilopoda of linden-oak-hornbeam (*Tilio-Carpinetum*) and thermophilous oak forests (*Potentillo albae-Quercetum*) of the Mazovian Lowland

[With 4 tables and 3 figures in the text]

Abstract. Studies on species composition and structure of *Chilopoda* communities were carried out in linden-oak-hornbeam (*Tilio-Carpinetum*) and thermophilous oak forests (*Potentillo albae-Quercetum*) in the vicinity of Warsaw. Ecological and zoogeographical analysis was conducted on the collected material. Statistically significant differences were pointed out in density of *Lithobiomorpha* in linden-oak-hornbeam and thermophilous oak forests on the Mazovian Lowland. Constant species, i.e. *Lithobius mutabilis*, *Strigamia acuminata* and *Schendyla nemorensis*, were distinguished in *Chilopoda* communities of the two plant associations. Ecological analysis revealed that *Chilopoda* communities depended on such conditions of forest habitats as humidity or light-perviousness.

INTRODUCTION

The literature dealing with *Chilopoda* of Poland is scanty as only few regions have been faunistically examined so far (KACZMAREK 1980). Data on the fauna of *Chilopoda* of the Mazovian Lowland can be found merely in a couple of works (SELIVANOFF 1880, SŁÓSARSKI 1883, W. KACZMAREK 1963, GROŃSKA 1968). Also Polish works concerning ecology of this group are very meager. Information on ecology of particular species comes from predominantly faunistic works and is restricted to description of places where *Chilopoda* occur (J. KACZMAREK 1952, 1954, 1957, 1964a, b, 1963, GROŃSKA 1968). The role of *Chilopoda* in macrofauna of a pine wood on the area of the Kampinos Forest taken into account W. KACZMAREK (1963), while the only more detailed description of *Chilopoda* community was supplied by J. KACZMAREK (1977), who estimated density and recorded dominance structure on various areas of the Dębina reserve on the Wielkopolska Lowland. Foreign literature provides more abundant data on ecology of *Chilopoda*. Apart from a number of works dealing with various aspects of biology and ecology of certain species (PALMEN

and RANTALA 1954, LEWIS 1965, WIGNARAJAH and PHILLIPSON 1977, ALBERT 1983a, b, c, d, SERGEEVA 1983), there also are examinations aimed at defining the role of *Chilopoda* in a zoocoenosis under studies (ALBERT 1976, SERGEEVA, KUDRIASEVA and TITOVA 1985), or those which focus on description of the composition of *Chilopoda* communities in different habitats (BECKER 1982, ANDERSSON 1983, 1985). The most thoroughly examined item is the structure of *Chilopoda* communities in biocoenosis of hornbeam forest (WEIDEMANN 1972, ALBERT 1977, FRÜND 1987).

Being predators, *Chilopoda* are not trophically bound to any definite type of vegetation, yet various plant associations are conducive to the occurrence and specific character of certain microhabitats advatageous to these litter-soil animals. For this reason it is interesting to examine the composition and structure of *Chilopoda* communities in various types of plant associations. From the survey of literature quoted above it follows that so far no studies have been conducted on this invertebrate group either in linden-oak-hornbeam (*Tilio-Carpinetum*) or in thermophilous oak forests (*Potentillo albae-Quercetum*). The aim of the present studies was to examine the structure of these communities on some chosen sites in those habitats.

MATERIAL, METHODS AND STUDY SITES

Chilopoda fauna was collected in 1979–1984 in environs of Warsaw within complex studies on linden-oak-hornbeam and thermophilous oak forests on the Mazovian Lowland, carried out by the Institute of Zoology, Polish Academy of Sciences. The assumptions, range and aim of the studies were put forward by BAŃKOWSKA and GARBARCZYK (1989). In linden-oak-hornbeam forests the material was sampled at 6 sites: in the Modrzewina reserve in Mała Wieś near Belsk in 1981, 1982 and 1984, in the Dębina reserve near Klembów on two sites: in the variant of dry linden-oak-hornbeam forest (I) in 1980, 1981, 1984 and in the humid variant (II) in 1980 and 1981, in the forest district at Radziejowice (I) in 1984, in the Cyganka reserve near Truskaw on the area of the Kampinos National Park in 1979 and 1980 and in the King Jan III Sobieski reserve in 1984. In thermophilous oak forests the material was sampled at three sites: in the forest district at Radziejowice (II) in 1984 and on two sites in the B. Hryniewiecki reserve at Podkowa Leśna (I and II) in 1983 and 1984. A detailed description of the study sites is supplied in the work by KOTOWSKA and NOWAKOWSKI (1989).

For the elaboration of quantitative data the use was made of material sampled by litter sifting method. The litter-sifting samples were taken from these sites which were examined in 1981, 1982 and 1984. Each sample always comprised 10×0.1 m^2 of litter, taken in the period April–October, once about a fortnight. Only on the area of the Modrzewina and Dębina reserves the samples were taken once a month. The samples were hand-sorted.

The analysis of species composition also considered materials sampled by additional methods, i.e. those coming from Barber pitfall traps (10, 20 or 30 traps at

each site) emptied once a fortnight or once a month in April through October, from soil samples taken from the area of 10×0.1 m^2 and extracted in Tullgren apparatus and from samples taken by a split corer of 0.017 m^2 surface (10 samples from a site) and in case of linden-oak-hornbeam forest in the King Jan III Sobieski reserve, also collected by hand in June 1987. Barber traps were made use of during every season of studies on each site, except for the Dębina reserve (1981). Soil samples were taken in the Cyganka reserve in 1979 and in the Modrzewina reserve in 1982. In the Modrzewina reserve the material was also collected with the use of split corer in 1982. A total of 2460 *Chilopoda* individuals was sampled and identified.

SPECIES COMPOSITION, CONSTANCY AND FREQUENCY

A total of 17 *Chilopoda* species (Tab. I) occurred on the studied sites in linden-oak-hornbeam and thermophilous oak forests of the Mazovian Lowland. The recorded species accounted for 35% of *Chilopoda* fauna of Poland. Two taxons turned out new for the region of Mazovia, namely, *Lithobius muticus* C. L. KOCH and *L. tenebrosus fennoscandius* LOHMANDER. So far *L. muticus* was reported solely from western and southern part of Poland (J. KACZMAREK 1980). A female of this species was found in litter-sifted samples from a thermophilous oak forest on the site at Radziejowice. *L. tenebrosus fennoscandius* – a subspecies reported from Scandinavia and in Poland found in northern, eastern and central parts of the country (J. KACZMAREK 1980) — was found in linden-oak-hornbeam forest in the Modrzewina reserve, where a female was trapped in Barber trap.

From the studied sites in plots of *Tilio-Carpinetum* on the Mazovian Lowland, 14 species of *Chilopoda* were reported, while from the plots of *Potentillo albae-Quercetum* — 8 species (accounting for 54% and 31% of the species recorded on Mazovia, respectively). 5 species were common for the two habitats. Similarity of *Chilopoda* communities in the two plant associations expressed by the MARCZEWSKI–STEINHAUS index amounted merely to 0.29. The values of this index were also low while comparing *Chilopoda* communities from particular sites (Fig. 1), the highest values being recorded for the pairs of *Chilopoda* communities from proximal sites, i.e. from the plots of linden-oak-hornbeam forest at the Dębina reserve and from the two plots of thermophilous oak forest in the Hryniewiecki reserve. In all the other cases the value of this index did not exceed 0.60. Species structure of *Chilopoda* communities from the sites located in the same type of plant associations were not found to be more similar than those coming from linden-oak-hornbeam and thermophilous oak forest.

