

# HALF A CENTURY AFTER IONESCU'S WORK ON ROMANIAN DIPLURA – A FAUNAL CONTRIBUTION BASED ON MATERIAL COLLECTED FROM KARST AREAS

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*Abstract.* The main publication on the Romanian diplurans belongs to M.A. Ionescu who inventoried 22 species mainly from soil and forest litter from 22 collecting points. The further faunal investigation of two caves (Peștera Izvorul Tăușoarelor and Peștera Movile) allowed Condé to describe other four new taxa, three species and one subspecies. This paper represents the first study at a national level, half century after Ionescu's contribution. The faunal data presented, were obtained from over 60 sites, most of them karst areas (including caves) unstudied up to the present. As a result, the faunal list of Diplura known in the Romanian fauna has risen to 28 taxa. A new combination: *Litocampa montana* Sendra n. comb. is argued. For 16 taxa, the local (based on the UTM grid codes) and general distributions and the redescription of some species are given.

*Key words:* Diplura, karst areas, *Lithocampa montana* n. comb., redescription of taxa.

## 1. INTRODUCTION

First data on the Romanian fauna of Diplura belongs to J. STACH (1929) who recorded a campodeid named *Campodea staphylinus* at Cluj, Tg. Mures and Mehadia. At that time all campodeid specimens were labelled as *C. staphylinus* but all these determinations should be revised. He also cited *C. fragilis* in Salonta Mare. Based on the material collected by HOLDHAUS nearby Bucharest, SILVESTRI (1929a) described *Japyx confusus* var. *rumena*. Up to the present, the greatest contribution to the knowledge of the Romanian fauna of Diplura belongs to the Romanian entomologist MIHAIL ANDREI IONESCU who dedicated a great part of his scientific activity to the study of Apterigota. In 1932 he obtained the PhD diploma with the thesis entitled *Nouvelles contributions a la connaissance de la faune des Protures de la Roumanie*. After that, he continued to specialise at his job at the Museum of Natural History in Vienna (1934) and at the Institute of Bio oceanography in Split (1936). As Professor of entomology at the Bucharest University (since 1948), M. A. IONESCU continued his work on the Romanian fauna of Diplura. After his first observation of the genus *Japyx* in Romania (oral presentation, 1930 cit. in IONESCU, 1955), Ionescu brings the first systematic, ecologic and zoogeographic contributions to the Romanian fauna of Diplura (1951, 1955).

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In his synthetic work on the Romanian fauna (1955) he inventoried 22 species of Diplura belonging to 2 families and 4 genera, and described 7 of these species as new for science. The faunal contributions of CONDÉ (1991, 1993, 1996) increased up to 26 the number of species known in the Romanian fauna (Table 1).

Unfortunately, after Ionescu's death (5<sup>th</sup> February 1988), only a small part of his collection has been saved and is preserved now in the *Emile Racovitza* Institute of Speleology.

Besides the available material remained from the Ionescu's collection, 578 specimens belonging to 16 species collected from 64 sites (most of them from karst areas – caves and litter) and preserved in the *Emile Racovitza* Institute of Speleology collection have been identified. Most of these specimens were collected by Alexandrina and Ștefan Negrea, biospeleologists and senior researchers at the Emile Racovitza Institute of Speleology.

Table 1

The Romanian species of Diplura in Ionescu and others contributions

	Romanian Diplura Species	Silvestri 1929	Ionescu 1951	Ionescu 1955	Condé 1991	Condé 1993	Condé 1996
1	<i>Japyx confusus rumena</i> Silvestri 1929	X		X			
2	<i>Campodea (Campodea) fragilis</i> Meinert 1865			X			
3	<i>Campodea (Campodea) silvestrii</i> Bagnall 1918			X			
4	<i>Campodea (Campodea) pieltaini</i> Silvestri 1932			X			
5	<i>Campodea (Campodea) ilixonis</i> Denis 1932 Syn <i>C. colladoi</i> Silvestri 1932			X			
6	<i>Campodea (Campodea) magna</i> Ionescu 1955			X			
7	<i>Campodea (Campodea) wallacei</i> Bagnall 1918		X	X			
8	<i>Campodea (Campodea) pseudofragilis</i> Condé 1984 Syn. <i>Campodea (Campodea) remyi</i> Denis 1930 in Ionescu 1955		X	X			
9	<i>Campodea (Campodea) taunica</i> Marten 1930 Syn. <i>Campodea (Campodea) silvestrii posterior</i> Silvestri 1932		X	X			
10	<i>Campodea (Campodea) vihorlatensis</i> Paclt 1961						
11	<i>Campodea (Campodea) tuxeni</i> Wygodzinsky 1941						
12	<i>Campodea (Dicampa) frenata</i> Silvestri 1912		X	X			
13	<i>Campodea (Dicampa) sprovieri</i> Silvestri 1912		X	X			
14	<i>Campodea (Dicampa) malpighii</i> Silvestri 1912		X	X			
15	<i>Campodea (Dicampa) apula</i> Silvestri 1912		X	X			
16	<i>Campodea (Dicampa) propinqua</i> Silvestri 1932		X	X			
17	<i>Campodea (Dicampa) campestris</i> Ionescu 1955			X			

	Romanian Diplura Species	Silvestri 1929	Ionescu 1951	Ionescu 1955	Condé 1991	Condé 1993	Condé 1996
18	<i>Campodea (Dicampa) silvicola</i> Ionescu 1955			X			
19	<i>Campodea (Dicampa) neuherzi</i> Condé 1966						X
20	<i>Campodea (Paurocampa) suensoni</i> Tuxen 1930		X	X			
21	<i>Campodea (Paurocampa) spelaea</i> Ionescu 1955			X			
22	<i>Eutrichocampa collina</i> Ionescu 1955			X			
23	<i>Litocampa montana</i> Sendra n.comb. Syn. <i>Campodea (Dicampa) montana</i> Ionescu 1955			X			
24	<i>Litocampa humilis comani</i> Condé 1991				X		
25	<i>Plusiocampa humicola</i> Ionescu 1951		X	X			
26	<i>Plusiocampa elongata</i> Ionescu 1955			X			
27	<i>Plusiocampa isterina</i> Condé 1993					X	X
28	<i>Plusiocampa euxina</i> Condé 1996						X

## 2. MATERIAL AND METHODS

Specimens of campodeid fauna collected during last 50 years, mainly by A. and St. Negrea from 64 different endogean and subterranean environments where studied.

All studied specimens were washed in distilled water and prepared for microscopic examination on slides and glass coverslips, using Marc André II solution. For dehydrated specimens we used previously, a mix of: Choral hydrato (40 grams), distilled water and acetic acid (30 cm<sup>3</sup> each) (LANGERON, 1949). Following the examination of the specimens, the preparation was rehydrated and specimens were placed into 70% ethanol for storage.

To these unstudied specimens we added a part of Ionescu's collection still preserved in the "Emile Racovitza" Institute of Speleology in Bucharest. The numbers in brackets, placed after number of specimens presented for each examined material, represents the inventory numbers from the scientific collection.

A Wild M3Z stereomicroscope and a phase-contrast optical microscope (Leica DMLS) were used for microscopic examination. For body length, we measured the specimens mounted "in toto" from the base of the frontal process distal macrochaetae to the abdomen's supra-anal valve.

The taxonomic description, abbreviations, and indexes used in this paper were based on the works of CONDÉ (1955). Abbreviations used are: *ma*, medial-anterior; *la*, lateral-anterior; *lp*, lateral-posterior.

The UTM (Universal Transverse Mercator) system was used to illustrate the distribution of species. Romania is situated in the UTM grid zones 34T, 35T, 34U

and 35U. The geographic coordinates of the sites are given in MGRS format, omitting the UTM zone designation letter. Each MGRS square is defined by a UTM code formed by two letters followed by two digits, representing a 10 X 10 km square within the zone – the accuracy of coordinates on the distribution maps. The UTM codes were provided according to the bio-cartographic code of Romania (LEHRER & LEHRER 1990) and are presented for the name of each site (cave, or locality) in Table 2. Each site provided with the UTM code can be identified on the distribution maps, following the grid notation.

All the sites cited by IONESCU (1955) and new recorded sites cited in this paper were located on the Romanian map using the UTM coordinates (Fig. 1).

The numbers marked on the symbols from the map (circle for new sites presented in this paper and black squares for the sites cited by IONESCU in 1955 or white squares for CONDÉ's quotations) correspond to the current number of site from Table 2.

Table 2

The collecting sites of the Romanian Diplura figured on Map 1

Number of sampling area on the map (white circles)	UTM code (according to the map grid)	Name of corresponding collecting sites included in the sampling area (100 km <sup>2</sup> )
1	ER71	Valea Baciului; Bârzava Valley; Cuptoare Valley; Sudol III Cave; Sudol I Cave; Gaura Turcului Cave; Baliului Valley near to Gaura Pârşului Cave; Hoţilor Cave-Băile Herculane
2	ER70	Bârzava Valley; Caraşului Gorges; Ţolosu Cave; Peştera de sub Cetate (Cave); Comarnic Cave; Cave No. 2 from Crno Polie
3	ER80	Semenic
4	ER60	Gârliştea Valley; Peştera de după Cârşe (Cave)
5	ER61	Reşiţa (Bârzava valley and Lupac hills)
6	ER62	Câlnic (on Bârzava Valley)
7	FR30	Corcoaia Cave 35 (Cerna Valley)
8	FR06	Peştera din Piatra Fetii (Cave)
9	FR00	Feneş Cave
10	FR74	Valea Rea, Peştera Craniului (Cave)
11.	FQ17	Domogled, (Podu Roşu), Şaua Padina; Grota Haiducilor (Cave); Peştera Hoţilor (Cave); Pştera Imbre (Cave); Băile Herculane (on Dealul Roşu); Cerna Valley at 7 Izvoare.
12	FQ18	Cerna Valley at Podul Cascadei.
13	EQ95	Moşu Hill under Jupalnic Mine
14	EQ99	Domanşa
15	FQ26	Topolniţa spring; Topolniţa Valley; Topolniţa Cave.

