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A Review of the Taxonomy, Geographical Distribution and Ecology of the Centipedes of Yugoslavia

(Myriapoda, Chilopoda)

by

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Abstract: Some of the most important problems of taxonomy, distribution and ecology are described. An up to date review of the knowledge of the centipede fauna of Yugoslavia is presented. 1 species of Scutigermorpha, 86 species of Lithobiomorpha, 62 species of Geophilomorpha and 10 species of Scolopendromorpha are listed. Subspecies are not listed because of their uncertain status. Taxonomic problems arise from inaccurate descriptions: older descriptions are of questionable validity, while others are made on the basis of a small number of specimens so that there are insufficient data on variability. The age and the taxonomic characters of the post-larval stadia are likewise unknown. Some taxa illustrate the processes of speciation and there are many endemic species. There is little ecological information.

1. Introduction:

The flora and fauna of the Balkan peninsula are very rich. Because of its location, relief and geological history, the Balkan peninsula can be considered as "refuge". On one hand, many thermophilous species survived the glacial periods. During interglacial periods these species expanded their area of distribution. On the other hand, some populations of boreal species became subdivided and the process of speciation took place in these geographically isolated populations. Here the process of evolution can be observed, because in a relatively small area various closely related populations can be found.

These general conclusions are valid for the majority of plant and animal taxa as well as for centipedes. There are some publications about taxonomy, geographic distribution and ecology of centipedes of Yugoslavia, but very little is known about these fields of research.

2. Taxonomy:

The most extensive studies on taxonomy of centipedes in what is now Yugoslavia were done by LATZEL (1880, 1882), ATTEMS (1895, 1899, 1903, 1929a, 1929b, 1930, 1949, 1951, 1959) and by VERHOEFF (1899, 1900, 1925, 1929, 1930, 1931, 1934, 1935, 1937a, 1937b, 1938). The taxonomy of centipedes also was studied by FOLKMANOVA (1935, 1940, 1946), HOFFER (1935, 1937) and by JAWLOWSKI (1933). Recently, more data have been added by MATIC (1957, 1966, 1979), MATIC & TEODOREANU (1966), MATIC & DARABANTU (1968), and MATIC & STENZER (1977). Some taxonomic problems were solved by EASON (1970, 1972, 1974, 1982, 1983) and EASON & MINELLI (1976). The author is currently working in this field (KOS 1987, 1988).

The present knowledge of fauna of centipedes in Yugoslavia is shown in Table 1. It lists 62 species of Geophilomorpha, 10 species of Scolopendromorpha, 86 species of Lithobiomorpha and 1 species of Scutigermorpha. Subspecies are not included in this list because of their uncertain status. For instance, two subspecies of the same species have been reported from the same locality. Presumably most subspecies will either get the rank of a full species or will sink into synonymy. Inaccurate descriptions of some species also represent a great problem. Some older descriptions are of questionable validity (e.g. LATZEL 1880), whereas some others are made on the basis of a small number of specimens (1 or 2) (e.g. VERHOEFF 1937, MATIC 1979, MATIC & STENZER 1977, MATIC & DARABANTU 1968). It is also important to know the stage of development of the specimens studied, because the taxonomic characters change during post-larval development (ANDERSON 1978, 1979). More precise descriptions of the variability of taxonomic characters within the same population, and better knowledge of their post-larval development, will resolve the status of some species described by some earlier authors. The fauna of centipedes in the Balkan peninsula has not yet been studied extensively. Therefore we can expect that many new taxa will be discovered in the future.

Table 1: The present knowledge of the fauna of centipedes (Chilopoda) in Yugoslavia. The distribution is according to the republic (SLO Slovenia, CRO Croatia, BIH Bosnia and Herzegovina, MTG Montenegro, SRB Serbia, MAC Macedonia), to biogeographic district by MATVEJEV & PUNCER (Biog) (1 East Alpine, 2 Subalpine, 3 Mediterranean, 4 Submediterranean, 5 Aegean Submediterranean, 6 Outer Dinaric, 7 Inner Dinaric, 8 Dinaric Moesian, 9 Moesian, 10 Scardic Pinic, 11 Pannonian, 12 Subpannonian, 13 Subcarpathian) and to their general distribution (G.D.) (en Endemic, il Iliric, pa Palearctic, me Mediterranean, al Alps, eu European, mi Middle Europe, se Southeastern Europe, s South Europe).