In order to define constancy of occurrence of particular *Chilopoda* species in habitats of the two studied plant associations, the constancy coefficient was employed after TISCHLER (1949). In *Chilopoda* communities from linden-oak-hornbeam forests, the following three species were absolutely constant: *Lithobius mutabilis*,

Table I. Characteristic of *Chilopoda* communities in studied linden-oak-horn

(n — species abundance, data from the samples of sifted litter;

% — contribution on percent; + + + — unrepresentative data from the

No	Species	Plant: *Tilio-Carpinetum*					
		Modrzewina res.		Dębina res. I		Dębina res. II	
		$n \pm a$	%	$n \pm a$	%	$n \pm a$	%
1	*Lithobius mutabilis* C. L. KOCH	5.39 ± 1.77	50.8	5.57 ± 1.40	36.8	2.43 ± 1.30	61.8
2	*L. lapidicola* MEINERT	0.16 ± 0.15	1.5				
3	*L. melanops* NEWPORT	+ + +	0.6				
4	*L. forficatus* (L.)	+ + +	0.3				
5	*L. pelidnus* HAASE	+ + +	0.3				
6	*L. calcaratus* C. L. KOCH						
7	*L. erythrocephalus* C. L. KOCH						
8	*L. muticus* C. L. KOCH						
9	*L. piceus* C. L. KOCH						
10	*L. agilis* C. L. KOCH						
11	*L. tenebrosus fennoscandius* LOHMANDER	+					
–	*L. (L.)* sp. adult	+ + +	1.5				
–	*L. (L.)* sp. epimorph. st.	2.16 ± 0.88	20.4	3.62 ± 2.18	23.9	+ + +	7.3
12	*L. curtipes* C. L. KOCH			3.71 ± 1.62	24.5	0.50 ± 0.38	12.7
–	*L. (M.)* sp. epimorph. st.			+ + +	4.4	+ + +	1.8
–	*L.* sp. anamorph. st.	0.36 ± 0.32	3.3	1.00 ± 0.85	6.6	+ + +	1.8
13	*Lamyctes fulvicornis* MEINERT	+					
14	*Strigamia acuminata* (LEACH)	1.55 ± 0.63	14.6	0.38 ± 0.34	2.5	+ + +	5.5
15	*Schendyla nemorensis* C. L. KOCH	0.71 ± 0.44	6.7	+ + +	0.3	+ + +	9.1
16	*Necrophleophagus longicornis* (LEACH)			+ + +	0.9		
17	*Pachymerium ferrugineum* C. L. KOCH						
	Total	10.61 ± 2.66	100.0	15.14 ± 5.53	100.0	3.93 ± 1.67	100.0
	Number of species	8		5		4	

Strigamia acuminata and *Schendyla nemorensis* (Tab. II). The constant species in linden-oak-hornbeam forests was *Lithobius curtipes*. The other 10 species (*Lithobius lapidicola, L. forficatus, L. pelindus, Necrophleophagus longicornis*) or among accidental species (*Lithobius melanops, L. erythrocephalus, L. piceus, L. agilis, L. tenebrosus fennoscandius, Lamyctes fulvicornis*).

It is hard to formulate any statements as to the species constancy of *Chilopoda* communities in thermophilous oak forests for only three sites were examined there. It should be noted however, that on all the examined sites in thermophilous oak forests there occurred the same species which were absolutely constant in linden-oak-hornbeam forests, namely, *Lithobius mutabilis, Strigamia acuminata* and

-beam forests and termophilous oak forests on the Mazowian Lowland

$\pm a$ – range of the confidence interval $= t_{\alpha} \frac{s}{\sqrt{n-1}}$ for $\alpha = 0.05$;

samples of sifted litter, + – species recorded only with the additional methods)

association									
				Potentillo albae-Quercetum					
Study area									
Radziejowice I		Cyganka res.	King Jan III Sobieski res.	Radziejowice II		B. Hryniewiecki res. I		B. Hryniewiecki res. II	
$n \pm a$	%	$n \pm a$	$n \pm a$	$n \pm a$	%	$n \pm a$	%	$n \pm a$	%
1.42 ± 1.07	30.9	+	+	+ + +	21.2	0.80 ± 0.61	31.7	2.12 ± 1.21	45.0
+ + +	3.6	+		+ + +	6.1				
		+	+						
		+							
						+ + +	3.2		
			+	+		+			
				+ + +	3.0				
		+							
+									
+ + +	1.8	+						+ + +	0.7
1.8 ± 1.30	40.0	+		0.58 ± 0.43	21.2	0.84 ± 0.66	33.3	1.96 ± 1.21	35.0
		+	+						
+ + +	7.3	+				+ + +	25.4	+ + +	2.9
+ + +	9.1	+		+ + +	6.1	+		0.52 ± 0.42	9.3
+ + +	7.3	+	+	+ + +	42.4	+ + +	4.8	0.36 ± 0.34	6.4
		+							
						+ + +	1.6	+ + +	0.7
4.58 ± 2.70	100.0	—	—	2.75 ± 2.03	100.0	2.52 ± 1.40	100.0	5.28 ± 2.20	100.0
5		9	5	6		6		4	

Schendyla nemorensis (Tab. II). These certainly were the species most often found in the linden-oak-hornbeam as well as in thermophilous oak forests. It was further evidenced by the frequency of their occurrence in the total number of litter-sifted samples from each of the examined habitats (Tab. II), which is regarded as constancy criterion according to BALOGH (1958) and WALLWORK (1976).

Chilopoda communities in the association of thermophilous oak forest differed by the presence of three species which were not recorded in the association of linden-oak-hornbeam forests, namely, *Lithobius calcaratus*, *L. muticus* and *Pachyme-*

Table II. Frequency (*F*) and constance (*C*) of *Chilopoda* in the studied linden-oak-hornbeam and thermo
C_1 — constancy calculated from studied areas; X — data have not been consid

No	Species	*Tilio-Carpinetum*			
		Modrzewina res.	Dębina res. I	Dębina res. II	Radziejowice I
		F(%)	*F*(%)	*F*(%)	*F*(%)
1	*Lithobius mutabilis*	83.9	100.0	85.7	58.3
2	*Lithobius lapidicola*	6.5	—	—	8.3
3	*Lithobius melanops*	3.2	—	—	—
4	*Lithobius forficatus*	3.2	—	—	—
5	*Lithobius pelidnus*	3.2	—	—	—
6	*Lithobius calcaratus*	—	—	—	—
7	*Lithobius erythrocephalus*	X	X	X	X
8	*Lithobius muticus*	—	—	—	—
9	*Lithobus piceus*	X	X	X	X
10	*Lithobius agilis*	X	X	X	X
11	*Lithobius tenebrosus fennoscandius*	X	X	X	X
–	*Lithobius* (*L.*) sp. adult	9.7	—	—	8.3
–	*Lithobius* (*L.*) sp. epimorph. st.	64.5	57.1	21.4	75.0
12	*Lithobius curtipes*	—	71.4	42.9	—
–	*Lithobius* (*M.*) sp. epimorph. st.	—	28.6	7.1	—
–	*Lithobius* sp. anamorph. st.	19.4	42.9	7.1	25.0
13	*Lamyctes fulvicornis*	X	X	X	X
14	*Strigamia acuminata*	61.3	28.6	21.4	25.0
15	*Schendyla nemorensis*	35.5	4.8	21.4	16.7
16	*Necrophleophagus longicornis*	—	14.3	—	—
17	*Pachymerium ferrugineum*	—	—	—	—

rium ferrugineum. These species prefer insolated, sunny and drier places and frequently populate crops on open areas or light-pervious places in various types of forests (Verhoeff 1937, Palmen 1949, Eason 1964, J. Kaczmarek 1980, Becker 1982, Fründ 1987). The most characteristic was the presence of *Lithobius muticus*, because its occurence is considered frequently as being connected with oaks (Thiele 1956, Loksa 1966, Fründ 1987).