16	FQ63	Greci Forest
17	FQ49	Cloșani; Cloșani Cave; Valea Lupșei (litter)
18	FQ59	Izvoarele Valley
19	FQ69	Valea Mare, beech forest
20	FQ48	Bulba Cave
21	FQ28	Cave No. 71 from the Cerna Basin
22	FQ58	Tismana forest
23	EQ55	Valea Găurii, near to Peștera Haiducească (Cave); Gaura Haiducească Cave, 22.VIII.1965
24	EQ67	Gaura Porcariului Cave; Peștera de la Vălee (Cave); Nera Gorges (litter); Nera, near to Dubova Cave
25	EQ84	Gura Ponicovei Cave
26	EQ69	Mărghitaș Cave
27	EQ68	Cave from Terezia
28	EQ49	Oravița Valley
29	EQ85	The Cozla Mountain (lithoclastic)
30	FS39	Draganului Valley near to Ciripa (litter)
31	FS09	Peștera Vacii (Cave)
32	FS06	Tărcăița Valley
33	FS15	Sighiștel
34	FS35	Valea Mare
35	FR16	Lunca Bărzavei
36	FT78	Cioaca Bărgăului, beech forest
37	ML24	Muntele Roșu (Ciorici peak); Zăganu (Ciucaș)
38	ML79	Soveja, Dragomirna Valley in beech forest
39	KL90	Căciulata
40	LL90	Comarnic (forest)
41	LL53	Șirnea Valley
42	LL73	Azuga
43	LL26	Sâmbăta
44	LL31	Câmpulung Musecel
45	LL64	Piatra Craiului
46	LM26	Canton Maia
47	MN11	Ceahlău – Lutu Roșu
48	MM29	Bicaz Valley; Izvorul Muntelui
49	MM39	Bistrița Valley near to Tarcău; Potoci Valley at Tarcău
50	GS21	Tâlva Mare
51	GR10	Galbonu Valley at Baia de Fier
52	FT10	Peștera de la Izbândiș (Cave)
53	FT52	Stâne (lapidicolous), 26.IV.1969

54	MK21	Băneasa forest
55	MK31	Cernica forest
56	PK37	Babadag forest
57	PK17	Ciucurova forest (litter); Cilic
58	PK12	Casian (lapidicolous)
59	PK26	Slava Rusă
60	PL10	Niculițel forest (litter); Cocoșu forest
61	PJ25	Comorova forest (litter)
62	LN15	Izvorul Tăușoarelor Cave
63	LN34	Ilva Mare
64	MM16	Șugău Cave
Records after Ionescu, 1955 (black squares)	UTM code (according to the map grid)	Name of corresponding collecting sites included in the sampling area (100 km <sup>2</sup> )
1	MK21	Filaret
2	MJ27	Băneasa
3	MK41	Cernica; Pasărea
4	PJ28	Murfatlar; Agigea
5	NK81	Cernavodă
6	PK27	Slava Cercheză
7	FP57	Calafat
8	KL77	Sibiu
9	NL45	Hanul Conachi
10	FS53	Câmpeni
11	LL82	Bucegi (Sinaia, Cocora)
12	NM14	Târnița
13	NM16/17	Măgura Odobești
14	KL91	Cozia Mt.
15	ML24	Muntele Roșu
16	GR10	Bumbești-Pițic
17	MM29	Bicaz
18	PK37	Babadag
19	KL72	Mălaia
20	LK85	Nucet
21	FS70	Peștera de la Glod (Cave)
22	FR72	Peștera dracului de la Paroșeni
Records after Condé, (white squares)	UTM code (according to the map grid)	Name of corresponding collecting sites included in the sampling area (100 km <sup>2</sup> )
1	LN15	Peștera Izvorul Tăușoarelor (= No. 62 from new records)
2	PJ25	Peștera Mobile



### 3. RESULTS

#### 1. *Campodea (Campodea) wallacei* Bagnall, 1918

**Ionescu's collection:** 1 male, 1 female and 1 juvenile, Campeni, Lespezi, 1950.

With doubts we labeled these specimens as *C. wallacei*. Epicuticle without ornamentation; antennae with 28–29 articles in adults and 28 in the juvenile; the baciliform sensillum of the third article is between macrochaetae *d* and *e* (in sternal position); macrochaetae on the thorax sclerites long worn thin barbs in their 1/3 to 1/2 distal, marginal setae thin and glabrous or with 2–4 thin distal barbs; cerci worn thin macrochaetae with 1–6 thin distal barbs or glabrous at the distal macrochaetae, similar shown by *Campodea plusiochaeta* Silvestri 1912.

**Distribution:** Described in England by BAGNALL (1918) it was much later cited in several sites of Europe: France (CONDÉ, 1950a, PAGÉS, 1951), Sweden (AGRELL, 1944), Italy (BARETH & CONDÉ, 1985), Serbia (BLESIC, 1992), Montenegro (BLESIC, 1998), Croatia (BLESIC, 1996) and in Romania (IONESCU 1951, 1955), but we doubt of several of these.

#### 2. *Campodea (Campodea) pseudofragilis* Condé, 1984

Syn: *Campodea (Campodea) remyi* Denis 1930 sensu Ionescu 1951

**Ionescu's collection:** 1 female and 1 juvenile, Agigea 27-V-1950.

Antennae with 19 (female) or 18 (juvenile) articles; the baciliform sensillum of the third article is between macrochaetae *d* and *e* (in sternal position).

**Distribution:** This species was known only for Greece in some stations from Achaia (Peloponnese) and Ithaca Island (CONDÉ, 1984).

#### 3. *Campodea (Campodea) tuxeni* Wygodzinsky, 1941

**Material examined:** 1 male, 2 females and 1 juvenile (76) Lupac Hills, 9.VIII.1973, A. and St. Negrea leg. 1 female (114) Valea Izvoarele 8.IX.1975. 2 juveniles (29) Valea Oraviței (500 m upstream Lacul Mare), 9.VIII.1976, A. and St. Negrea leg.

One sensillum trochanteral bacilliform.

**Distribution:** This species was described by WYGODZINSKY (1941) from Slovenia and later it was cited by CONDÉ (1947, 1954), RUSEK (1964) and BLESIC (1998b) throughout several stations of Central Europe.

#### 4. *Campodea (Campodea) vihorlatensis* Paclt, 1961

**Material examined:** 1 female, (33) Valea Tărcăița, 1.VII.1971.

One antennae with 17 articles; the baciliform sensillum of the third article is between macrochaetae *d* and *e* (in sternal position).



**Distribution:** This is the first citation of the species outside eastern Slovakia where the species was described by PACLT (1961a) and cited by RUSEK (1964).

5. *Campodea (Campodea) taunica* Marten, 1930

syn. *Campodea (Campodea) silvestrii* posterior Silvestri 1932

**Ionescu's collection:** 1 juvenile Slava Cerkeză VIII.1950.

**Material examined:** 2 males and 1 female (138) Stâne (lapidicolous) 26.IV.1969; 1 male and 1 female (106) Celic Forest (litter) 6.XI.1968 leg. A. and St. Negrea; 1 male and 1 female (71) Ciucurova Forest (litter) 9.XI.1968 leg. A. and St. Negrea; 1 female (172) Pârâul Oilor (4 km upstream the dam) 8.VIII.1974 leg. A. and St. Negrea (litter); 2 males and 1 female (19) Babadag Forest (litter) 16.V.1967. leg. A. and St. Negrea; 2 females (171) Valea Bistritei (amont Tarcau) 29.V. 1975; 1 male (176) Baneasa Forest 13.XI.1968. leg. A. and St. Negrea (litter); 1 male and 1 female (7) Valea Cernei (litter) 20.XI.1970 leg. A. and St. Negrea; 2 females (26) Valea Starnicului (litter) 10.VI.1970 leg. A. and St. Negrea; 2 females and 1 juvenile (83) Dealu Moșu (over Orșovel) (litter). 21.X.1975. leg. A. and St. Negrea; 2 juveniles (45) Valea Baliului under Peștera Gaura Pârșului (Cave) (litter) 31.VII.1971. A. and St. Negrea; 1 male (78) in a forest between N. Balcescu si Ciueurova; 1 male (13) Valea Cuptoare (Spring Minda, litter) 22.VI.1977 leg. A. and St. Negrea; 1 male (8) Ceahlău (Lutu Roșu) 1020 m alt. 7.V.1976. leg. A. and St. Negrea; 1 female (12) Peștera Sudor I (Cave) (on floor) 3.IX.1981; 1 female (43) Valea Crenei at Cracul Gaurii 14.XI.1972 leg. A. and St. Negrea; 1 male and 1 unknown sex (145) Câmpulung Muscel. 26.VIII.1966; 1 male and 2 females (48) Valea Barzavei 29.VII.1971; 1 female (105) Peștera No. 2 de Sub Crno Polie (Cave), 4.X.1965; 1 female (112) Valea Mare 7.IX.1975; 2 males, 4 females and 3 juveniles (129) Ilva Mare (litoclastic) 26.II.1968.