Species	S	C	B	M	S	M	biogeographic district	G.D.
	L	R	I	T	R	A		
	O	O	H	G	B	C		
Geophilomorpha								
<i>Bothriogaster signata</i> ATTEMS, 1926	-	-	-	-	-	+	5	en
<i>Brachyschendyla montana</i> (ATTEMS, 1895)	+	+	+	-	-	-	2,6,7	?
<i>Chaetechelyne montana</i> MEINERT, 1870	-	+	-	-	-	-	4	?
<i>Ch. hercegovinensis</i> VERHOEFF, 1938	-	-	+	-	-	-	4	en
<i>Ch. vesuviana</i> (NEWPORT, 1845)	+	+	-	-	-	-	3,4,7	pa
<i>Chalanda scheerpeltzi</i> ATTEMS, 1952	+	-	-	-	-	-	1,7	en
<i>Clinopodes abbreviatus</i> (VERHOEFF, 1925)	+	+	+	+	-	-	6,7	?
<i>C. escherichii</i> (VERHOEFF, 1896)	+	+	+	+	-	-	4,6,7	?
<i>C. flavidus</i> C.L. KOCH, 1847	+	+	+	+	+	-	1,2,4,6,7	?
<i>C. improvisus</i> VERHOEFF, 1943	-	-	+	-	-	-	?	en
<i>C. karamani</i> VERHOEFF, 1943	-	-	+	-	-	-	?	en
<i>C. linearis</i> (C.L. KOCH, 1835)	+	+	-	-	-	-	6,7	W pa
<i>C. polytrichus</i> (ATTEMS, 1903)	-	-	-	-	+	-	9	?
<i>C. rodnaensis</i> (VERHOEFF, 1938)	-	+	+	-	-	-	6	il
<i>C. skopljensis</i> (VERHOEFF, 1938)	-	-	-	-	-	+	5	en
<i>C. styriacus</i> (ATTEMS, 1895)	+	-	-	-	-	-	2	en
<i>C. trebevicensis</i> (VERHOEFF, 1898)	+	+	+	+	-	-	6,7	il ?
<i>Dalmatodyla splitensis</i> VERHOEFF, 1938	-	+	-	-	-	-	3	en
<i>Dicelophilus carniolensis</i> C.L. KOCH, 1847	+	+	+	-	-	-	1,6,7	il
<i>Dignathodon microcephalum</i> (LUCAS, 1846)	-	+	+	+	+	-	4,9	me
<i>Geophilus arenarius</i> MEINERT, 1870	-	+	-	-	-	-	4	?

