

A CONTRIBUTION TO THE KNOWLEDGE OF THE HARVESTMEN (OPILIONES) FROM THE SUBMEDITERRANEAN REGION OF SLOVENIA

Tone NOVAK

Ph.D., Department of biology, University of Maribor, 62000 Maribor, Koroška 160, SLO
dr. biol. znan., Oddelek za biologijo, Univerza v Mariboru, 62000 Maribor, Koroška 160, SLO

Jürgen GRUBER

Ph.D., Natural History Museum, 1014 Wien, Burgring 7, A
dr. biol. znan., Naturhistorisches Museum Wien, 1014 Wien, Burgring 7, A

Ljuba SLANA

opilionologist, 62380 Slovenj Gradec, Ozare 31, SLO
opilionologinja, 62380 Slovenj Gradec, Ozare 31, SLO

ABSTRACT

A faunistic review of the harvestmen (Opiliones) of the Submediterranean region of Slovenia is represented and the current taxonomical and zoogeographical problems of some species are discussed.

Key words: faunistic review, Opiliones, Slovenia, Submediterranean
Ključne besede: faunistični pregled, suhe južine, Slovenija, submediteran

INTRODUCTION

Geographically, Slovenia shares the Alpine, Central European, Mediterranean, Dinaric and Pannonic regions, the specific climates included. First zoogeographical comments and the map (Hadži, 1931) of the old Yugoslav monarchy, Slovenia included, were made by Hadži (1930). At a later stage, Carnelutti (1981, 1992) and Mršič (in prep.) tried to determine the boundaries between the zoogeographical regions more accurately. In determining the borders and the hierarchy of the regions, Mršič (ibid.) took into account certain geographical, meteorological as well as paleogeographical circumstances.

The Mediterranean part of Slovenia, popularly named Primorska or Slovensko primorje, is technically recognized as Submediterranean (Fig. 1) because of its moderate Mediterranean characteristics. It should have been considered as a subregion of the Dinaric region

(Mršič, personal comm.). The provisional Submediterranean region of Slovenia measures about 1,900 sq. km, comprising about 9% of the territory of Slovenia.

Taxonomic review

For this review all known collections of Opiliones deposited in Slovenia were considered and other relevant data were taken into account. The Universal Transfer Mercator (UTM) projection is used to present the locations of the finding places.

CYPHOPHTHALMI

SIRONIDAE

Siro duricorius (JOSEPH, 1868), Fig. 2

Vremščica, VL 26, EP leg., 17.5.1959, IZRK 10965: 1 f., 1 ? (damaged) - TN det. 1981; Nanos, VL 27, G leg.