In order to characterize *Chilopoda* communities of particular study sites with respect to the frequency of occurrence of the recorded species, the frequency index was employed (Balogh 1958, Wallwork 1976). And thus *Lithobius mutabilis* was the species most frequently recorded in sifted samples coming from four out of the seven examined sites, namely, from linden-oak-hornbeam forest in the Modrzewina and Dębina reserves (I and II) and from thermophilous oak forest in the Hryniewiecki reserve (II) (Tab. II). It may be well expected that also on the remaining sites, i.e. in linden-oak-hornbeam and thermophilous oak forest at Radziejowice (I and II) and on the other site at the Hryniewiecki reserve (I), frequency index of this species was actually much higher, as most of juvenile specimens, very numerous in sifted samples from these sites (Tab. I), were denoted as *Lithobius* (*L.*) sp. epimorphic or anamorphic stadia while these undoubtedly were specimens of *L. mutabilis*. Hence it

philous oak forests of the Mazovian Lowland. (C_1 — constancy calculated from the samples of sifted litter; ered in calculating of F and C_1, which are based on the sifted litter samples)

		Potentillo albae-Quercetum				
Total		Radziejowice II	Hryniewiecki res. I	Hryniewiecki res. II	Total	
C_1 (%)	C_2 (%)	F (%)	F (%)	F (%)	C_1 (%)	C_2 (%)
84.6	100.0	33.3	28.0	76.0	48.4	100.0
3.8	50.0	16.7	—	—	3.2	33.3
1.3	16.6	—	—	—	—	—
1.3	50.0	—	—	—	—	—
1.3	33.3	—	—	—	—	—
—	—	—	4.0	—	1.6	33.3
X	16.6	X	X	X	X	66.6
—	—	8.3	—	—	1.6	33.3
X	16.6	X	X	X	X	—
X	16.6	X	X	X	X	—
X	16.6	X	X	X	X	—
5.1	50.0	—	—	—	1.6	33.3
56.4	83.3	50.0	36.0	52.0	45.2	100.0
26.9	66.6	—	—	—	—	—
9.0	33.3	—	—	—	—	—
23.1	83.3	—	20.0	8.0	11.3	66.6
X	16.6	X	X	X	X	—
39.7	83.3	16.7	—	28.0	14.5	100.0
33.3	100.0	41.7	12.0	20.0	21.0	100.0
3.8	33.3	—	—	—	—	—
—	—	—	4.0	4.0	3.2	66.6

may be assumed that it was the most frequent *Chilopoda* species on all of the examined sites. Another species most frequently occurring on a majority of the studied sites was *Strigamia acuminata*. It was frequently present on three sites in linden-oak-hornbeam forests at the Modrzewina, Dębina reserve (II) and at Radziejowice (I) as well as on one site in thermophilous oak forest in the Hryniewiecki reserve (II). The third species of a high occurrence frequency on the studied sites was *Schendyla nemorensis*. This species was slighty less frequent or equally frequent in linden-oak-hornbeam forests as *Strigamia acuminata*, yet whereas on the site in thermophilous oak forest at Radziejowice (II), the value of frequency index estimated for *Sch. nemorensis* exceed even that of *Lithobius mutabilis*, while on the site in the Hryniewiecki reserve it was the second most frequent species. On the whole, constancy of this species in litter-sifted samples from the sites in thermophilus oak forests was greater than that of *S. acuminata*. *Lithobius curtipes* was found in litter-sifted samples only on two sites in linden-oak-hornbeam forest in the Dębina reserve, where it attained the second highest value of frequency index, being, after *L. mutabilis*, the second species most frequently found there. The other species, i.e. *L. lapidicola*, *L. melanops*, *L. forficatus*, *L. pelidnus*, *L. calcaratus*, *L. muticus*, *Necrophloephagus longicornis* and *Pachymerium ferrugineum*, were recorded only sporadically in litter samples.

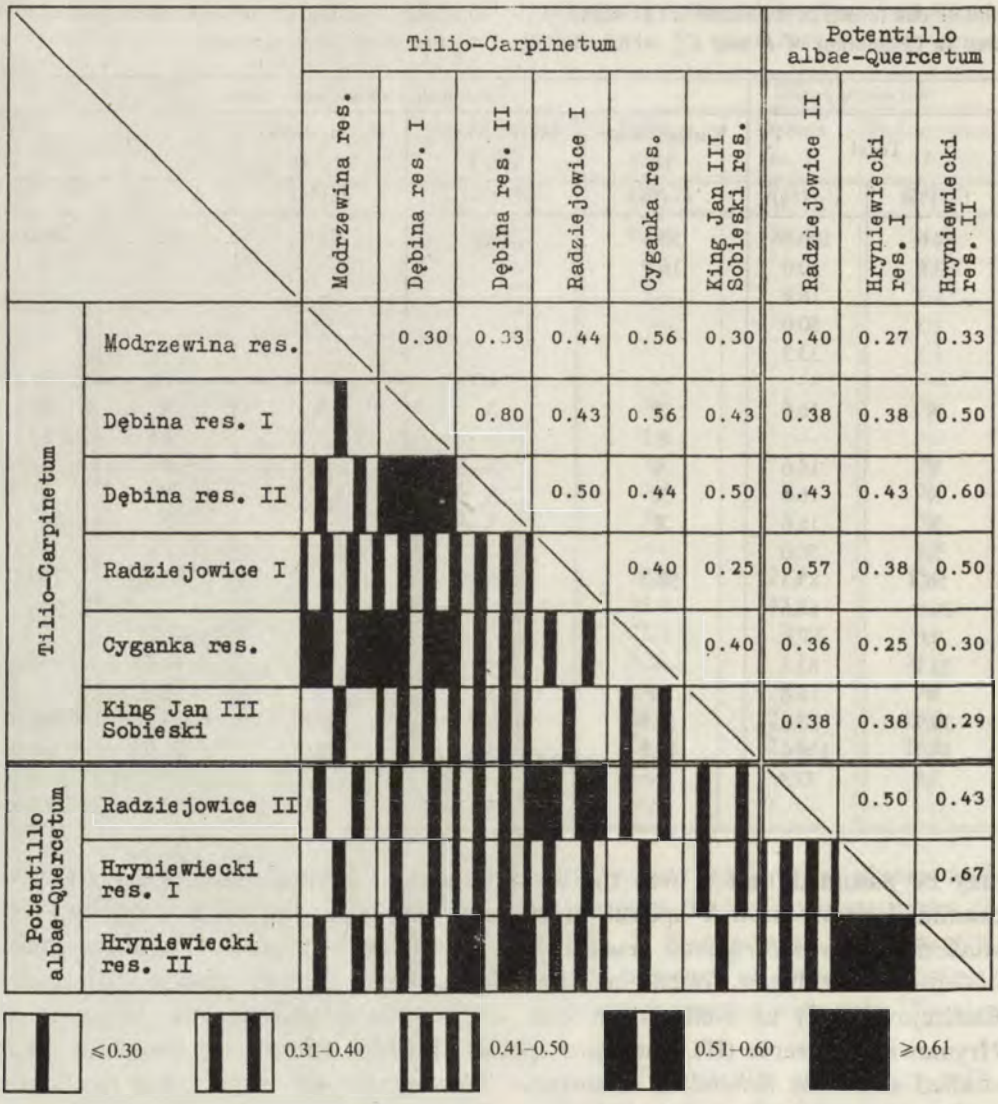

Fig. 1. Similarity of species composition of *Chilopoda* communities in the studied linden-oak-hornbeam forests and thermophilous forests on the Mazovian Lowland (according to the MARCZEWSKI-STEINHAUS index).