6. *Campodea (Campodea) magna* Ionescu, 1955

*Campodea (Campodea) aff. taunica* Sendra & Teruel, 2010

Syntype: Male, 7.0 mm, Muntele Roșu, Ciucaș, preserved in 70° ethylic alcohol at the "Emile Racovitza" Institute.

**Redescription.** Cuticle with microdenticles. Clothing setae glabrous. Antennae shorter than the body, 5.5 mm length, with 31 articles; each article a little bit longer than wide; baciliform sensillum of third article located between macrochaetae *b* and *c* (tergal position). Cupuliform organ of apical article with four sensilla with two collarettes each. Frontal process deformed under the slide, with

tree macrochaetae near the tip, anterior chaetae slightly longer than two posterior chaetae (130  $\mu\text{m}$ / 100  $\mu\text{m}$ ) with barbs in their  $\frac{1}{2}$  distal. Three macrochaetae along each antennal insertion line, similar length ( $a/i/p= 95/85/80 \mu\text{m}$ ) with 2–5 barbs in their  $\frac{1}{3}$  distal. Labial palps with more than a hundred neuroglandular setae.

Distribution of macrochaetae typically 3+3 (*ma*, *la*, *lp*) on pronotum and mesonotum, 2+2 (*ma*, *lp*) on metanotum (Fig. 2). All macrochaetae slightly robust with 0-4 very thin barbs (barbs can be observed since 400x). Marginal setae thicker than clothing setae, with abundant short barbs along their length. One baciliforme trochanteral sensillum. Metathoracic tarsi extending beyond abdominal segment IV. Ventral tibial macrochaetae with 1–3 thin distal barbs. Calcars with 1 or 2 thin barbs. Three subapical setae smooth. Claws subequal, without crests. Telotarsal process glabrous, setiform.

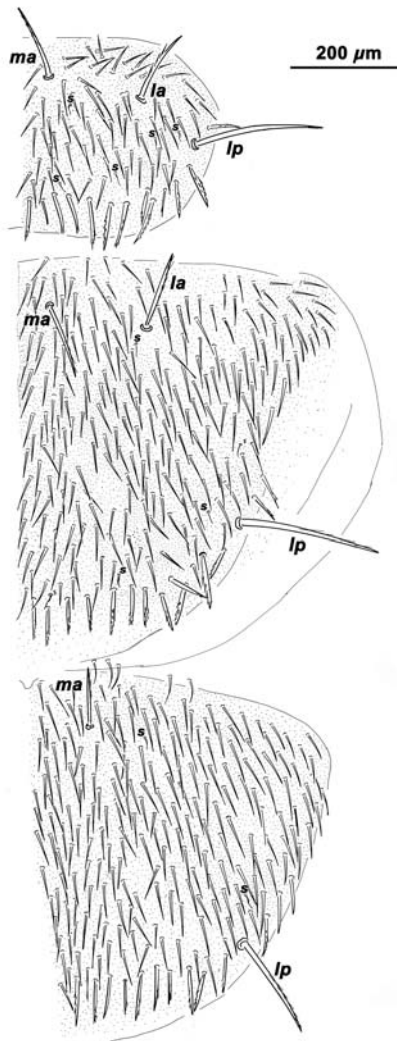


Fig. 2. *Campodea (Campodea) magna* Ionescu, 1955. Pronotum, mesonotum and metanotum.

Urotergites VI–VII with 1+1 *la* and 1+1 *lp* with thin barbs, urotergite VIII with 3+3 *lp*, urotergite IX 5+5 *lp*. Urosternite I with more than 400 glandular  $g_1$ -setae (arranged in four rows) on posterior margin and 6+6 M; appendages subtrapezoidal with more than 30 glandular setae  $a_1$  and more than 40  $a_2$ ; urosternites II–VII 4+4 macrochaetae, with typical styles, apical with two strong basal barbs. Cerci unknown.

Other specimens from the material examined included at the moment in *C. magna* are: 1 female (20) Valea Cuptoare 26.III.1976 leg. A. and St. Negrea; 4 females (23) Domogled at Podu Roșu (litter) 24.XI. 1970 leg. A. and St. Negrea; 1 juvenile (25) Valea Bistritei (amont Tarcau) 8.IV.1978. A. and St. Negrea; 3 males, 4 females and 2 juveniles (39) Valea Barzavei (upstream Minda) 11.VIII.1973. leg. A. and St. Negrea; 1 female (44) Valea Stârnici ("la varniță", in litter) 31.III.1972 leg. A. and St. Negrea; 2 males, 3 females and 1 unknown sex (50) Dealul Moșu

under the Jupalnie mine (litter) 2.IX.1975. leg. A. and St. Negrea; 1 female (87) Domogled to Crucea Alba 28.VI.1973 leg. A. and St. Negrea; 3 males and 3 females (115) the Cozla Mountain (litoclastic) 19.VI.1972; 3 juveniles and 1 sex? (144) Tismana Forest 20.V.1973 leg. A. and St. Negrea. All specimens are in bad condition to be examine, with broken antennae and cerci; in some of them we have been able to see a trochanteral sensillum.

**Affinities:** That species is similar in the macrochaetae distribution to *C. taunica* but, we still keep this species as a good species due to four differences with *C. taunica*: clothing setae, marginal setae and macrochaetae of notos robusta and more barbated, one thochateral sensillum, cuticle with microdenticles and more number of antennal articles. We also considered under *C. magna* the specimens sort of as *C. aff. taunica* from Turkey (SENDRA *et al.*, 2010).

**Distribution:** At the moment the species is known in several stations of Romania (IONESCU, 1955) and Turkey (SENDRA *et al.*, 2010).

#### 7. *Campodea (Dicampa) sprovierii* Silvestri, 1933

**Material examined:** 2 males (108) Valea Potoci at Tarcău, 8.IX.1968, A and St. Negrea leg. 1 female (174) Ciucurova, 12.III.1967, A and St. Negrea leg. (litter) 1 female (124) Calciulata (km 7) (lapidicolous) 6.VI.1967. 1 female (92) Lunca Bârzavei 8.VIII.1974 (litter). A and St. Negrea leg. 1 male (1) Valea Baciului (at 30 m upstream Minda – litoclastic). 29.VIII.1971. A. and St. Negrea leg. 1 male and 3 female (122. Semenici-Văliug 18.VI.1972; 2 juveniles (65) the Măcin Mountains, Greci Forest, 10.XI.1966, A. and St. Negrea leg. 1 male and 1 female (143) Valea cu Apa, Pietra Craiului, 9.IX.1973. 1 female (168) Ranchina Hill, 1.III.1976, A and St. Negrea leg. 6 males, 1 female, 2 juveniles, 1 unknown sex. 1 female (170) Valea Brzavei (300 m upstera Secu, in litter), 30.VIII.1975, A and St. Negrea leg.; 1 female (74) Niculitel Forest (litter), 13. III.1967, A. and St. Negrea leg. 1 male (75) Lunca Bârzavei (litter) 12.VIII.1972, A and St. Negrea leg. 2 males, 1 female and 1 juvenile (104) Reșița (The hills to Lupae; litter), 10.XII.1972, A and St. Negrea leg. 1 male, 1 female (146) Valea Galbenul (nearby Baia de Fier) 19.X.1971, G. Diaconu leg. 1 female (94) Moșu Hill (the slope toward Danube), 27-VI-1976, St. and A. Negrea leg. 2 males, 3 females (32) Valea Gaurii at the insurgency of the Gaura Haiducească Cave, 9.X.1969, A and St. Negrea leg. 1 female and 1 juvenile (58) Domogled (at Podu Rosu), 28.VI.1973, A and St. Negrea leg. 1 male and 2 females (31) Matina Forest, 8.XI.1968, A and St. Negrea leg. 1 male, 2 female (90) Valea Biczului (500 m Bistrita confluence), 7.IV.1978, A and St. Negrea leg.; 1 female (64) Ranchina Hill (litter), 30.VIII.1979, A and St. Negrea leg. 2 males, 2 females (41) Domogled at Podu Roșu (litter), 9.XI.1972, A and St. Negrea leg. 1 male, 2 females (97) Bârzava (downstream