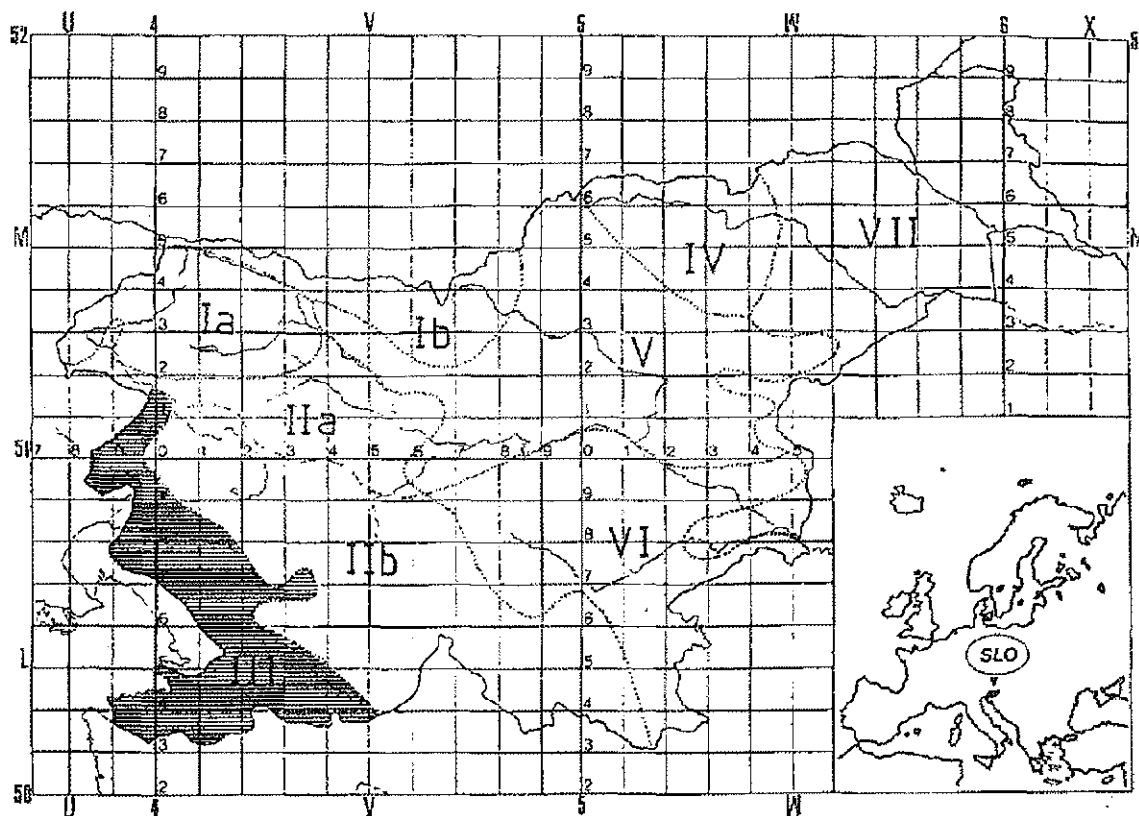


Fig. 1: Provisional zoogeographic regionalisation of Slovenia (according to N. Mršić) on the UTM map.
Slika 1: Provizorična zoogeografska reorganizacija Slovenije (po N. Mršiću) na UTM karti.

Regions

- I. Alpine, a: Julian Alps, b: Karavanke and Kamnik - Savinja Alps
- II. Dinaric, a: Alpine - Dinaric, b: Eudinaric
- III. Submediterranean
- IV. Central European (Pohorje)
- V. Prealpin
- VI. Prepannonic
- VII. Subpannonic

Regije

- I. alpska, a: Julijske Alpe, b: Karavanke in Kamniško - Savinjske Alpe
- II. dinarska, a: alpsko-dinarska, b: evdinarska
- III. submediteranska
- IV. centralnoevropska (Pohorje)
- V. predalpska
- VI. predpanonska
- VII. subpanonska

25.6. - 4.7.1894, NHMW 2984: 75 mm., 19 ff. - JG det.;
Vodni dol, Postojna, VI. 37, EP leg., 4.1968: 13 mm., 12
ff. - TN det.

L A N I A T O R E S

TRAVUNIIDAE

Peltonychia postumicola (ROEWER, 1935)

ROEWER (1935) described the species from Postojnska jama, Postojna, VI.36. Typus Coll. ROEWER Nr. 5018/3: 2 mm., 3 ff., 1 pullus - FR det.

Peltonychia tenuis ROEWER, 1935

The holotypus is a young animal (Martens 1978), alt-

hough determined as a male in Roewer's (1935) description. Locus typicus is the cave Martinova jama at Materija, VI. 24. Typus Coll. ROEWER No. 1516/1. In spring, summer and autumn 1995 we systematically searched in vain for further specimens in the cave, 3 to 4 hours per visit. Among troglomorphic taxa *Stalita*, *Neobisium*, *Onychiurus*, *Pseudosinella*, *Plusiocampa*, *Bathysciotes* and *Leptodirus* specimens were found in the inner parts, as well as adults and pulli of *Troglohyphantes*, *Bathysciotes*, *Brachydesmus* and about two dozens of non-troglomorphic taxa in the entrance part of the cave. Thus it seems unlikely that the *Peltonychia* were missed if they regularly inhabited the cave. We believe the species lives in the karst fissure systems or/and in deep soil strata and occurs in caves only occasionally.

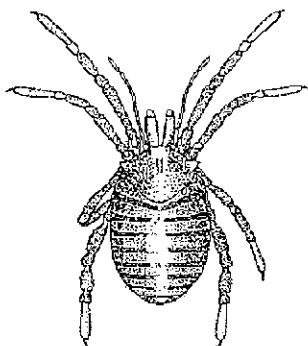


Fig./Slika 2: *Siro duricorius*.

Roewer (1935) described *P. gabria* from the cave "Gabria Jama bei Triest" in Italy. Typus Coll. ROEWER 5022/7. This cave could be the cave Grotta presso Basovizza (= Grotta dei colombi; No 32VG) at Basovizza - Bazovica, VL15, named Gabrič by the indigenous Slovene inhabitants (plan and description: Duemilla grotte, p. 281). Stoch and Dolce (1984) do not refer to the species for the karst of Trieste, perhaps for the reason that there are two villages named Gabria - Gabrije, UL88, near Gorizia - Gorica. It seems justifiable to consider the underground habitats in the neighbourhood of the villages Gabria Inferiore and G. Superiore as the actual finding places. The concrete locus typicus remains thus unknown.