DENSITY

The highest value of *Chilopoda* density was estimated for the site I in linden-oak-hornbeam forest in the Dębina reserve (Tab. I). Slightly lower value of their density was calculated for the site in linden-oak-hornbeam forest in the

Modrzewina reserve. Difference between the two values was of no statistical significance. However, statistically significant differences were noted while comparing values of *Chilopoda* density estimated for these two sites with the values of density calculated on all the other sites, both in linden-oak-hornbeam and thermophilous oak forests alike. For the two sites in linden-oak-hornbeam forests at the Dębina reserve (II) and Radziejowice (I) the recorded difference in *Chilopoda* density was statistically insignificant (Fig. 2). Statistical significance of differences in total density of *Chilopoda* was examined by means of COCHRAN–COX test (COCHRAN, COX 1957).

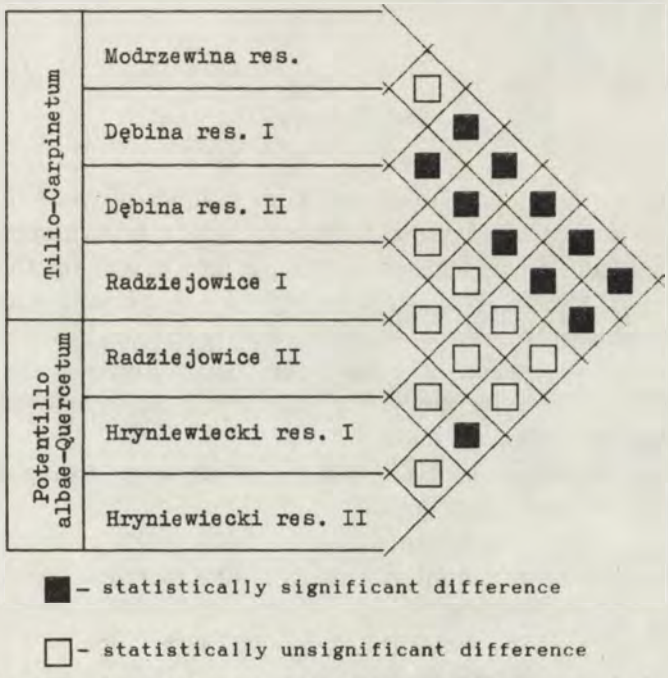

Fig. 2. Results of Cochran — Cox text for statistical significance of difference (on the level p = 0,05) in the density of Chilopoda on the studied areas of linden-oak-hornbeam forests and thermophilous oak forests on the Mazovian Lowland.

Out of the three sites in thermophilous oak forests, the site II in the Hryniewiecki reserve was marked for the highest density of *Chilopoda*. On the other two sites in thermophilous oak forests, i.e. at Radziejowice (II) and on the site I in the Hryniewiecki reserve, the estimated density was by two times lower, yet statistically significant difference was calculated only in case of *Chilopoda* density on the site II in the Hryniewiecki reserve and on the site II at Radziejowice.

On the basis of data from litter-sifted samples taken in the season of 1984 from three sites in linden-oak-hornbeam forests (except for the site II at Dębina) and from the three sites in thermophilous oak forests, it was found out that *Chilopoda* density in linden-oak-hornbeam forests on the Mazovian Lowland was about 3.5 times higher than in thermophilous oak forests. The values of *Chilopoda* density recorded

in these two types of habitats amounted to 12.58 ind./m^2 and 3.58 ind./m^2 respectively, the difference being statistically significant. The difference was caused by unlike density of *Lithobiomorpha* in the two studied types of forests. In linden-oak-hornbeam forests of the Mazovian Lowland their density came up to 12.04 ind./m^2, while in thermophilous oak forests it was 2.76 ind./m^2, the difference being statistically significant. On the other hand, density of *Geophilomorpha* in the two types of forests was similar, namely it amounted to mean 1.13 ind./m^2 in linden-oak-hornbeam forests and to 0.82 ind./m^2 in thermophilous oak forests. COCHRAN–COX test revealed that the difference in these values was statistically insignificant.

DOMINANCE STRUCTURE

On the basis of the material obtained from samples of sifted litter, percentage contribution was estimated of particular species to the total number of *Chilopoda* collected on four sites in linden-oak-hornbeam forests and on the three sites in thermophilous oak forests. The estimates considered species-unidentified juvenile specimens *Lithobiomorpha*, whose number was proportionally divided into the number of all the specimens of each genus (anamorphic stadia) or subgenus (epimorphic stadia). The same method of calculation was employed in relation to mature specimens identified to subgenus only.

In dominance structure of *Chilopoda* 5 classes were distinguished after the following criteria of dominance index:

eudominant	> 50.0%
dominant	10.1 — 50.0%
influent	5.1 — 10.0%
recedent	2.1 — 5.0%
subrecedens	⩽ 2.0%

On all the studied sites, both in linden-oak hornbeam and in thermophilous oak forests, a strikingly high percentage share in *Chilopoda* communities was contributed by one species only, i.e. *Lithobius mutabilis* (Tab. III). On the sites in linden-oak-hornbeam forests, the contribution of *L. mutabilis* ranged slightly from 65.2% to 74.8%. In Modrzewina and at Radziejowice the second most abundant species was litter *Geophilomorpha – Strigamia acuminata*. This species was the dominant on the site in Modrzewina, which was the most abundant in species, while at Radziejowice it was one of influential species, along with *Lithobius lapidicola* and *Schendyla nemorensis*. All these three influents had approximately the same percentage contribution to the community, the differences among them not exceeding 2%. Also in Modrzewina the two species accompanied *Strigomia acuminata, Schedyla nemorensis* — as influent and *Lithobius lapidicola* — as recedent. The main difference in dominance structure between the two sites in linden-oak-hornbeam forests in Modrzewina and at Radziejowice (I) consisted in a relatively large class of

subrecedents in the former, which included such species as *Lithobius melanops, L. fortificatus, L. pelindus*. Furthermore, it should be remembered that also other species were found in Modrzewina, not recorded in litter-sifted samples but discovered by additional methods (*Lithobius tenebrosus fennoscandius, Lamyctes fulvicornis*), while on the site at Radziejowice (I) there was the lack of recedents and subrecedents, while additional methods turned out only one species (*Litobius agilis*). On the two sites in the Dębina reserve the second dominating species after *L. mutabilis* was *L. curtipes*, *Strigamia acuminata* being either a recedent or influent there. The percentage contribution of *Schendyla nemorensis* to *Chilopoda* communities on the studied sites in linden-oak-hornbeam forests was fairly constant. The species was an influent on three sites and only on the site I in the Dębina reserve it was a subrecedent, along with *Necrophloephagus longicornis*, which occurred solely on this site.