Secu) (litter), 29.VII.1971, A and St Negrea leg. 1 male, 4 female (66) Cocoșu Forest (litter), 6.XI.1968, A and St Negrea leg. 1 male, 1 female and 1 juvenile (129) Ilva Mare (litoclastic), 26.II.1968. 3 males, 2 females (136) the Sâmbăta Monastery, 27.VIII.1969, Alex Juvara leg. 14 males, 7 females (148) Sulzestii de jos, 16.VII.1969. 3 males, 3 females (55) Valea Barzavei la Calnit litiera, 15.XII.1972, A and St. Negrea leg. 1 female (118) Valea Rea (spring at Peștera Craiului), 7.IX.1973. 1 male (77) Valea Cernei at Cracu Gaurii, 27.VI.1973 ; A and St Negrea leg. 1 unknown sex (98) Valea Potoci (at Tarcau), 19.IX.1976, A and St Negrea leg. 2 males, 1 female, 1 unknown sex (8) Ceahlău (Lutu Roșu) 1020 m alt., 7.V.1976, A and St. Negrea leg. 2 males (127) Casian (endogean), 25.VII.1967. 1 sex?, 1 juvenile (120) Soveja (stream Gragomira in beech forest) 13.V.1974. 3 males, 6 females (110) Domajnea, 31.X.1973 (litter), V. Iavorschi leg. 3 females (151) Valea Mare (to Scărișoara), 7.IX.1975, V. Iavorschi and E Serban leg. 3 males, 5 females, 5 juveniles, 1 sex? (96) Valea Șirnea, 6.XI.1967, A and St Negrea leg. 2 females (173) Slava Rusă Forest, 15.VI.1967, A. and St. Negrea leg. (litter). 1 female (81) Cabana Izvorul Muntelui 860 m, 7.V.1976. 1 male, 1 female (38) Cernica Forest, 10.V.1967, A and St. Negrea leg. 1 juvenile (5) Muntele Roșu, 19.XI.1970, A. and St. Negrea leg. 1 male (113) Valea Lupșei, 12.IX.1975. 1 juvenile, 1 unknown sex (33) Domogled to Crucea Alba, 7.VI.1976. 1 male (82) Techirghiol Forest, 12.V.1972. 4 males, 2 females (135) Poalele Zăgan, Ciucaș, 5.V.1973. 1 female (150) Soveja, 13.V.1974. 1 female (132) Azuga, 28.V.1969. 1 male, 7 females (112) Valea Mare, 7.IX.1975. 2 juveniles, 6 unknown sex (102) Cocoșu Forest, 10.V.1967, A and St Negrea leg. 3 males and 1 female (22) Tinovul Mare, 22.IX.1976, leg. A and St. Negrea. 2 males and 1 female (95) Talva Mare. 11.X.1976, A and St. Negrea leg. 1 juvenile and 1 female (37) Valea Cernei downstream Podu Cascadei, 23.IX.1973, A and St. Negrea leg.; 1 male (60) Resita Lunca Barzavei (litter), 11.XII.1972, A. and St. Negrea leg.; 1 male (42) Padurea la Greci (litter), 14.III.1967, A and St. Negrea leg. 1 male, 1 female: (69) forest at the Cilic Mountain, 10.V.1967 (litter). 1 male (123) Soveja (fpruce fir forest), 13.V.1974, V. Decu leg. 3 male, 8 female, 2 unknown sex (93) Peștera din Piatra Feti Cave, 26.V.1963, A. and St. Negrea leg. 1 female (14) Luna Bârzavei (litter), 4.IV.1972, A and St. Negrea leg.

Sensillum of third article tergal, between macrochaetae b and c, except in (22) Tinovul Mare, (174) Ciucurova and (143) Valea cu Apă from Piatra Craiului where it occupied a sternal position (d-e macrochaetae).

**Distribution:** This species is common along many sites in eastern Mediterranean. It is known in several Egean islands and the Peloponnese Peninsula (SILVESTRI, 1932a, CONDÉ, 1984, WYGODZINSKY, 1941), at the Carpathians, the Balkan and Anatolian Peninsula (RUSEK, 1965, SENDRA *et al.* 2006b). In Romania it was recorded by IONESCU (1951, 1955).

8. *Campodea (Dicampa) campestris* Ionescu, 1955

**Material examined:** 1 female (70) Martina Forest (litter) 15. V. 1976. leg. A. and St. Negrea; 4 specimens (38) Cernica Forest 10.V.1967. leg. A. and St. Negrea.

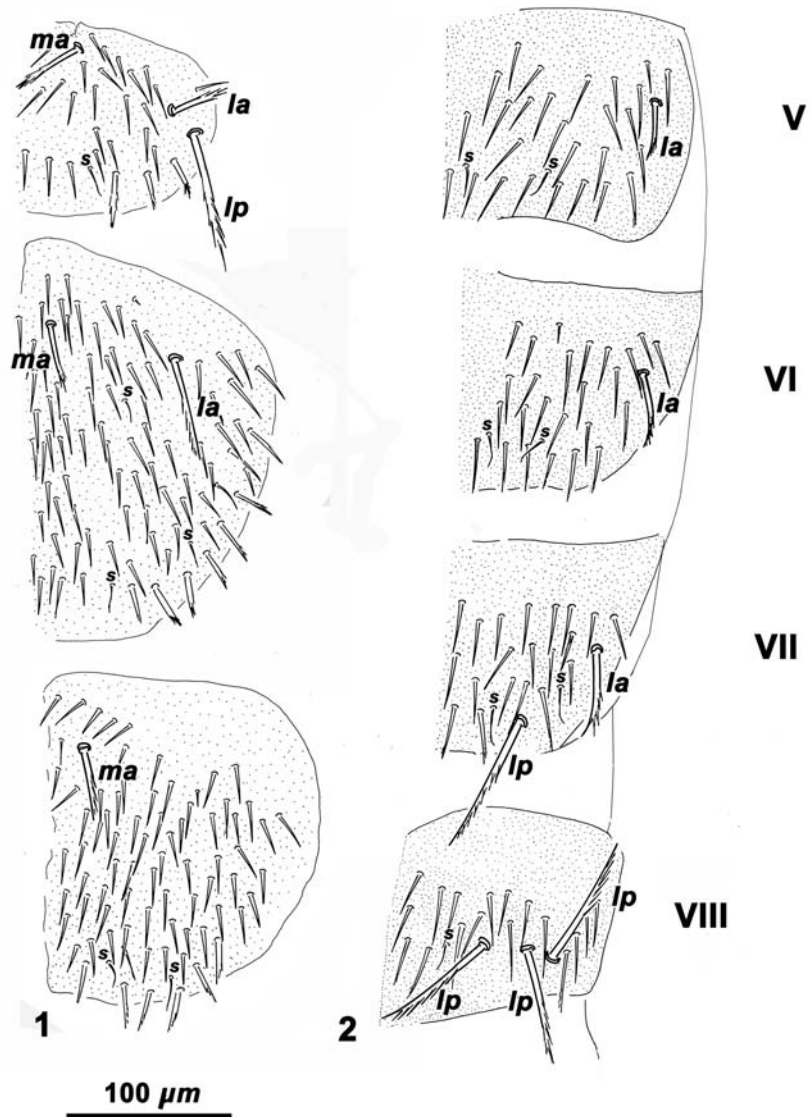


Fig. 3. *Campodea (Dicampa) campestris* Ionescu, 1955:  
1. Pronotum, mesonotum and metanotum; 2. Urotergites V to VIII.

We have chosen not to designate a neotype with our specimens due to their bad conservation and the absence of the cerci (which are coated with numerous clothing setae), an important feature to define this species.

Body length (excluding cerci) 2.10–3.60 mm; cuticle with microdenticles; clothing setae short and glabrous; antennae with 18 articles (23–25 Ionescu's specimens, 19–25 Rusek's specimens, Rusek 1965); cupuliform organ with four bare sensilla; sensillum of third article sternal position between macrochaetae *d* and *e* (tergal position in Rusek's specimens). Notal macrochaetae (Fig. 3.1) worn thin barbs in their 1/3 to 2/3 distal; marginal setae thicker than clothing setae and with 0–4 distal barbs; *mal/lal*: 0.56 to 0.62 (0.5 for Rusek's specimens): 1, 1, 1 *ma*, 1, 1, 0 *la*, 1, 0, 0 *lp*. Calcars 3–5 barbs since their basis. 1+1 *la* macrochaetae urotergites V–VI; 1+1 *la*, 1+1 *lp* VII, 3+3 *lp* VIII and 5+5 *lp* IX; *lp* macrochaetae long and barbed in their 2/3 distal, *la* shorter with barbs in their 1/3 to 1/2 distal (Fig. 3.2). Cerci lost (cerci worn long macrochaetae in the two juveniles specimens' Rusek). Urosternite I of male with about fifty glandular *g*<sub>1</sub>-setae arranged in 2–3 rows on posterior margin, appendages subtrapezoidal with more than 10 glandular setae *a*<sub>1</sub>.

**Distribution:** After the description of *C. campestris* by IONESCU (1955) in Romania, RUSEK (1965) cited and redescribed this species using specimens from Kunst (Bulgary). Later it has been located in several sites of Serbia (BLESIC 1984, 1987a, 1988, 1993, 1997a, 1998b, 1999, 2000a) and Montenegro (BLESIC, 1998a).

### 9. *Campodea (Paurocampa) suenisoni* Tuxen 1930

**Material examined:** 1 male and 1 female (103) Voichița Waterfall, 22.IX.1977, A and St. Negrea leg. 3 males (9) Semenici (under the Gozna peack, in litter), 1.VIII.1971. 1 male and 1 female (28) Valea Bicaz at the confluency with Bistrita 16.IV.1976 leg. A et St. Negrea. 1 female (67) the forest from the Comarnic canton, 26.IX.1967, A and St. Negrea leg. 3 females (49) Valea Cernei at waterflow (litter) 21.XI.1970. leg. A et St. Negrea. 5 males, 6 females and 1 juvenile (169) Valea Baciului (500 m amont Minda), 4.IV.1972, A. and St. Negrea. 3 males, 9 females and 3 juveniles (54) Domogled (litter) 13.XI.1972, A and St. Negrea leg. 1 female (6) Valea Cernei at 7 Izvoare Calde, 5.VI.1976, A. and St. Negrea leg. 1 male and 1 female (85) Valea Baciului (500 m amont Minda, right banck) 28.III.1976, A. and St. Negrea leg. 1 female and 1 juvenile (16) Valea Bârzavei (litter), 10.VIII.1972, A. and St. Negrea leg. 3 males (101) Peștera Hotilor (Cave) (at floor) (Băile Herculane), 28.IX.1967, A. and St. Negrea. 1 female and 1 juvenile (56) Ceahlău (alt. 1120 m), 17.IX.1976, A. and St. Negrea leg. 1 male (68) Valea Strârnici, 10.VIII.1973, A. and St. Negrea leg. 8 males and 6 females (87) Domogled to Crucea Alba 28.VI.1973, A. and St. Negrea leg. 1 male and 1 female (142) Herculane, 15.V.1969. 1 male, 1 female and 1 juvenile (122) Semenici-Valiug,