Species	S L O	C R O	B I H	M T G	S R B	M A C	biogeographic district	G.D.
<i>G. electricus</i> (L., 1758)	+	+	+	-	+	-	6,7	eu
<i>G. impressus</i> C.L. KOCH, 1847	-	+	-	-	-	-	3	en ?
<i>G. insculptus</i> ATTEMS, 1895	-	+	+	-	+	-	2,4,7,9	il
<i>G. pygmaeus</i> LATZEL, 1880	+	+	-	-	-	-	2,6	al
<i>G. pusillifrater</i> VERHOEFF, 1898	-	+	-	-	-	-	4	en
<i>G. bosniensis</i> VERHOEFF, 1895	-	-	+	-	-	-	6	en
<i>G. cribelliger</i> VERHOEFF, 1895	-	-	+	-	-	-	4	en
<i>G. antecribellatus</i> VERHOEFF, 1895	-	+	+	-	-	-	4,6	en
<i>G. carnicus</i> VERHOEFF, 1928	+	-	-	-	-	-	2	en
<i>G. carpophagus</i> LEACH, 1815	+	+	-	+	-	-	4,7	pa
<i>G. labrofissus</i> VERHOEFF, 1938	+	-	-	-	-	-	1 ?	en
<i>G. oligopus</i> ATTEMS, 1895	+	-	+	-	-	-	7	eu
<i>G. pauropus</i> ATTEMS, 1927	+	+	-	-	-	-	6,7	en
<i>G. promontorii</i> VERHOEFF, 1928	+	-	-	-	-	-	?	?
<i>Nesogeophilus palpiger</i> (ATTEMS, 1903)	+	-	-	-	-	-	4	en
<i>Brachygeophilus strictus</i> (LATZEL, 1880)	-	+	-	-	-	-	3,4	en
<i>Henia attemsi</i> VERHOEFF, 1928	+	-	-	-	-	-	4	en
<i>H. bicarinata</i> (MEINERT, 1870)	-	+	+	-	-	-	4	en
<i>H. crinita</i> ATTEMS, 1903	+	-	+	-	-	-	4,6	il
<i>H. illyrica</i> (MEINERT, 1870)	+	+	+	+	+	-	4,6,7	il
<i>H. pulchella</i> (MEINERT, 1870)	-	+	-	-	-	-	3	me
<i>Himantarium gabrielis</i> (L. 1767)	+	+	+	+	-	-	3,4,6	me
<i>Insigniporus sturanyi</i> ATTEMS, 1903	-	-	-	-	-	+	5	en
<i>Mecistocephalus maxillaris</i> (GERVAIS, 1837)	-	-	-	-	?	-	?	?
<i>Necrophloeophagus longicornis</i> (LEACH, 1815)	+	+	+	+	+	-	4,6,7,9	pa
<i>Pachymerium ferrugineum</i> C.L. KOCH, 1835)	+	+	+	+	-	+	2,3,4,6,12	pa
<i>Pleurogeophilus hercegovinensis</i> VERHOEFF, 1901	-	-	+	-	-	-	4	en
<i>P. gorizensis</i> (LATZEL, 1880)	+	-	-	-	-	-	4	en
<i>Schendyla nemorensis</i> (C.L. KOCH, 1836)	+	+	+	-	-	-	4,7	pa
<i>Sch. (E.) carniolensis</i> (VERHOEFF, 1902)	+	-	-	-	+	-	7,9	en
<i>Sch. dalmatica</i> ATTEMS, 1904	-	+	-	-	-	-	4	en
<i>Stigmatogaster gracilis</i> (MEINERT, 1870)	-	+	-	+	-	-	3,4	me
<i>Strigamia acuminata</i> (LEACH, 1815)	+	+	+	+	-	-	1,2,6,7	eu
<i>S. carniolensis</i> (VERHOEFF, 1935)	+	-	-	-	-	-	?	en
<i>S. crassipes</i> (C.L. KOCH, 1835)	+	+	+	-	-	-	1,2,6,7	pa
<i>S. engadina</i> (VERHOEFF, 1935)	+	-	-	-	-	-	6	il ?
<i>S. hercegovinensis</i> (VERHOEFF, 1935)	-	-	+	-	-	-	4	en
<i>S. transylvanica</i> (VERHOEFF, 1928)	+	+	+	+	+	-	6,7,9	il ?
<i>Thracophilus bulgaricus</i> VERHOEFF, 1926	-	-	+	-	-	-	4	se
<i>T. monoporus</i> ATTEMS, 1951	-	+	+	-	-	-	4	en
<i>T. subterraneus</i> VERHOEFF, 1943	-	-	+	-	-	-	4	en