Table III. Dominance structure (in percent) of the *Chilopoda* communities in the studied linden-oak-hornbeam forests and thermophilous oak forests on the Mazovian Lowland

No	Species	*Tilio-Carpinetum*				*Potentillo albae-Quercetum*		
		Modrzewina res.	Dębina res. I	Dębina res. II	Radziejowice I	Radziejowice II	Hryniewiecki res. I	Hryniewiecki res. II
1	*Lithobius mutabilis*	74.7	65.1	70.6	74.8	36.1	85.2	83.6
2	*Lithobius lapidicola*	2.2	—	—	8.8	10.3	—	—
3	*Lithobius melanops*	0.9	—	—	—	—	—	—
4	*Lithobius forficatus*	0.4	—	—	—	—	—	—
5	*Lithobius pelidnus*	0.4	—	—	—	—	—	—
6	*Lithobius calcaratus*	—	—	—	—	—	8.5	—
7	*Lithobius muticus*	—	—	—	—	5.1	—	—
8	*Lithobius curtipes*	—	31.1	14.9	—	—	—	—
9	*Strigamia acuminata*	14.6	2.5	5.4	9.1	6.1	—	9.3
10	*Schendyla nemorensis*	6.7	0.3	9.1	7.3	42.4	4.7	6.4
11	*Necrophleophagus longicornis*	—	0.9	—	—	—	—	—
12	*Pachymerium ferrugineum*	—	—	—	—	—	1.6	0.7

On the sites in thermophilous oak forest in the Hryniewiecki reserve, *L. mutabilis* was an eudominant, while on the site at Radziejowice it merely co-dominated with *Schendyla nemorensis* and *Lithobius lapidicola* (Tab. III). Thus it was the only site where *L. mutabilis* was not an eudominant and where *Schendyla nemorensis* had such a great share in *Chilopoda* community. The influents in the community from this site were *Strigamia acuminata* and *Lithobius muticus*. None of these species was a second dominant on either of the sites in the Hryniewiecki reserve; the influents on the site I included *Lithobius calcaratus*, while on the site II — *Strigamia acuminata* and *Schedyla nemorensis*. On both sites *Pachymerium ferrugineum* was the subrecedent.

In order to compare dominance structure of *Chilopoda* communities, the Morisita index was applied (Horn 1966). The greatest similarity of dominance

structure was observed in case of *Chilopoda* communites from linden-oak-hornbeam forests at Modrzewina and Radziejowice (I), from the two sites in thermophilous oak forest at the Hryniewiecki reserve as well as from the site in thermophilous oak forest at the Hryniewiecki reserve (II) and linden-oak-hornbeam forests in Modrzewina and at Radziejowice (I) (Fig. 3). Fairly close similarity of communities from these sites resulted primarily from a very high and alike contribution of *Litobius mutabilis* as well as similar shares of *Strigamia acuminata* and *Schendyla nemorensis*, i.e. the species classiefied here as absolutely constant for linden-oak-hornbeam and thermophilous oak forests of the Mazovian Lowland. More numerous group of subrecedents hardly affected the value of the MORISITA index, which further increased similarity of the communities from these sites.

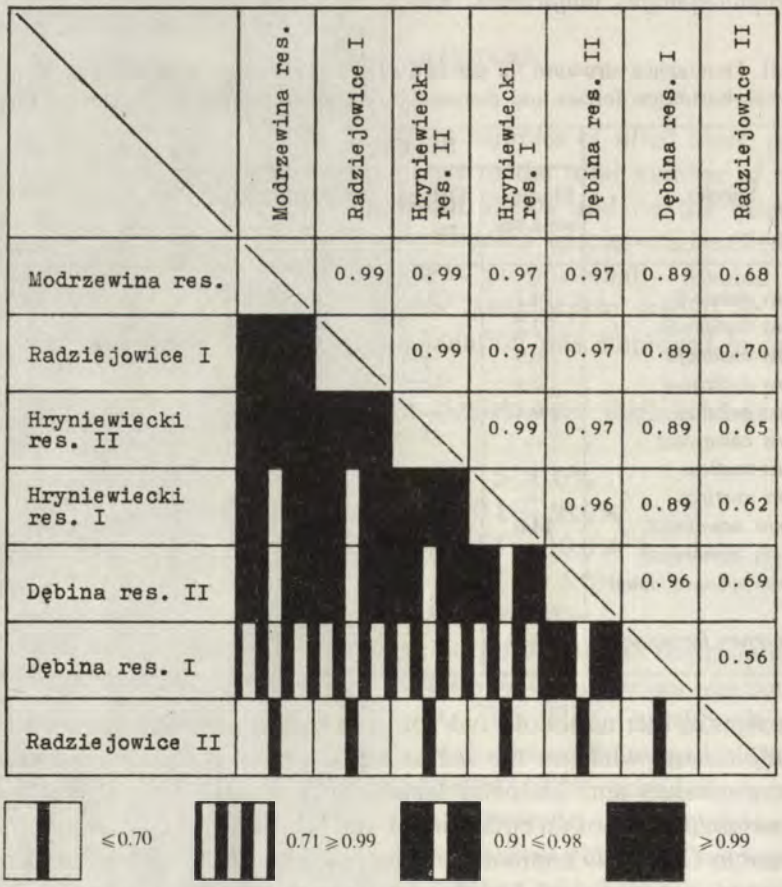

Fig. 3. Similarity of dominance structure of *Chilopoda* communities in the studied linden-oak-hornbeam forests and thermophilous oak forests on the Mazovian Lowland (according to the MORISITA index).

The least similar were the *Chilopoda* communities from the site I in linden-oak-hornbeam forest at the Dębina reserve and from the site in thermophilous oak forest at Radziejowice. The communities from these two sites were also marked

for the greatest difference in the values of dominance index for *Lithobius mutabilis* (Tab. III).

On the whole, the value of MORISITA index for *Chilopoda* communities from linden-oak-hornbeam and thermophilous oak forests of the Mazovian Lowland was fairly high, which pointed to a close similarity of dominance structure of *Chilopoda* communities from the studied sites.

ECOLOGICAL ANALYSIS

Among habitat conditions which determine the occurrence of *Chilopoda*, the most important are moisture conditions (BLOWER 1955, J. KACZMAREK 1979, LEWIS 1981). Pronounced susceptibility to drying up is the reason of a criptic mode of life of these animals (EASON 1964). Hence distribution of *Chilopoda* is highly dependent on accessibility of proper microhabitats of diversified coverage, which, in the first place, can be found in forest habitat. For this reason *Chilopoda* are more or less bound to this habitat (J. KACZMAREK 1979). Moreover, as these predators do not show any special preferences as to the chemical composition of soil (LEWIS 1981), it is difficult to distinguish explicitly stenotopic or oligotopic species according to the classification suggested by CZECHOWSKI and MIKOŁAJCZYK (1981). All the species recorded during present studies ranked among forest polytopes or eurytopes. It is natural that forest species prevailed in the species composition of communities both in linden-oak-hornbeam and thermophilous oak forests. Percentage contribution of these species to the total number of recorded taxons amounted to 57.1% and 62.5% in the two types of forests respectively.