18.VI.1972. 1 female (30) Domogled to Sava Padina 27.VI.1973, A. and St. Negrea leg. 5 males, 12 females and 1 juvenile (84) Cheile Nerei downstream of Peștera Dubova Cave (litter), 8.V.1969, A. and St. Negrea leg. 1 male, 1 juvenile and 1 sex? (45) Valea Baliului under the Peștera Gaura Parsului Cave (litter), 31.VII.1971, A. and St. Negrea. 4 males, 3 females and 3 juveniles (134) Topolnița Spring. 9.X.1973. (litter). 3 females (107) Cheile Nerei, 8.XI.1967 (litter), A. and St. Negrea leg. 1 male and 1 female (32) Valea Gaurii at the insurgency of the cave Gaura Haiducească, 9.X.1969, A. and St. Negrea. 2 females (99) Peștera Hotilor (Cave) 26.VI.1962 (twilight zone) A. and St. Negrea leg. 2 males and 2 females (40) Valea Garlistei (at 1.5 km to the springs, in litter), 10.VI.1972, A. and St. Negrea leg. 3 males, 2 females, 1 juvenile and 1 sex? (97) Bârzava (downstream Secu) in litter, 29.VII.1971, A. and St. Negrea leg. 1 male and 1 juvenile (3) Valea Baciului (500 m upstream Minda), 28.III.1976, A. and St. Negrea leg. 15 males, 19 females and 2 juveniles (152) Sighiștel (the Apuseni Mountains), 14.VII.1969. 1 juvenile (125) Dealul Roșu, Punk Stream, Băile Herculane, 19.VI.1972, I Balș-Juvara. 1 male, 3 females (124) Căciulata (km 7) (lapidicolous) 6.VI.1967. 1 female (44) Valea Stârnici ("la varnita" litter), 31.III.1972, A. and St. Negrea. 1 male (121) Peștera Vacii (Cave) (in rotten wood), 30.III.1972. 2 females (47) Cheile Carașului, 5.IX.1970 (litter), A. and St. Negrea leg. 3 males and 3 females (43) Valea Cernei at Cracul Găurii, 14.XI.1972, A. and St. Negrea leg. 2 females (119) Peștera Topolnița (Cave), 23.VI.1973, M Baltag Mg Gruia leg. 4 males, 3 females and 5 sex? (18) Valea Baciului, 3.IV.1972, A. and St. Negrea. 2 males, 4 females, 1 juvenile and 2 sex? (151) Valea Mare (to Scărișoara), 7.IX.1975, V. Iavorschi and E Șerban leg. 1 female (100) Valea Baciului (500 m. upstera of the cave Peștera Turcului), 11.VI.1970, A. and St. Negrea leg. 1 male, 1 female, 2 juveniles (111) Topolnița (lapidicolous), 11.VII.1972. 1 male and 1 female (80) Valea Stârnici (litter), 7.III.1974, A. and St. Negrea leg. 9 males, 6 females and 1 sex? (24) Terezia at the Terezia Cave, 24.VI.1974. A. and St. Negrea, V. Decu. 2 females (51) Valea Cosin at the Cerna confluency, 12.VI.1978. A. and St. Negrea leg. 1 female (72) Valea Bârzavei (downstream Minda, in litter), 2.IV.1972, A. and St. Negrea leg. 1 juvenile (34) Valea Bârzavei, 11.VIII.1973. 1 female (33) Valea Tărcăița, 1.VII.1971. 2 females and 2 sex? (53) Valea Drăganului confluency with Valea Dracului, 19.VII.1971. 1 male (137) Peștera No. 71 (Cave) from Bazinul Cernei, 11.X.1966. 1 male, 2 females and 2 sex? (27) Valea Baciului, 2.VIII.1971. 3 males, 1 female, 4 juveniles and 4 sex? (48) Valea Bârzavei, 29.VII.1971, 1 male (140) Peștera Gaura Haiducească (Cave), 22.VIII.1965. 1 female (91) Grota Haiducilor (Cave), 18.XII.1956.

Antennae with 26 to 30 articles (5 antennae with 26 articles, 7 with 27, 1 with 28 and 1 with 30); baciliform enlarged of third article is between *b* and *c* macrochaetae (tergal position); apical article with 4 globiformes sensilla; and without trochanteral sensilla.

**Distribution:** Since TUXEN (1930) described this species, it has been cited many times by several authors in central Europe (CONDÉ, 1954, 1966, PACLT, 1961, PACLT & RUSEK, 1961) throughout Alps reaching the Carpathian mountains in Romania (IONESCU, 1951, 1955) and Bulgaria (RUSEK, 1965, 1985, CONDÉ, 1974, BLESIC, 2000b) and Dinaric region (BLESIC, 1997a, 1998a, 1998b, 2001).

#### 10. *Campodea (Paurocampa) spelaea* Ionescu, 1955

**Material examined:** 1 male, 4 females (147) Peștera de la Izbândiș, 25.VIII.1961.

Marginal setae glabrous are the only feature to differentiate from *C. (P.) suenisoni*. More material would be necessary to be sure about the status of this species.

**Distribution:** Although CONDÉ (1966) doubts about *C. (P.) spelaea*, in his later work (CONDÉ, 1974), he used that denomination for specimens from two Romanian caves (Peștera Moanei and Peștera Lesiana). We do also for our specimens and more material would be needed to make a more precise determination

#### 11. *Eutrichocampa collina* Ionescu, 1955

Syntype Female, 2.72 mm, Cheile Turzii, preserved on slide with a hydrosoluble solution at Racovitza Institute.

**Redescription.** Cuticle without microdenticles. Clothing setae short and glabrous. Antennae shorter than the body with 22 articles (1.32 mm length); baciliform sensillum of third article located between macrochaetae d and e (sternal position). Cupuliform organ of apical article with four bare sensilla. The tree macrochaetae near the frontal tip, anterior chaetae longer than two posterior chaetae (45 um/ 25 um) with 1 or 2 distal barbs in their. The three macrochaetae along each antennal insertion line, similar length ( $a/i/p= 25/32/30$  um) glabrous or with one distal barb. Labial palps with about thirty neuroglandular setae. Distribution of macrochaetae (Fig. 4.1) 3+3 (*ma*, *la*, *lp*) on pronotum, mesonotum and metanotum without macrochaetae; *ma* macrochaetae longer than *la* macrochaetae, but half of length of *lp*; *ma* and *lp* with thin barbs along their  $\frac{1}{2}$  distal and *la* only with one distal barb. Marginal setae similar than clothing setae and sometimes with a very thin distal barb. Metathoracic tarsi extending beyond abdominal segment IV. Ventral tibial macrochaetae with one thin distal barbs. Calcars shorts with 1 or 2 thin barbs. Three subapical setae smooth. Claws subequal, without crests. Telotarsal process laminar, sternal side covered with long barbs.



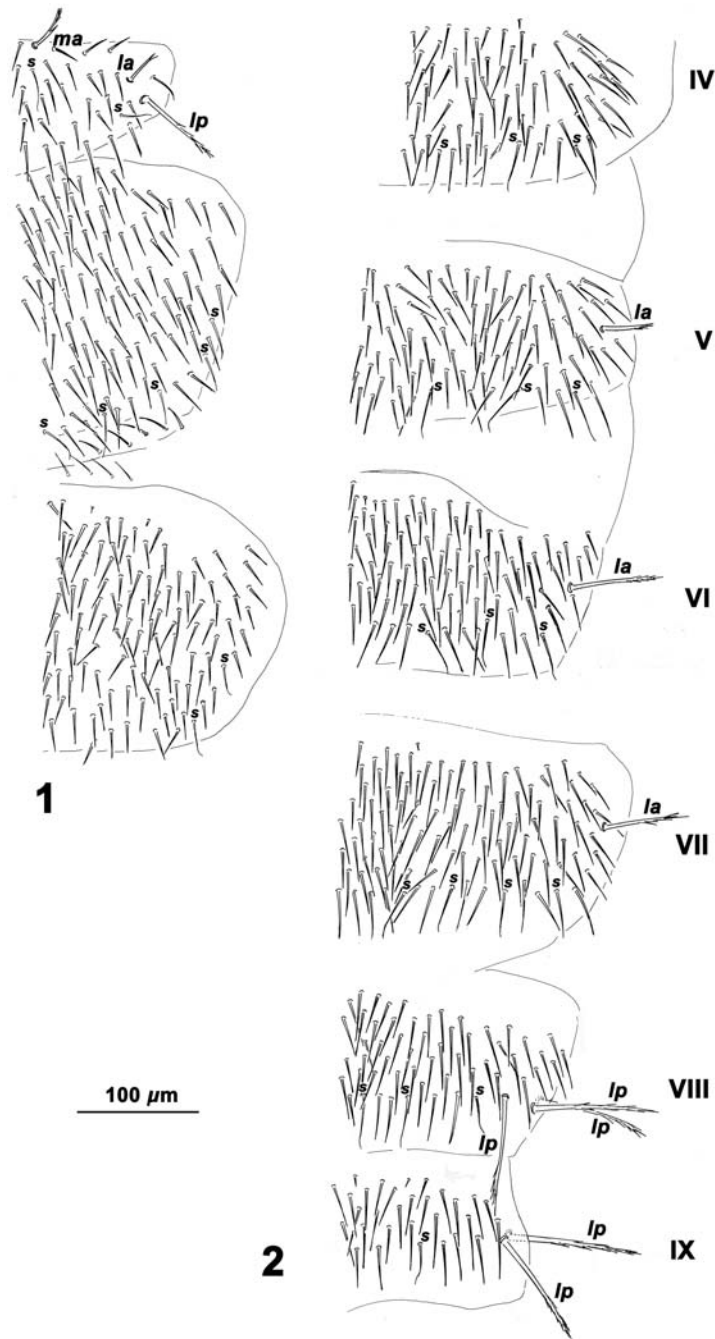


Fig. 4. *Eutrichocampa collina* Ionescu 1955:  
 1. Pronotum, mesonotum and metanotum; 2. Urotergites IV to IX.