The present taxonomical knowledge of the nominal species *P. postumicola*, *P. gabria* and *P. tenuis* is very scarce and the validity of the taxonomic characteristics and their actual variability are practically unknown (Marcellino, 1982). Besides the fact that the European Laniatores are morphologically instable, the strange zoogeographical distribution of the three *Peltonychia* species leads to doubts regarding the criteria for their description. The specimens from 100 km distant Postojna, VL36, and Prato in Venezia Giulia, UM63, belong both to *P. postumicola*, while those from 20 km distant Postojna and Markovščina (*P. tenuis*) as well as (?) Basovizza, VL15 (*P. gabria*) or 35 km distant (?) Gabria (*P. gabria*), intermediate to Postojna and Prato, belong to different species. In the future, a synonymy for the two or all three species is to be expected.

EREBOMASTRIDAE

Holoscotolemon unicolor ROEWER, 1915, Fig. 3

The species is expected at the NE border of the Sub-mediterranean region. The nearest known finding-places: Rakov Škocjan (VL47) and Lož (VL56).

PHALANGODIDAE

Scotolemon doriae PAVESI, 1878

The species occurs sporadically in central middle

and western Mediterranean. The nearest finding-places: are Rovinj and Riva at Lago di Garda (Martens, 1978). The species can be expected in Slovensko primorje as well.

PALPATORES

NEMASTOMATIDAE

Nemastoma bidentatum bidentatum ROEWER, 1914, Fig. 4

Nanos, VL 27, G leg. 25.6. - 4.7.1894, NHMW 4510: 2 mm. - JG det.; cave Jama Sv. Janeza, Prestranek, VL 36, 11.8.1957: 1 m. - 221/1984 TN det.; Postojna, VL36, KWV leg.: 1 m. - 3107 FR det. 1917, in ZMB (Roewer, 1919; Gruber & Martens, 1968).

Nemastoma bidentatum sparsum GRUBER & MARTENS, 1968

Motel Rižana, VL 04, sieve, LS, TN leg., 29.9.1990: 2 mm., 1 f. - 33/1990 TN det.; Mlini, VL 13, under stones, around trees, sieve, LS, TN leg., 30.9.1990: 1 f. - 32/1990 TN det.; Sočerga, VL 13, sieve, LS, TN leg., 28.9.1990: 1 m., 1 f. - 31/1990 TN det.; Bezovica, VL 14, gillya, sieve, LS, TN leg., 29.9.1990: 4 mm., 4 ff. - 1/1990 LS det.; Črni kal - Praproče, VL 14, 50 m from the road-crossing, under stones, sieve, LS, TN, 29.9.1990: 3 mm., 2 ff. - 29/1990 TN det.; Kastelec, VL 14, LS, TN leg., 30.9.1990: 1 f. - 30/1990 TN det.; Predloka, VL 14, sieve, LS, TN leg., 29.9.1990: 2 mm. - 35/1990 TN det.; Matavun, doline at Škocjanske jame cave, VL25, JM leg., 12.7.1974, JM 1280: 18 ad. - JM det.; Zavrhek, VL25, 400 m alt., JM leg., 12.7.1974, JM 1318: 27 ad., 1 iuv. - JM det.

Nemastoma bidentatum ssp.

Cave Jama Sv. Janeza, Prestranek, VL 36, leg. EP, 29.8.1954: 1 f. - 173/1984 TN det.; cave Osojca, Posto

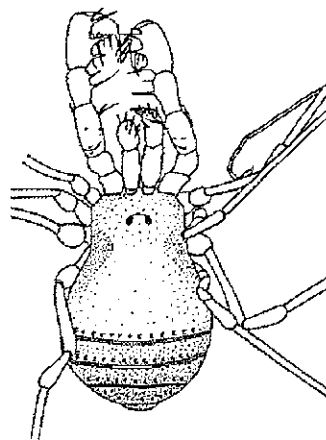


Fig./Slika 3: *Holoscotolemon unicolor*.

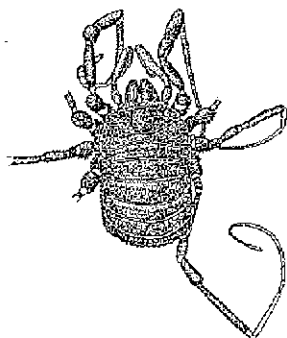


Fig./Slika 4: *Nemastoma bidentatum bidentatum*.

jna, VL 36, EC, RE leg., 20.4.1976, NHMW 6065: 1 f. - JG det.