Various forms of protection against drying can be perceived at *Litobiomorpha* and *Geophilomorpha*. The latter, being usually less hardy, find shelter under the soil surface. Thus they neither depend on the soil coverage nor are as much bound to forest soil as *Lithobiomorpha* (BLOWER 1955, LEWIS 1981, DUNGER 1983). It was well seen in case of *Geophilomorpha* occurring on the examined sites. Out of the four species only one, i.e. *Strigamia acuminata*, was bound to the forest habitat, being a litter species of humid deciduous or mixed forests (GROŃSKA 1968, MATIC 1972, J.KACZMAREK 1979, FRÜND 1987). The other three species, i.e. *Schendyla nemorensis*, *Necrophloephagus longicornis* and *Pachymerium ferrugineum*, rank among eurytopes. They may be found in forests, on open areas as well as in man-transformed habitats. *N. longicornis* and *P. ferrugineum* are more bound to meadow than forest habitats (EASON 1964, DUNGER 1983, ANDERSSON 1985). Therefore a noteworthy fact was the occurrence of *P. ferrugineum* in thermophilous oak forest, for the species is regarded as little sensitive to changes in moisture conditions, which allows it to inhabit both flooded meadows as well as insolated plots of pine woods, i.e. it very well tolerates extreme for *Chilopoda*, habitat conditons (PALMEN, RANTALA 1954, EASON 1964, DUNGER 1983).

Out of 13 *Lithobiomorpha* species recorded to occur in linden-oak-hornbeam and thermophilous oak forests of the Mazovian Lowland, only 4 ranked among

eurytopes. These were: *Lithobius melanops* — prefering moist and warm spots and not avoiding anthropogenic habitats (Eason 1964, Matic 1966, Barber 1985); *L. forficatus* — most widespread eurytope, common in forests and on open areas as well as in man-managed places, found under logs, stones, in gardens, parks, shrubberies, cellars, store-rooms, compost-heaps and brids' nests, occuring in mountains up to the height of 2000 m asl (Eason 1964, Matic 1966, Zalesskaja 1978); *L. erythrocephalus* — occuring in various types of forests, parks, cementeries, on meadows, road verges, in man-transformed habitats (Matic 1966, Grońska 1968, Andersson 1985), recorded, as the only eurytopic *Lithobiomorpha*, in thermophilous oak forests, both at Radziejowice as well as in the Hryniewiecki reserve (I); *Lamyctes fulvicornis* — known as the species prefering streams' banks, yet frequently found in habitats other than vicinity of water courses, i.e. in forests, shrubberies, road verges, synanthropic habitats, even in glass-houses (J. Kaczmarek 1980, Lewis 1981, Andersson 1985).

The other *Lithobiomorpha* were forest polytopes. The most numerously occuring in both types of the studied forests was *Lithobius mutabilis*. It is one of the most common *Lithobius* species in Poland (J. Kaczmarek 1979). It occurs all over Poland, being found in the Tatra mountains up to the height of 2000 m asl (Łomnicki 1963, J. Kaczmarek 1980). It is a forest species, primarily a litter one, more seldom found under bark of stumps, under moss or in rotten wood (J. Kaczmarek 1952, 1954, Thiele 1956, Zalesskaja 1978, Albert 1982, Fründ 1987), nonetheless, also it was reported from linden-oak-hornbeam forests and mixed woods on the Łódź Highland (Grońska 1968). In both of the studied habitats there was also found another *Lithobiomorpha* species, classified to forest polytopes in the present work, namely, *L. lapidicola*. It occurred inabundantly in linden-oak-hornbeam forests and in thermophilous oak forests. Scanty data on its ecology, due to frequent mistaking it for other species (Andersson 1980, Eason 1982), make it difficult to define its ecological requirements. Undoubtedly it is mainly bound to forest habitat (Eason 1964, Grońska 1968, J. Kaczmarek 1979). Other forest polytopes of the order *Lithobiomorpha* occurred exclusively either in linden-oak-hornbeam forests or in termophilous oak forests.

In the examined linden-oak-hornbeam forests there were found 5 species of forest polytopes of the order *Lithobiomorpha*, out of which the most numerous was *L. curtipes*, althought it did not occur on all the sites in linden-oak-horbeam forests (Tab. I). The species was reported from Europe from various types of forests, but on the south it is considered a mountain species and it was found at the height of 1500 –2000 m asl (Matic 1966, Zalesskaja 1978). According to Fründ (1987), while co-occurring with *L. matabilis* in a beech forest, *L. curtipes* remained in deeper litter layers rather, as less hardened to dryness. The other four species of forest polytopes were sporadically found in the studied linden-oak-hornbeam forests: *L. pelidnus* — known from various types of forests (Matic 1966, J. Kaczmarek 1980), collected in moist, deep litter of alder forest on the Łódź Higland (Grońska 1968) and also considered a litter species by J. Kaczmarek (1979), however according to the studies carried out by Fründ in a beech forest (1987), it occurred mainly in

stumps and in their vicinity, which would rather point at its preference for more humid places; *L. piceus* — regarded as litter species of deciduous and mixed forests, prefering shady and moist places (VERHOEFF 1937, GROŃSKA 1968, J.KACZMAREK 1980); *L. agilis* – also a litter species of deciduous and mixed forests, occurring also at somewhat drier places (GROŃSKA 1968, J. KACZMAREK 1980), THIELE (1956) considered it, together with *L. muticus*, as a species accompanying the associations *Querceto-Carpinetum polytrichetosum*. *L. tenebrosus fennoscandius* was so far found in Poland in deciduous forests only (J. KACZMAREK 1980), yet in Scandinavia it is most common in coniferous forests, not showing any special preference for any distinct type of vegetation or surface morphology (ANDERSSON 1985).

In thermophilous oak forests there occurred only two forest polytopes of the order *Lithobiomorpha*, namely, *L. calcaratus* and *L. muticus*. According to J. KACZMAREK (1980) and BECKER (1982), the two species in question show a fairly remarkable ecological plasticity. This, however, does not make them eurytopic species, but only attests to their ability to survive under conditions of lesser humidity as compared to other *Lithobiomorpha*, because the two species prefer mainly forest habitats, where they inhabit drier and more insolated places (EASON 1964, BARBER 1985, FRÜND 1987).

ZOOGEOGRAPHICAL ANALYSIS

Among *Chilopoda* collected in linden-oak-hornbeam forests of the Mazovian Lowland there were distinguished cosmopolitan, Holarctic, Palaearctic and European species. The species composition of *Chilopoda* communities in thermophilous oak forests differed from that in linden-oak-hornbeam forests by the absence of Palaearctic element. Nonetheless, the percentage contributions of particular zoogeographical elements estimated on the basis of species composition were similar in the two plant associations (Tab. IV). An overwhelmingly predominant in the two types of habitats were European elements, the occurrence range of particular species being, however, restricted to some parts of the continent only. The central European species included: *Lithobius mutabilis*, the most abundant species in the two studied types of plant associations, *L. pelindus*, *L. piceus*, *L. agilis* — found in linden-oak-hornbeam forests only and *L. muticus*, found in thermophilous oak forest. The subspecies *L. tenebrosus fennoscandius*, found in linden-oak-hornbeam forest, is known mainly from Scandinavia, althought it also occurs numerously in Poland. The other European species are found all over Europe. These were: *L. melanops* — found in *Chilopoda* communities from linden-oak-hornbeam forests, *L. calcaratus* — found in thermophilous oak forest, *L. lapidicola* and *L. erythrocephalus* — recorded in both types of the studied plant associations on the Mazovian Lowland. The other species recorded in linden-oak-hornbeam and thermophilous oak forests were Holarctic or cosmopolitan. Their shares in species composition of *Chilopoda* communities were approximately the same in both plant associations (Tab. IV). Almost all of them

(except for *Strigamia acuminata*) betrayed a tendency to occur in habitats more or less transformed by man, e.g. *Lamyctes fulvicornis, Schendyla nemorensis* (ANDERSSON 1985), *Pachymerium ferrugineum* (PALMEN, RANTALA 1954), or distinctly showed features of synanthropization inhabiting vicinity of human settlements, as *Lithobius forficatus* (EASON 1964, MATIC 1966), or even glass-houses, as *Necrophleophagus longicornis* (J. KACZMAREK 1979). Owing to their synanthropic tendencies *Lithobius forficatus* was introduced from Europe to North America, Newfoundland and South America (EASON 1964), while *Lamyctes fulvicornis* widespread, most likely, from the Canary Island and Azores (PALMEN 1949) and presently is common all over Holarctic, while individual reports of its occurrence come also from southern Africa and south-western Australia (EASON 1964, ZALESSKAJA 1978). These two cosmopolitan species were recorded in linden-oak-hornbeam forests. Also *Pachymerium ferrugineum*, recorded only in thermophilous oak forest, is one of the most widespread species of European origin, which, owing to its high ecological plasticity, presently ranks cosmopolitan species (PALMEN, RANTALA 1954, EASON 1964).