Urotergites V–VII with 1+1 *la* with thin barbs (any *lp* see in uritergites V–VII, although Ionescu noticed about 1+1 *lp* in VII), urotergite VIII with 3+3 *lp* and IX with 5+5 *lp* more and more shorter from latero-tergal to ventral position (Fig. 4.2). Urosternite I 4+4 macrochaetae and II–VII with 3+3 macrochaetae but their small size make it difficult to differentiate the macrochaetae from clothing setae; appendages subcylindrical with 9 glandular setae *a<sub>1</sub>*; urosternite VIII with 1+1 macrochaetae; typical stylus, apical with two basal barbs. Cerci broken with a base followed by 8 short articles, worn long setae and longer macrochaetae with few distal barbs.

For this rare species we would need more material, of course at least a male to complete the description.

**Distribution:** This species was described by IONESCU (1955) only from one station in Cluj Region. Much later Blesic referred to this species not very far away, in the east of Serbia (BLESIC, 1997b) and Bosnia-Herzegovina (BLESIC, 1996). CONDÉ (1984) described a subspecies, *Eutrichocampa collina ithacesia* Condé 1984, at Ithaca Island (Greece).

## 12. *Litocampa humilis comani* Condé, 1991

**Material examined:** 2 males, 3 females and 2 juveniles (116) Peștera de la Izvorul Taușoarelor (Cave), VIII.1958. 1 female and 1 juvenil (141) Peștera Șugău, 5.VI.1971.

Organ cupuliform with at least 12 sensilla in three antennae with 28 (2 antennae) and 31 (1 antennae).

**Distribution:** This species was described by CONDÉ (1991) after specimens collected in Peștera de la Izvorul Taușoarelor (Cave).

## 13. *Litocampa montana* Sendra n. comb. *Campodea (Dicampa) montana* Ionescu, 1955

**Syntype:** Male, 2.2 mm, la Padini, on the Lotrului Valley, at Malaia, preserved on slide with a hydrosoluble solution at the “Emile Racovitza” Institute.

**Others specimens from Ionescu’s collection used in the description:** 2 male, 3 females and 3 juveniles, body length: 2–2.8 mm (adults), 1.8–2 (juveniles).

**Description.** Cuticle without ornamentation. Clothing setae short and glabrous. Antennae shorter than the body with 21 to 23 articles (all adults): 4 of 21 articles, 1 of 22, 2 of 23, each article is longer than wide; baciliform sensillum of third article located between macrochaetae *d* and *e* (sternal position). Cupuliform organ of apical article with four bare sensilla. The tree macrochaetae near the frontal tip, anterior chaetae longer than two posterior chaetae (32 μm/25 μm) glabrous. Three macrochaetae along each antennal insertion line, similar length.

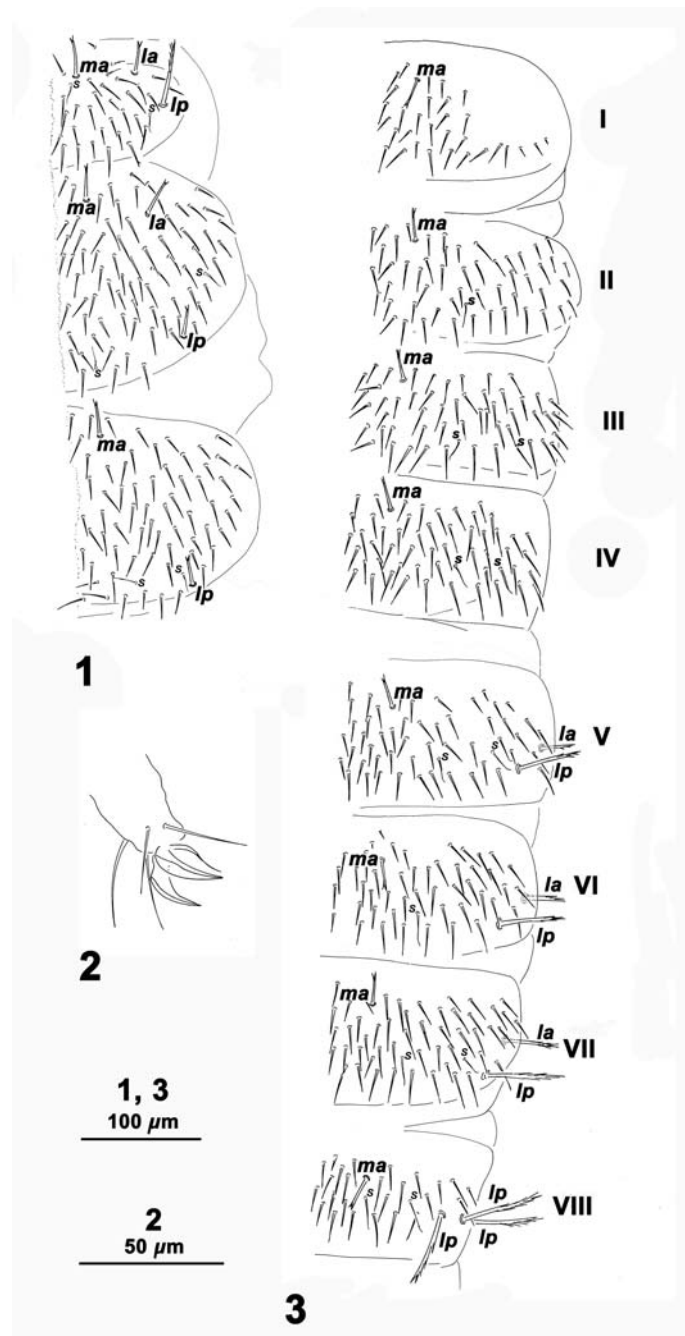


Fig. 5. *Litocampa Montana* Sendra n. comb.: 1. Pronotum, mesonotum and metanotum; 2. claws; 3. Urotergites I to VIII.

( $a/i/p=28/30/25\ \mu\text{m}$ ) glabrous or with a thin apical barb. Labial palps with more than about sixty neuroglandular setae. Distribution of macrochaetae typically (Fig. 5.1) 3+3 (*ma*, *la*, *lp*) on pronotum and mesonotum, 2+2 (*ma*, *lp*) on metanotum. All macrochaetae short and thin with only one distal barb, except *lp* on pronotum is the longest with 3–4 thin barbs in their  $\frac{1}{2}$  distal. Marginal setae similar to clothing setae, on lateral can wear a distal thin barb. Metathoracic tarsi extending beyond abdominal segment V. Ventral tibial macrochaetae with one distal barb. Calcars with 5–8 barbs along its length. Three subapical setae smooth. Claws subequal, clearly layered with small lateral crests without any ornamentation (Fig. 5.2). Telotarsal process glabrous and setiform. Urotergites I–VIII (Fig. 5.3) with 1+1 *ma*, short and with one thin distal barb, V–VII with 1+1 *la* and 1+1 *lp* with thin barbs along their  $\frac{1}{3}$  to  $\frac{1}{2}$  distal, urotergite VIII with 3+3 *lp*, urotergite IX 5+5 *lp* (any *ma* or *mp* on IX). Urosternite I with more than 60 glandular  $g_1$ -setae arranged in two rows on posterior margin and 6+6 macrochaetae; appendages subtrapezoidal with more than 10 glandular setae  $a_1$  and more than 13  $a_2$ ; urosternites II–VII 4+4 macrochaetae; typical stylus, apical setae with two strong basal barbs. Cerci with a base followed by 6 articles worn long macrochaetae with 1–4 long barbs that became only one in distal articles; all articles with clothing setae scarcity.

**Affinities:** Although IONESCU (1955: Fig. 15A) knew and also drew the lateral crests of the claws, he decided to include its *L. montana* inside, genus *Campodea* Westwood, 1842 into subgenus *Dicampa* Silvestri 1932, probably because he did not know the description of *Litocampa* Silvestri 1933 genus. Nowadays that decision should be considered wrong and we have suggested a new combination including this species inside *Litocampa*.

*Litocampa montana* n. comb. is closely related to others species such as *Litocampa tuzetae* (Condé 1948) from France (CONDÉ, 1948a) and *Litocampa cognata* (Condé 1948) known also from France (CONDÉ, 1948b) and Italy (RAMELLINI, 2000). But several features separate the Romanian species from the others, such as: its small body size, less number of articles of *antenna*, very short notal macrochaetae and medial macrochaetae of IX urite are absent.

#### 14. *Plusiocampa humicola* Ionescu 1951

**Syntype:** female 4.00 mm, Turnu Valley and Gardului Valley (at the Cozia Mountain) September 1982, Leg.? Preserved on slide with a hydrosoluble solution at “Emile Racovitza” Institute.

**Others specimens of Ionescu collection used in the redescription:** Turnu Valley and Gardului Valley 1 male, 2 juveniles, (without date); Valea Lespezi, Câmpeni (Cluj Region), 1 male, 2 females, 1 juvenile, 27.IX.1950, 1 juvenile, 26.IX.1950; Valea lui Ilie, Câmpeni, 1 male, 1 juvenile, 27.IX.1950.