Nemastoma dentigerum CANESTRINI, 1893

Strunjan, UL94, beach east of Piran, WH leg., 18.-25.6.1972, JM 1616: 1 f. - JM det.; Lit.: Divača, VL 16 (Martens, 1978).

Paranemastoma quadripunctatum (PERTY, 1833)

Cave Dimnice, Markovščina, VL 24, VS leg., 19.4.1968, JM 939: 1 m., 1 f. - JM det.; ibid., JG, MES leg., 12.6.1968, NHMW 5538: 3 mm., 2 ff., 6 iuv. - JG det.; ibid., VS leg., 22.10.1968, JM 1171: 1 f. - JM det.; Nanos, VL 27, G leg., 25.6. - 4.7.1894, NHMW 5535: 1 f. - JG det.; cave Jama Sv. Janeza, Prestranek, VL 36, EP leg., 23.8.1945: 1 m. - 220/1984 TN det.; cave Županov spodmol, Sajovče, VL 36, EP leg., 2.11.1963, IZRK 10963: 1 iuv. - TN det. 1981.

Histicostoma dentipalpe (AUSSERER, 1867),
Fig. 5

Nanos, VL 27, G leg., 25.6. - 4.7.1894, NHMW 3330: 1 m., 1 f. - JG det.

Carinostoma carinatum (ROEWER, 1914), Fig. 6

Markovščina, VL 24, doline at Dimnice, ca. 570 m alt., sieve, JG leg., 12.6.1968, NHMW 3358: 1 f. - JG det.; Postojna, VL37 (Martens, 1978).

Mitostoma chrysomelas (HERMANN, 1804)

Osp, VL04, DD leg., 18.9.1995: 1 m. - 51/1995 TN det.; Mlini, VL 13, under stones, around trees, sieve, LS, TN leg., 30.9.1990: 1 m. - 10/1990 TN det.; Bezovica, VL 14, gittya, sieve, LS, TN leg., 29.9.1990: 1 iuv. - 12/1990 TN det.; Črni kal - Praproče, VL 14, under stones, sieve, LS, TN, 29.9.1990: 1 m., 1 f. - 8/1990 TN det.; ibid., forest, sieve, LS, TN, 29.9.1990: 1 f. - 9/1990

TN det.; Predloka, VL 14, sieve, LS, TN leg., 29.9.1990: 1 m. - 11/1990 TN det.

Mitostoma alpinum (HADŽI, 1931)

The species can be expected in the mountainous northern part of the territory. The nearest finding-place: Krn (UM92).

It is possible that an eyeless *Mitostoma* species occurs in the hypogean habitats of the region, too. The nearest finding-places: Cerovac: *M. karamani* (Hadži, 1940) (own data) and Bergamo's Alps: *M. anophthalmum* FAGE, 1946 (Martens, 1978).

DICRANOLASMATIDAE

Dicranolasma scabrum (HERBST, 1799), Fig. 7

Veliki Badinj pri Sočergi, VL 13, by the road, sieve, LS, TN leg., 28.9.1990: 1 m., 1 iuv. - 28/1990 TN det.; Kastelec, VL 14, pit-fall trap, forest, leg. FP, 11.4.1990: 1 f. - 24/1990 TN det.; Divača, VL 16, leg?, date?, Coll. ROEWER R II/216: 2 mm., 2 iuv. - JG rev.; cave Dimnice, VL 24, Markovščina, on a speleotheme under the entrance pothole, JG leg., 12.6.1968, NHMW 1680: 1 f. - JG det.; Markovščina, VL 24, doline at Dimnice, ca. 500 m alt., JG leg., 12.6.1968, NHMW 1681: 2 mm., 2 ff., 1 iuv. - JG det.

TROGULIDAE

Trogulus tricarinatus (LINNAEUS, 1767)

Milski bori, Črnotiče, VL 14, at the road, sieve, under stones, LS, TN leg., 29.9.1990: 1 m. - 27/1990 TN det.; Podpeč, VL 14, way to the tower, LS, TN leg., 29.9.1990: 1 m. - 17/1990 TN det.; Podpeč - Črni kal, VL 14, pit-fall trap, FP, 12.4.1990: 1 f. - 22/1990 TN det.; Matavun, doline at Škocjanske jame cave, VL25, JM leg., 12.7.1974, JM 1278: 1 m. - JM det.