Table IV. Contribution of zoogeographical elements to the species composition of the studied plant association

Distribution	*Tilio-Carpinetum*	*Potentillo albae-Quercetum*
European	57.1	62.5
Holarctic	21.4	25.0
Cosmopolitic	14.3	12.5
Palearctic	7.1	—

Strigamia acuminata and *Schendyla nemorensis*, which along with the central European species *Lithobius mutabilis*, were most frequently found both in linden-oak-hornbeam and thermophilous oak forests, are Holarctic element, yet a widespread occurrence of *Strigamia acuminata* in the proximity of North American ports and in Newfoundland is an evidence, according to EASON (1964), that the species was introduced there from Europe. Also *Schendyla nemorensis* and *Necrophloephagus longicornis* were introduced from Europe to North America and Newfoundland (EASON 1964). *N. longicornis* was sampled only in linden-oak-hornbeam forests.

Notwithstanding a considerable share of cosmopolitan and Holarctic elements in the species composition of *Chilopoda* communities in linden-oak-hornbeam and thermophilous oak forests on the Mazovian Lowland, a majority of species ranked among ingenious European element, with the exception of *Lamyctes fulvicornis*. The only Palaearctic element noted in linden-oak-hornbeam forests was *Lithobius curtipes*, whose occurrence range comprises three biomes, namely, taiga, deciduous forests of temperate climate and steppes, and spreads well beyond the polar circle (ZALESSKAJA 1978).

SUMMARY

Chilopoda found in the studied Mazovian linden-oak-hornbeam forests accounted for 54% of the *Chilopoda* fauna of this region, while that found in thermophilous oak forests — for 31%. Hence the habitat of these two plant associations is fairly representative of *Chilopoda* fauna of Mazovia.

Chilopoda communities of the two plant associations do not differ, with respect to the number of species, from *Chilopoda* communities of other deciduous forests in Central Europe, where 5–10 *Chilopoda* species were found to occur (J. KACZMAREK 1952, THIELE 1956, ALBERT 1979, BECKER 1982, FRÜND 1987). In Mazovian linden-oak-hornbeam forests 4–9 species were recorded, while in thermophilous oak forests 4–6 species of *Chilopoda* occured.

Among 5 species common for *Chilopoda* communities from linden-oak-hornbeam and thermophilous oak forests, 3 species occurred in these habitats with absolute constancy, namely, *Lithobius mutabilis, Strigamia acuminata* and *Schendyla nemorensis*. The species most frequently found in the two types of forests was *Lithobius mutabilis*. On a majority of sites it was euconstant and eudominant. The dominance of this central European forest species in *Chilopoda* communities of linden-oak-hornbeam forests in western Poland (*Galio silvatici-Carpinetum*) was observed by J. KACZMAREK (1977, 1989). The species was also dominating in beech forests of central Europe (THIELE 1956, ALBERT 1982, FRÜND 1987). Furthermore, it was the most abundant species in beech forests at Wielkopolska (J. KACZMAREK 1952). Notwithstanding the common occurrence of *L. mutabilis* in various types of forest stands (MATIC 1966, GROŃSKA 1968, J. KACZMAREK 1980), the species is most closely bound to the habitat of natural deciduous forests of central Europe, such as beech, linden-oak-hornbeam and thermophilous oak forests. In case of the other two species, i.e. *Strigamia acuminata* and *Schendyla nemorensis*, absolute constancy of occurrence was not coupled with their frequency in samples and dominance on particular sites. The share of *Strigamia acuminanta* in *Chilopoda* communities did not exceed 15%, while of *Schendyla nemorensis* – 10%, except for the community of *Chilopoda* on the site in thermophilous oak forest at Radziejowice, where the species was one of three co-dominants. However, the contribution of the two species in question of to the *Chilopoda* communities under studies was higher than in linden-oak-hornbeam forests in western Poland, where they accounted for about 2% (J. KACZMAREK 1977, 1989).

Although the same *Chilopoda* species were absolutely constant in the two studied plant associations, yet the communities differed widely, as evidenced by a low value of MARCZEWSKI-STEINHAUS index. Notable differences in species composition were also noted while comparing *Chilopoda* communities from particular sites. Greater similarity of species composition of the *Chilopoda* communities under comparison could result from proximity of particular sites, which was best seen in case of the two sites in linden-oak-hornbeam forest in the Dębina reserve, two sites in thermophilous oak forest in the Hryniewiecki reserve or even at Radziejowice, where the two sites were situated in two different plant associations.

Differences in species composition of *Chilopoda* communities from linden-oak-hornbeam and thermophilous oak forests were certainly affected by moisture conditions inherent in the very character of the habitats, e.g. the presence of well insolated patches of thermophilous oak forests. Thus *Chilopoda* communities in thermophilous oak forests lacked typically litter species preferring greater humidity, e.g. *Lithobius curtipes* or *L. piceus*. Instead of them there occured such species as *L. calcaratus, L. muticus, Pachymerium ferrugineum. L. calcaratus* and *L. muticus* prefer drier and more insolated places, although they rank among forest species (Eason 1964, Barber 1985, Fründ 1987). Hence they may be regarded as species characteristic of this type of forest. *P. ferrugineum* is an eurytopic species, more frequently found on open areas (Palmen, Rantala 1954) and therefore it cannot be considered as characteristic of *Chilopoda* communities in thermophilous oak forests.

It is not certain, however, whether the impoverishment of species composition of *Chilopoda* communities in thermophilous oak forests (by 9 species which were found in linden-oak-hornbeam forests in the same region), resulted solely from different habitat conditions. Apart from well insolated patches in thermophilous oak forests abounded also shady and more humid places, whose micro-habitats should satisfy preferences of some less demanding, eurytopic species, such as *Lithobius melanops, L. forficatus, Lamyctes fulvicornis, Necrophleophagus longicornis*, or even certain other species numbered among forest polytopes. It is not unlikely that differences in species composition of *Chilopoda* communities in the two plant associations stemmed, to a certain extend from the fact that the habitat of thermophilous oak forest was represented merely by thee sites, two of which were located pretty close to each other. As compared to the examined six sites in linden-oak-hornbeam forest, the record of species composition of *Chilopoda* communities from thermophilous oak forests may be incomplete. It may well be that litter species are replaced by those populating tree trunks, which, however, could not possibly have been stated, as diversity of microhabitats had not been taken under consideration while choosing the subsequently applied sampling methods.