**Redescription.** Body length (excluding cerci) 2.9–4.1 mm. Antennae less than half the body, 0.41 to 0.50x body length. Cercal length about half the body length, 0.42–0.52x body length. Cuticle without ornamentation. Clothing setae long and mostly glabrous, excepting some on urotergites.

Adult antennae with 21 and 22 doliiform articles (one antennae with 21 articles and two with 22); juveniles with 22 and 23 (3 with 22 and 2 with 23); baciliform sensillum of third article located between macrochaetae *d* and *e* (ventral position). Up to six sensilla in a 24 µm-long trough or “gouge” (BARETH & CONDÉ, 1981) in a distal verticil on each medial and distal article. Cupuliform organ of apical article with 4–5 sensilla with three collarettes each. Frontal process not protuberant with three macrochaetae near the tip glabrous; macrochaetae along each antennal insertion line (*a*, *i* and *p*) with 1–4 distal barbs. Labial palps with 40–60 neuroglandular setae.

Nota not elongated, distribution of macrochaetae: 6+6 (1+1 *ma*, 3+3 *la*, 2+2 *lp*) on pronotum, 7+7 (1+1 *ma*, 3+3 *la*, 2+2 *lp*, 1+1 *mp*) on mesonotum and 5+5 (1+1 *ma*, 1+1 *la*, 2+2 *lp*, 1+1 *mp*) on metanotum, long and with thin and long barbs along their  $\frac{3}{4}$  distales; *mp* the shortest, less than half the *lp*. Marginal setae long, with 1–6 thin and long barbs. Metathoracic tarsi extending beyond abdominal segment VI. Femur with a dorsal macrochaetae barbed almost since their bases. Two ventral tibia with 3–4 distal barbs. Calcars with long barbs extending from their bases. Two rows of barbuled setae on ventral face of the tarsus and the three subapical setae smooth. Claws with unequal ridged lateral crests, without elongated talon. Telotarsal process glabrous and setiform.

All macrochaetae long and thin, almost completely barbed. Urotergites I–II with 1+1 *post*<sub>1</sub>; III with 2+2 *post*<sub>1,3</sub>; IV with 1+1 *la*<sub>3</sub>, 4+4 *post*<sub>1,2,3,4</sub>; V with 1+1 *la*<sub>3</sub>, 5+5 *post*<sub>1,2,3,4,5</sub>; VI–VII, 1+1 *la*<sub>2,3</sub>, 5+5 *post*<sub>1,2,3,4,5</sub>; VIII 6+6 *post*; and IX 8+8 *post*; *post*<sub>2</sub> macrochaetae always the shortest, half the length of other *post*. Urosternite I with 7+7 macrochaetae, urosternites II–VII with 5+5 macrochaetae, urosternite VIII with 2+2 macrochaetae. Apical setae of each stylus with one tooth (strong barb) at its base; subapical and sternal setae with 3–4 barbs. Adults cerci with a base subdivided into two or three followed by 5–6 articles, only 3 in juveniles, worn long macrochaetae barbed in their  $\frac{1}{2}$  distal and clothing setae scarcity.

In the males, urosternite I without glandular *g*<sub>1</sub>-setae; appendages subcylindrical and wider than in females, with 10–12 glandular *a*<sub>1</sub>-setae in apical; female appendages with 8–10 glandular *a*<sub>1</sub>-setae.

**Affinities.** *P. humicola* is closely related to several species: *Plusiocampa caprai* Condé 1950 from Varese, Italy (CONDÉ, 1950b), *Plusiocampa grandi* Silvestri 1933 from Trentino, Italy (SILVESTRI, 1933a) and the complex of species of *Plusiocampa strouhali* Silvestri 1933 which inhabit the endogean and subterranean habitats of Alps (SILVESTRI, 1933b; CONDÉ, 1954). There are two

features to separate these species from *P. humicola*. Firstly, it does not have glabular  $a_2$ -setae on its sternite I appendages, and secondly, it has the lowest number of antennae articles. *P. humicola* is also near to *Plusiocampa beroni* Bareth & Condé 2001, a species of the Bulgarian subterranean environment (BARETH & CONDÉ 2001), but it is different by this through the absence of  $g_1$  on sternite I of the males. In conclusion we keep at the moment this Ionescu' *Plusiocampa* as a valid species. Meantime we are looking for more taxonomical information about European *Plusiocampa* species.

#### 15. *Plusiocampa elongata* Ionescu, 1955

**Syntype from Ionescu'collection:** 1 female 5.56 mm, Peștera dracului de la Paroșeni (Cave)(Hunedoara county) Preserved on slide in hidrosoluble solution, deposited in the "Emile Racovitza" Institute.

**Other specimens used in the redescription:** 4 males, 1 female and 1 juvenile (109) Peștera Gaura Porcariului (Cave) (on floor), 8.XI.1967, A. and St. Negrea leg. 2 juveniles (11) Peștera Gaura Porcariului (on the cave floor), 25.VI.1966, A. and St. Negrea leg. 1 unknown sex (15) Gaura Porcariului (on the cave floor), 9.X.1998. 3 males, 7 females and 3 juveniles (35) Peștera Sudor III (on the cave floor), 15.XI.1961. 1 male and 1 juvenile (36) Peștera Gaura Turcului (Cave) (under stones), 11.VI.1970, A. and St. Negrea leg. 1 male and 1 female (57) Peștera de după Cârșă, (on the cave floor), 6.X.1963, A. and St. Negrea leg. 3 males and 1 juvenile (62) Peștera Țolosu (Cave), 28.VIII.1964, V. Decu, A. and St. Negrea leg. 4 males and 1 female (63) Peștera de sub Cetate (Cave), 5.IX.1970, A. and St. Negrea leg. 1 juvenile (131) Peștera Feneș (Cave), 30.X.1962.

**Redescription:** Body length (excluding cerci) 4.0–6.4 mm (adults), 4.2–4.9 mm (juveniles). Antennae shorter than the body, 0.59 to 0.66x body length. Cercal length shorter than the body length 0.64x body length (syntype). Cuticle without ornamentation. Clothing setae long glabrous or with 2–3 thin distal barbs.

Adult antennae with 30 to 35 articles (one antennae with 30 articles, two with 31, two with 32, one with 33, four with 34 and four with 35); articles doliiforms in some specimens, but usually medial and distal articles twice longer than wide; coniform sensillum of third article located between macrochaetae *d* and *e* (ventral position). Up to ten sensilla in a 25–30  $\mu$ m-long trough or "gouge" (BARETH & CONDÉ, 1981) in two or three verticils on each medial and distal article. Cupuliform organ of apical article with four complex sensilla, with three high collarettes each. Frontal process no protuberant with 10–12 macrochaetae glabrous or, on some of them, with thin distal barbs and also lightly tuberculata; macrochaetae along each antennal insertion line (*a*, *i* and *p*) at least barbed in the distal portion, *i* longer than *a* and *p*; *x*-setae well diferenciate with barbs along its 1/3 distal. Labial palps with up to 150 neuroglandular setae.

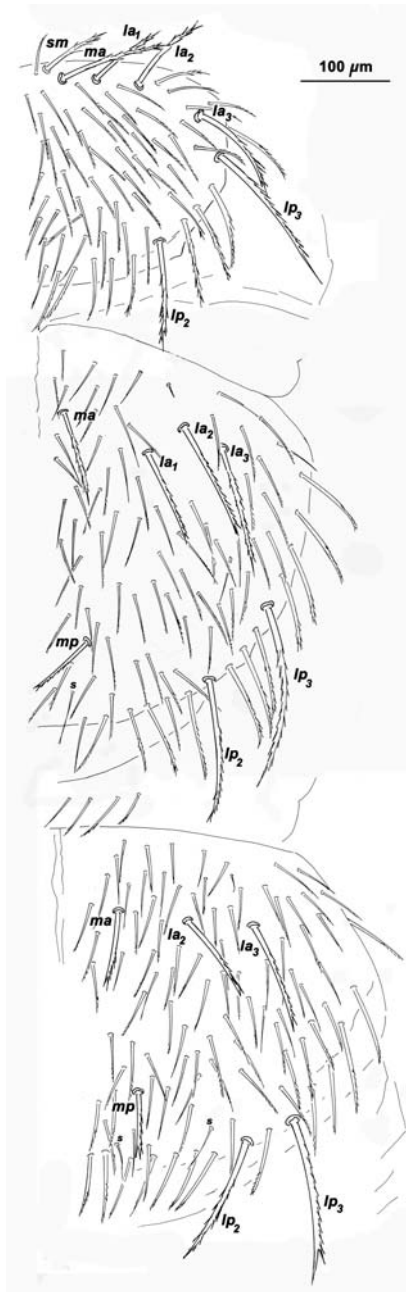


Fig. 6. *Plusiocampa elongata* Ionescu 1955:  
Pronotum, mesonotum and metanotum.