Species	S	C	B	M	S	M	biogeographic district	G.D.
	L	R	I	T	R	A		
	O	O	H	G	B	C		
Lithobiomorpha								
<i>Eupolybothrus acherontis</i> (VERHOEFF, 1900)	-	-	+	-	-	-	4	en
<i>E. caesar</i> (VERHOEFF, 1899)	-	-	+	-	-	-	4	en
<i>E. fasciatus</i> (NEWPORT, 1845)	?	+	+	+	-	-	1,2,7	s
<i>E. grossipes</i> (C.L. KOCH, 1847)	+	+	-	-	-	-	1,2,6,7	s
<i>E. herzegovinensis</i> (VERHOEFF, 1900)	-	+	+	-	-	-	4	en
<i>E. leostygis</i> (VERHOEFF, 1899)	+	-	+	-	-	-	4	en
<i>E. macedonicus</i> (VERHOEFF, 1943)	-	-	-	-	-	+	10	en
<i>E. magnificus</i> (HOFFER, 1935)	-	+	+	+	-	-	4	en
<i>E. obrovensis</i> (VERHOEFF, 1930)	+	-	-	-	-	-	4	en
<i>E. sketi</i> MATIC, 1979	-	-	-	-	-	+	10	en
<i>E. spiniger</i> (LATZEL, 1888)	-	-	+	-	-	-	8	en
<i>E. stygis</i> (FOLKMANOVA, 1940)	-	-	+	-	-	-	4	en
<i>E. transylvanicus</i> (LATZEL, 1882)	-	+	+	+	+	-	9,13	se
<i>E. tridentinus</i> (FANZAGO, 1874)	+	+	+	+	+	-	1,2,6,7	se
<i>Harpolithobius anodus</i> (LATZEL, 1880)	+	+	+	+	-	-	1,2,7	E-eu
<i>H. calcivagus</i> VERHOEFF, 1925	+	-	-	-	-	-	1,2,7	en
<i>H. dentatus</i> (MATIC, 1957)	-	-	-	-	+	-	9	en
<i>H. gottscheensis</i> VERHOEFF, 1937	+	+	-	-	-	-	6	en
<i>H. komareki</i> FOLKMANOVA, 1946	-	-	+	-	-	-	4 ?	en
<i>Lithobius (L.) absoloni</i> FOLKMANOVA, 1935	-	-	-	+	-	-	4	en
<i>L. (L.) agilis</i> C.L. KOCH, 1847	+	+	+	-	-	-	1,2,6,7	pa
<i>L. (L.) aspersus</i> ATTEMS, 1899	-	+	-	-	-	-	?	?
<i>L. (L.) bayeri</i> FOLKMANOVA, 1935	-	+	-	-	-	-	?	en
<i>L. (L.) borealis</i> MEINERT, 1872	+	-	?	-	-	-	1,7	pa
<i>L. (L.) castaneus</i> NEWPORT, 1844	+	+	+	-	+	-	1,2,6,7	me ?
<i>L. (L.) cerberi</i> (VERHOEFF, 1943)	-	-	+	-	-	-	4	en
<i>L. (L.) croaticus</i> MATIC et TODOREANU, 1966	+	+	-	-	-	-	7	en
<i>L. (L.) dalmaticus</i> LATZEL, 1880	-	+	-	-	-	-	3	en
<i>L. (L.) dentatus</i> C.L. KOCH, 1844	+	+	+	-	-	-	1,2,6,7	pa
<i>L. (L.) dolinophilus</i> VERHOEFF, 1937	+	-	-	-	-	-	4	en
<i>L. (L.) erythrocephalus</i> C.L. KOCH, 1847	+	-	+	+	-	+	1,2,6,7,10	pa
<i>L. (L.) forficatus</i> (L., 1758)	+	+	+	+	+	+	1,2,4,6,7,12,13	pa
<i>L. (L.) illyricus</i> LATZEL, 1880	-	+	-	-	-	-	4	en
<i>L. (L.) jugoslavicus</i> MATIC et DARABANTU, 1968	+	-	-	-	-	-	7	en
<i>L. (L.) karamani</i> VERHOEFF, 1937	-	-	-	-	-	+	5	en
<i>L. (L.) lakatnicensis</i> VERHOEFF, 1926	-	-	-	-	+	-	9	en
<i>L. (L.) lapadensis</i> VERHOEFF, 1900	-	+	-	-	-	-	4	?
<i>L. (L.) lapidicola</i> MEINERT, 1872	+	-	+	-	-	-	1	pa
<i>L. (L.) latro</i> MEINERT, 1872	+	+	+	-	-	-	1,2,7	?
<i>L. (L.) luciani</i> FOLKMANOVA, 1935	-	+	-	-	-	-	?	?
<i>L. (L.) lucifugus</i> L. KOCH, 1862	+	+	+	+	-	-	1,7	il ?
<i>L. (L.) macilentus</i> L. KOCH, 1862	+	-	-	-	-	-	7	mi