Impoverishment of *Chilopoda* communities in thermophilous oak forests was also reflected in *Chilopoda* density, *Lithobiomorpha* in particular, which was 4 times lower than in linden-oak-hornbeam forests. Thus it may be concluded that although it is questionable whether species composition of *Chilopoda* communities in thermophilous oak forests was actually poorer, yet, beyond all doubt, a specific character of these plant associatons and the presence of more vast, well insolated patches of the forest bring about qualitative and quantitative changes in *Chilopoda* communities, affecting, litter species, i.e. *Lithobiomorpha*.

The values of *Chilopoda* density in linden-oak-hornbeam forests on the Mazovian Lowland, which ranged widely from 3.93 ind./m^2 to 15.14 ind./m^2, were however, much smaller than the values recorded in central European beech forest (*Luzulo-Fagetum*), i.e. 78.28 ind./m^2, the value having been estimated on the basis of material also sampled by means of litter sifting (Albert 1982). It is noteworthy that density of *Lithobiomorpha* was 6 times higher, while of *Geophilomorpha* — 4 times

higher. It may be therefore assumed that *Lithobiomorpha* density is subject to greater changes due to the type of forest (beech, linden-oak-hornbeam, thermophilous oak forest) than the density of *Geophilomorpha*.

The consequence of various species composition and density of *Chilopoda* communities in both plant associations under studies, was a different dominance structure, which, apart from several common features, was fairly diversified in each of the studied communities. All the *Chilopoda* communities from the studied sites in linden-oak-hornbeam and thermophilous oak forests on the Mazovian Lowland were decidedly dominated by the central European species *Lithobius mutabilis*, which was an eudominant on almost all the sites.

A pronounced domination of two *Lithobiomorpha* species over the other species in *Chilopoda* communities was recorded in a good deal of forest ecosystems (Levis 1965, Wignarajah, Phillipson 1977, Korobejnikov 1977, Krivoluckij, Marakušina and Smurov 1977, Albert 1979, Fründ 1987). Typical in this respect were *Chilopoda* communities in the Dębina reserve, where the second dominant was *Lithobius curtipes*. A similar dominance structure to that recorded on the two sites in linden-oak-hornbeam forest, i.e. the greatest share contributed by *L. mutabilis* and slighty smaller — by *L. curtipes*, were noted in a beech forest in Western Germany (Albert 1979, Fründ 1987). In a linden-oak-hornbeam forest in the Jakubowo reserve near Poznań, a similar dominance pattern was observed, although *L. mutabilis* had a smaller percentage share in the community, accounting for about 50% (J. Kaczmarek 1989). Dominance of these two species was also recorded in another reserve on the Wielkopolska Lowland, in the same type of plant association (J. Kaczmarek 1977), yet dominance relations between the two species were inverse: the first dominating species was *L. curtipes*, and *L. mutabilis* — the second. *L. curtipes* was also the first dominant in other forest habitats of the same reserve (flood-plane forest and heron preserve area), while the second dominants were other *Lithobiomorpha* species. Hence the dominance pattern of *L. mutabilis* and *L. curtipes*, although at various proportions of shares of the two species in *Chilopoda* communities, seems to be fairly common in deciduous forests of a relatively humid floor, as inherent for flood-plane forests, beech forests or linden-oak-hornbeam forests. The sites in linden-oak-hornbeam forest in the Dębina reserve were the most humid of all the studied sites (Nowakowski, Kotowska 1989) and for this reason, it seems, the ocurrence of *L. curtipes* was so abundant. Then, judging by moisture conditions, a greater percentage contribution of *L. curtipes* should be expected to the community on the site II in the Dębina reserve, which spread in a more humid variant of linden-oak-hornbeam forest than the site I. It was not, however, confirmed by the obtained results. A possible reason for this discrepancy may be the fact that the site II in the Dębina reserve was subject to sampling over one season only, while on the site I the samples were taken in two years.

Notwithstanding different second dominants (in Modrzewina, at Radziejowice and in the Hryniewiecki reserve), dominance structure of the studied *Chilopoda* communities was fairly uniform, as proved by high values of the Morisita index. The

second most abundant species in a majority of the studied communities was *Strigamia acuminata*, while in the community from the site I in the Hryniewiecki reserve — *L. calcaratus*. It may be thus assumed that a typical trait of *Chilopoda* communities of forest ecosystems in the dominance of two litter species rather (as *S. acuminata* is also a litter species) and not of two *Lithobiomorpha* species as suggested by ALBERT (1979). *S. acuminata*, being less exposed to dryness as it populates deeper litter layers, replaced *L. curtipes* in linden-oak-hornbeam forests, while in thermophilous oak forests its place was taken by *L. calcaratus*, which prefers drier and sunny places. It is difficult, however, to explain abundance of *Schendyla nemorensis* on the site in thermophilous oak forest at Radziejowice. It may be assumed that the pattern of dominance relations depends not only on the vary type of plant community (forest, meadow), but is also affected by moisture conditions inherent for a particular plant association.

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STRESZCZENIE

[Tytuł: Pareczniki (*Chilopoda*) lasów grądowych (*Tilio-Carpinetum*) i dąbrów świetlistych (*Potentillo albae-Qeretum*) Niziny Mazowieckiej]

W lasach grądowych (*Tilio-Carpinetum*) Niziny Mazowieckiej na 6 stanowiskach stwierdzono 14 gatunków *Chilopoda*, w tym nowy dla Mazowsza podgatunek *Lithobius tenebrosus fennoscandius*. Z trzech stanowisk dąbrowy świetlistej (*Potentillo albae-Qercetum*) wykazano 8 gatunków *Chilopoda*, w tym również nowy dla Mazowsza *Lithobius muticus* (Tab. I). Większość stwierdzonych gatunków związana jest wyłącznie ze środowiskiem leśnym. Pod względem zoogeograficznym przeważającą część składu gatunkowego zgrupowań *Chilopoda* obu typów środowisk stanowią elementy o zasięgu europejskim.

Spośród pięciu gatunków wspólnych dla zgrupowań badanych zespołów roślinnych trzy to gatunki absolutnie stałe w obu typach badanych środowisk: *Lithobius mutabilis, Strigamia acuminata, Schendyla nemorensis*. Najliczniej reprezentowanym gatunkiem w zgrupowaniach *Chilopoda* niemal wszystkich badanych powierzchni okazał się *L. mutabilis* (Tab. II i III).

Mimo wspólnych elementów składu gatunkowego zgrupowań *Chilopoda* obu środowisk, fauna pareczników dąbrów świetlistych różni się w sposób jakościowy i ilościowy od fauny lasów grądowych. Wyłącznie w dąbrowie świetlistej stwierdzono występoanie *Lithobius calcaratus, L. muticus i Pachymerium ferrugineum*, z których tylko dwa pierwsze wydają się być charakterystyczne ze względu na swoje ekologiczne wymagania. Fauna *Chilopoda* dąbrów świetlistych Niziny Mazowieckiej charakteryzuje się około 4 razy niższym zagęszczeniem *Lithobiomorpha* niż fauna lasów grądowych, podczas gdy zagęszczenie *Geophilomorpha* nie wykazuje istotnych różnic. Różnice w zagęszczeniu i składzie gatunkowym zgrupowań *Chilopoda* tłumaczy się różnymi warunkami środowiska między badanymi typami lasu, tj. wilgotnością i stopniem prześwietlenia. Jako konsekwencję tych czynników przedstawiono też obraz struktury dominacji zgrupowań *Chilopoda* na poszczególnych stanowiskach.

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