Nota elongated, distribution of macrochaetae (Fig. 6): 7+7 (1+1 *ma*, 4+4 *la*, 2+2 *lp*) on pronotum, 7+7 (1+1 *ma*, 3+3 *la*, 2+2 *lp*, 1+1 *mp*) on mesonotum and 6+6 (1+1 *ma*, 2+2 *la*, 2+2 *lp*, 1+1 *mp*) on metanotum, all long macrochaetae and barbed with thin barbs; *la* pronotum could be substituted by setae; *mp* macrochaetae the shortest, less than half of the *lp*. Marginal setae thicker and longer than clothing setae with barbs along its  $\frac{1}{2}$  distal. Metathoracic tarsi extending up to abdominal segment VI. Femur with one dorsal macrochaetae barbed. Two or three ventral tibia short with barbs since their  $\frac{1}{2}$  distal. Calcars with barbs extending from their bases. Two rows of barbuled setae on ventral face of the tarsus, the three subapical setae smooth, except sternal ones with thin barbs along its length. Unequal claws; posterior claw 1.15 to 1.30 longer than anterior claw. Lateral crests also unequal, well ridged and with an elongated talon. Telotarsal process glabrous and setiform. Urotergites I–II with 1+1 *post*<sub>1</sub>; III with 1+1 or 0 *la*<sub>3</sub>, 4+4 *post*<sub>1,2,3,4</sub> (3+3 at specimens from the Gaura Porcariului cave); IV with 1+1, 2+2 or 3+3 *la*<sub>3</sub>, *la*<sub>2,3</sub> or *la*<sub>1,2,3</sub>, 4+4 *post*<sub>1,2,3,4</sub>; V with 2+2 or 3+3 *la*<sub>2,3</sub> or *la*<sub>1,2,3</sub>, 5+5 *post*<sub>1,2,3,4,5</sub>; VI–VII, 3 *la*<sub>1,2,3</sub>, 5+5 *post*<sub>1,2,3,4,5</sub>; VIII 6+6 *post*; and IX 8+8 *post*; all macrochaetae long and almost completely barbed. Urosternite I with 8+8 macrochaetae, urosternites II–VII with 5+5 macrochaetae, urosternite VIII with 2+2 macrochaetae. Apical setae of each stylus with one thick barb at its base and 1–3 very thin barbs, subapical setae with 3–4 barbs and sternal setae with several apical barbs and some very thin.

Adults cerci with a base subdivided into two or three following by 5–6 articles, only 3 in

juveniles, worn long macrochaete barbed in their  $\frac{1}{2}$  distal and clothing setae scarcity. Cerci worn long macrochaetae well barbed, with a base following by 9 articles (syntype).

In males, urosternite I (Fig. 7) without glandular  $g_1$ -setae but with hyperdeveloped appendages, worn a lot of glandular  $a_1$ -setae in apical, up to 250 but without glandular  $a_2$ -setae; female subcylindric appendages with up to 16 glandular  $a_1$ -setae.

Male with spermatophores fascicles of 70  $\mu\text{m}$  diameter, spiral filamnet described  $2\frac{1}{2}$  turns, with 7  $\mu\text{m}$  diameter.

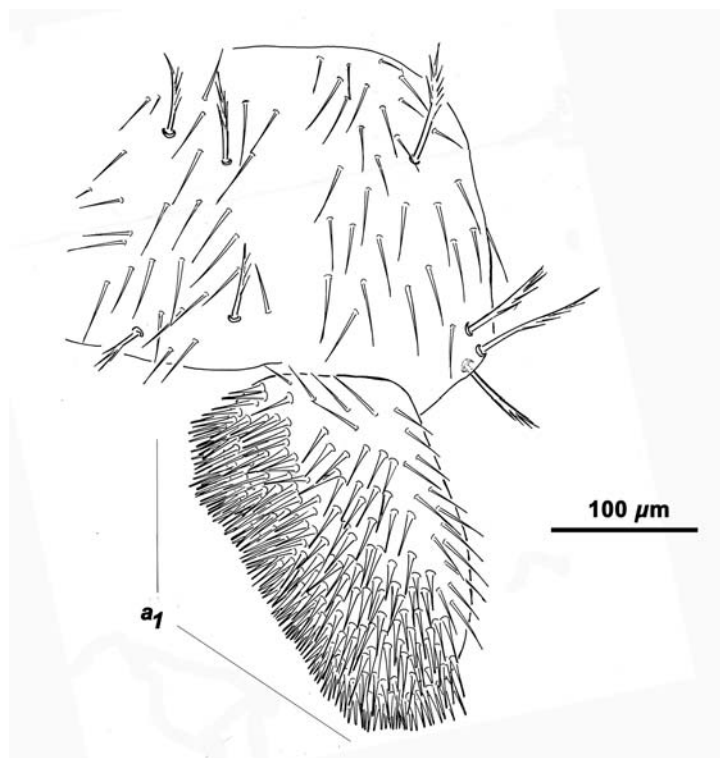


Figure 7. *Plusiocampa elongata* Ionescu, 1955: Urosternite I of the male.

**Affinities.** We should find in *Plusiocampa vodniensis* Condé & Bareth 2001 the closest related species of *P. elongata*, but there are many differences with it, and also the male of this Bulgarian species remains unknown. Both are subterranean species, but *P. vodniensis* has more antennae articles (36–38) and sensilla in cupuliform organ (6), but the main differences are in the number of urotergites macrochaetae (III urotergite with 1+1  $post_1$ , VI-VII with 2  $la_{2,3}$  and 4+4  $post_{1,3,4,5}$ ) (CONDÉ & BARETH, 2001).



#### 16. *Plusiocampa* aff. *elongata* Ionescu 1955

**Material examined:** (117, 130, 149) 1 male, 1 female and 1 juvenile, Peștera Cloșani, 28.VII.1972; 1 male, 1 female and 1 juvenile, 2.IV.1977; 3 males, 5 females and 1 sex ?, 19.III.1967.

Specimens from Peștera Cloșani (Cave) with some differences in the number of urotergal macrochaetae (0,0+1 or 1+1 post<sub>1</sub> on urotergite I, 1+1 post<sub>1</sub> II–III, 2+2 post<sub>1,3</sub> IV, 1+1 la, 4+4 post<sub>1,3,4,5</sub> V–VII) and more unequal claws, posterior claw 1.50 to 1.60 longer than anterior claw.

#### 4. DISCUSSION AND CONCLUSIONS

The obtained results of our work come on the one hand from the study of the specimens still preserved in the Ionescu's collection, and on the other hand, on later collected specimens, both deposited in the "Emile Racovitza" Institute of Speleology in Bucharest. The examination of Ionescu's collection has allowed us to designate three syntypes for the species: *P. elongata*, *P. humicola* and *C. magna*; the redescription of *C. campestris* and *E. collina*; a new combination for *Litocampa montana*; to propose two synonyms the Ionescu's species, *C. silvestrii posterior* and *C. remyi*, that change to *C. taunica* and *C. pseudofragilis*. In the modern collection we have found two new species for Romania, *C. tuxeni* and *C. vihorlatensis*.

In short, after our results, we could talk about 28 forms (species and subspecies) for Romanian Diplura. This diversity could be considered as expected if we compare with the dipluran diversity in others countries more or less studied, such as the continental Greece (Ionian Islands included) with 26 forms (CONDÉ, 1984, CONDÉ, 1956, PAGÉS, 1979, 1980) or Turkey with 29 forms (SENDRA *et al.*, 2010, PACLT, 1965). Nevertheless that diversity is lower if we do comparisons with France (excluded Corsica) with 76 forms (BARETH, 2006, PAGÉS, 1978) or the Iberian peninsula with 78 forms (SENDRA *et al.* 1985, 2004, 2006a, 2010; SILVESTRI, 1929b, 1932b), but one of the clear reason for that is due to both regions have received a lot of attention from entomologists who work in this group.

It is important to make some remarks to explain properly the diversity, composition and distribution of the dipluran Romanian fauna:

1. *Japyx confusus rumena* is the only form known in Romania. It belongs to the superfamily Iapygoidea, which is represented in the world for 528 species, a few more than the half of the total Diplura (SENDRA, 2006) but poorly represented in cold and temperate areas. Although, only one species for the Romanian fauna represents a very low diversity than it could be expected. Nevertheless, if we compare the eight species of Iapygoidea known (PAGÉS, 1978) from the regions of France, it could be observed that they are recorded at the same latitude as the

Romanian species. The reason for such a low number of species is probably caused by the fact that they were not looked for in fit habitats. The japygids prefer, as PAGÉS (op. cit.) wrote, soils well drained where the temperature of the surface reach 25°C and the relative humidity about 80% during several weeks in spring or the beginning of autumn.

2. Four species mentioned in Ionescu's papers have a western-European distribution (*C. fragilis*, *C. ilixonis*, *C. pieltaini* and *C. propinqua*) and because we were not able to check the specimens of Ionescu's collection we think that at least the latest three have to be put into reserve. These probably could be another *Campodea* species. That has happened with *C. taunica* and *C. pseudofragilis*.

3. The above statement would draw a different map for the distribution and composition of Romanian diplura. Almost, all species confirmed, except *C. fragilis* which is spread also in North-American continent (CONDÉ, 1973), have an Eastern European distribution. Moreover at least eight forms could be considered endemic from Romania: *C. magna*, *C. neuherzi*, *E. collina collina*, *L. humilis comani*, *L. montana*, *P. elongata*, *P. isterina* and *P. euxina*, and three more with doubts: *C. silvicola*, *C. spelaea* and *P. humicola*.

4. Among the dipluran species of the Romanian fauna, *C. neuherzi*, *C. spelaea*, *L. humilis comani*, and *P. elongata*, *P. euxina* and *P. euxina* were recorded up to present only in caves and could be considered troglobiontic species. BERON (1994) considered *C. frenata* as a probable trogliphilic species, being frequently observed in the vestibular zone of caves. Also in this category is *C. suensoni*, recorded in caves from the Meridional Carpathians and the Apuseni Mountains. The rest of the species are endogean and troglonexene, living in the soil at more or less depth.

In conclusion, although the information revealed by Ionescu and later contributions was very valuable to know the dipluran Romanian fauna, we should make an effort sampling in different edaphic, endogean and subterranean habitats throughout Romanian regions.

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