Species	S L O	C R O	B I H	M T G	S R B	M A C	biogeographic district	G.D.
<i>L. (L.) matici</i> PRUNESCU, 1966	-	-	+	+	+	-	6,7,9,13	se
<i>L. (L.) melanops</i> NEWPORT, 1845	+	+	+	-	-	-	?	pa
<i>L. (L.) microporus</i> VERHOEFF, 1937	+	-	-	-	-	-	6	en
<i>L. (L.) mucronatus</i> VERHOEFF, 1937	+	-	-	-	-	-	?	en
<i>L. (L.) mutabilis</i> L. KOCH, 1862	+	+	-	-	+	-	1,2,4,6,7,12,13	mi
<i>L. (L.) muticus</i> C.L. KOCH, 1847	+	+	+	+	-	-	1,2,6,7,10,12,13	pa
<i>L. (L.) nigripalpis</i> L. KOCH, 1867	-	-	-	-	+	-	9	me
<i>L. (L.) nodulipes</i> LATZEL, 1880	+	+	+	-	-	-	1,2,4,7	mi
<i>L. (L.) obrovensis</i> VERHOEFF, 1930	+	-	-	-	-	-	4	en
<i>L. (L.) parietum</i> VERHOEFF, 1899	+	+	-	-	-	-	2,12	se
<i>L. (L.) pelidnus</i> HAASE, 1880	+	-	-	-	-	-	7	mi
<i>L. (L.) peregrinus</i> LATZEL, 1880	-	+	-	-	+	-	3,4	me
<i>L. (L.) petricensis</i> FOLKMANOVA, 1935	-	-	-	-	+	-	9	en
<i>L. (L.) piceus</i> L. KOCH, 1862	+	+	+	-	-	+	2,7,10	pa
<i>L. (L.) planinaensis</i> MATIC et DARABANTU, 1968	+	-	-	-	-	-	1	en
<i>L. (L.) pusillus</i> LATZEL, 1880	+	+	+	+	-	-	4,6,7,8	?
<i>L. (L.) pygmaeus</i> LATZEL, 1880	+	+	+	-	-	-	1,7	il ?
<i>L. (L.) quartocomma</i> VERHOEFF, 1900	-	+	+	+	-	-	3,4	me
<i>L. (L.) remyi</i> JAWLOWSKI, 1933	-	-	-	-	+	-	9	en
<i>L. (L.) romanus</i> MEINERT, 1872	-	-	-	+	-	-	3	?
<i>L. (L.) serbicus</i> MATIC, 1957	-	-	-	-	+	-	9	en
<i>L. (L.) simplex</i> FOLKMANOVA, 1946	-	-	+	-	-	-	4	en
<i>L. (L.) slovenicus</i> MATIC, 1979	+	-	-	-	-	-	4	en
<i>L. (L.) stygius</i> LATZEL, 1880	+	+	+	-	-	-	6,7	en
<i>L. (L.) tenebrosus</i> MEINERT, 1872	+	+	+	-	-	-	1,7,8	en ?
<i>L. (L.) tricuspis</i> MEINERT, 1872	+	+	-	-	-	-	1,2	mi
<i>L. (L.) validus</i> MEINERT, 1872	+	+	+	-	+	-	1,2,6,7	mi
<i>L. (Lithonannus) apfelbecki</i> VERHOEFF, 1900	-	-	+	-	-	-	4	en
<i>L. (L.) burzenlandicus</i> VERHOEFF, 1931	+	+	+	+	+	-	1,6,7,8	se
<i>L. (L.) calcivagus</i> VERHOEFF, 1900	-	+	+	-	-	-	4	en
<i>L. (L.) microps</i> MEINERT, 1868	-	?	+	?	-	-	4,7	?
<i>L. (L.) reiseri</i> VERHOEFF, 1900	-	-	+	-	-	-	4	se
<i>L. (L.) trebinjanus</i> VERHOEFF, 1900	-	-	+	-	-	-	4	en
<i>L. (L.) wardaranus</i> VERHOEFF, 1937	+	+	-	+	-	-	6,7	se
<i>L. (Monotarsobius) aeruginosus</i> L. KOCH, 1862	+	+	+	-	-	-	1,2,6,7	eu
<i>L. (M.) austriacus</i> VERHOEFF, 1937	+	-	-	-	-	-	1	mi
<i>L. (M.) crassipes</i> L. KOCH, 1862	+	+	+	+	+	-	4,6,9,11,12,13	pa
<i>L. (M.) hadzii</i> MATIC et DARABANTU, 1968	-	+	-	-	-	-	6?,7?	en
<i>L. (M.) zveri</i> MATIC et STENZER, 1977	+	-	-	-	-	-	7	en
<i>L. (Troglolithobius) matulicii</i> VERHOEFF, 1899	-	-	+	-	-	-	4	en
<i>L. (T.) sketi</i> MATIC et DARABANTU, 1968	-	-	+	+	-	-	4	en
<i>L. (T.) troglomontanus</i> (FOLKMANOVA, 1940)	-	-	+	-	-	-	?	en
<i>Pleuroolithobius ionicus</i> (SILVESTRI, 1896)	-	+	-	+	-	-	4	E me

Species	S	C	B	M	S	M	biogeographic district	G.D.
	L	R	I	T	R	A		
	O	O	H	G	B	C		
<i>Strandiolus jugoslavicus</i> HOFFER, 1937	-	-	+	-	-	-	4	en
Scolopendromorpha								
<i>Cryptops anomalans</i> NEWPORT, 1844	+	+	+	+	+	+	3,4,6,7,9,12,13	pa
<i>C. croaticus</i> VERHOEFF, 1931	+	+	+	-	-	-	3,4,6,7	il ?
<i>C. hortensis</i> LEACH, 1815	+	+	+	-	-	-	1,2,6,7	pa
<i>C. illyricus</i> VERHOEFF, 1933	+	-	-	-	-	-	4	en
<i>C. parisi</i> BROLEMANN, 1920	+	+	+	+	-	-	2,4,6,7,8,12	eu
<i>C. rucneri</i> MATIC et TEODOREANU, 1966	+	+	-	-	-	-	3,7	en ?
<i>C. umbricus</i> VERHOEFF, 1931	-	+	-	-	-	-	4	en
<i>Scolopendra dalmatica</i> C.L. KOCH, 1847	-	+	+	+	-	-	3,4	en
<i>S. cingulata</i> LATREILLE, 1829	+	+	+	+	-	+	3,4,5	me
<i>Theatops erythrocephalus</i> (C.L. KOCH, 1847)	-	+	+	+	-	-	3,4	me ?
Scutigermorpha								
<i>Scutigera coleoptrata</i> (L., 1758)	+	+	-	+	-	+	3,4	mi

The cave habitat is especially interesting. Because of the predatory way of nutrition of centipedes, their abundance in caves is extremely low and specimens of cave populations are not easily found. Despite this the percentage of centipede taxa in caves in Yugoslavia is high and it is very likely that further cave taxa will be discovered. There are also some taxonomic problems in the higher taxonomic groups, e.g. the subgenus *Troglolithobius* MATIC, 1967. As a result of a more precise knowledge of evolution of centipedes and of geological history of southern Europe, it will be possible to establish higher taxonomic categories taking into account the principles of monophyletic development.

3. Zoogeographic Distribution:

ATTEMS (1929, 1949, 1959) and VERHOEFF (1937) described the zoogeographic distribution of centipedes. Conclusions made by both authors were based upon the knowledge of the distribution of single species available at that time. Problems of geographic distribution are closely related to taxonomic problems. Up to now the choice of localities and the presentation of the distribution which was derived from it has been unsystematic and incomplete. Therefore it is impossible to give an accurate distribution of individual species of centipedes in Yugoslavia. The survey of the distribution of centipedes is derived from the published data of ATTEMS 1949, 1959, MATIC 1957, 1967, 1979, MATIC & TEODOREANU 1967, MATIC & DARABANTU 1968, MATIC & STENZER 1977, TOMIC-JOVANOVIC 1964, KOS 1987, 1988a). The author's unpublished data are also included. The distribution of centipedes is shown in Table 1 according to the republic, to biogeographic districts (MATVEJEV & PUNCER 1989) and to their general distribution (ATTEMS 1949, 1959, MATIC 1966, 1972, MINELLI 1978, VERHOEFF 1937). A particularly interesting area is Herzegovina (in the republic of Bosnia and Herzegovina) with its own cave fauna. Many endemic species are known from this area.

4. Ecology:

Very little is known about the ecology of centipedes in Yugoslavia. There are only few data on vegetation of the localities where specimens were found (MATIC 1966, MATIC & TEODORE-ANU 1966). The author researched communities of centipedes in five places in Slovenia (KOS 1988b, unpublished). He collected data on species associations, on abundance and distribution of single species on these places. In the Balkan peninsula there live many endemic species of centipedes forming endemic communities. Therefore, results from other biogeographic areas cannot be easily applied to this area. The knowledge of some basic ecologic characteristics of centipedes could help us in zoogeographic analysis and understanding of some processes of speciation. Centipedes are sensitive to changes in the environment. Because of their long life cycles (ALBERT 1983) and their predatory nature, centipedes might serve as indicators of changes in the environment.

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