Trogulus nepaeformis (SCOPOLI, 1773) group,
Fig. 8

Piran - Portorož, UL 84, under a tin plate, HN leg., 12.4.1974, NHMW 5854: 1 m., 1 f. - JG det.; Sečovlje, UL 93, 9.1971: 1 m. - 542/1981 TN det.; Strunjan, UL 94, JH leg., 9.1965: 1 m. - 587/1983 TN det., ibid., 8.1972: 1 f. - 575/1981 TN det.; Bilje, UL 98, 3.8.1973: 1 m. - 543/1981 TN det.; Bilje - Miren, UL 98, 12.7.1973: 1 m. - 544/1981 TN det.; ibid., 23.7.1973: 1 m. - 538/1981 TN det.; Miren, UL 98, 6.8.1973: 2 mm., 1 f. - 537/1981 TN det.; Šempeter pri Novi Gorici, UL 98, 3.8.1973: 1 m. - 562/1981 TN det.; ibid., 31.8.1973: 2 ff. - 551/1981 TN det.; ibid., 31.8.1973: cf. 1 iuv. - 560/1981 TN det.; Motel Rižana, VL 04, sieve, LS, TN leg., 29.9.1990: 1 f. - 26/1990 TN det.; Tinjan, VL 04, highland, pit-fall trap 15, FP leg., 11.4.1990: 1 m. - 23/

1990 TN det.; Dol, VL 13, sieve, LS, TN leg., 30.9.1990: 1 m., 4 iuv. - 14/1990 TN det.; Mlini, VL 13, under stones, around trees, sieve, LS, TN leg., 30.9.1990: 2 mm., 2 ff. - 13/1990 TN det.; Zazid, VL 13, pit-fall trap, FP leg., 12.4.1990: 1 f. - 18/1990 TN det.; Črni kal, VL 14, pit-fall trap, FP, 12.4.1990: 3 mm., 1 f., 1 iuv.; Črni kal - Praproče, VL 14, 300 m from the road-crossing, under stones, sieve, LS, TN, 29.9.1990: 1 f. - 16/1990 TN det.; cave Osapska (Grajska) jama, Osp, VL 14, sieve, in grass, LS, TN, 30.9.1990: 1 iuv. - 19/1990 TN det.; Osp, VL 14, dancing-place, pit-fall trap 20, FP leg., 11.4.1990: 1 f. - 15/1990 TN det.; Osp, VL 14, pit-fall trap 13, FP leg., 11.4.1990: 1 f. - 25/1990 TN det.; Podpeč - Črni kal, VL14, FP leg., pit-fall trap 18, 12.4.1990: 3 mm., 1 f., 1 iuv. - 21/1990 TN det.; Podpeč - Osp, VL 14, pit-fall trap, FP leg., 11.4.1990: 1 f.; Predloka, VL 14, sieve, LS, TN leg., 29.9.1990: 1 m., 2 iuv. - 20/1990 TN det.; Slavník, VL 14, ca. 980 m alt., NE from Podgorje, MES leg., 24.5.1975, NHMW 5853: 2 mm., 1 f. - JG det.; Socerb, VL 14, pit-fall trap 1, FP leg., 10.4.1990: 1 iuv. 74/1990 TN det.; cave Dimnice, VL 24, Markovščina, EP leg., 11.6.1960: cf. 1 m. - 295/1983 TN det.; Predmeja, VL18, 9.-10.1964: 1 m., 2 ff., 1 iuv. - TN det.; Markovščina, VL 24, doline at Dimnice, ca. 570 m alt., JG leg., 12.6.1968, NHMW 5855: 1 m. - JG det.; Matavun, doline at Škocjanske jame cave, VL25, JM leg., 12.7.1974, JM 1279: 3 iuv. - JM det.; cave Županov spodmol, Sajevče, VL 36, 1969: cf. 1 iuv. - 572/1981 TN, JG det.; Sovič, Postojna, VL37, SP leg., NMP O-007, 1.-5.7.1994: 3 mm., 17 ff., 1 iuv. - 5/1995 TN det.

The taxonomy of the *T. nepaeformis* group has not been satisfactorily cleared and there is no agreement about the actual species number. *Trogulus* is the most difficult genus of the European opilionids to deal with taxonomically (Martens, 1988). In spite of some morphological differences of penes (cf. Neuffer, 1980), no specimen could be recognized as *T. closanicus* AVRAM, 1971, cited for Slovenia by Chemini (1984), the nearest finding place being Godovič, VL 29. A specialized revision is needed.

Trogulus tingiformis C.L. KOCH, 1848

Predmeja, VL18, 9.-10.1964: 1 f. - TN det.; Sovič, Postojna, VL37, SP leg., NMP O-007, 1.-5.7.1994: 1 m. - 6/1995 TN det.

Trogulus coriziformis C.L. KOCH, 1839

Strunjan, UL 94, beach east of Piran, WH leg., 18.-25.6.1972, JM 1617: 1 iuv. - JM det.

Trogulus spp.

Nanos, VL 27, G leg. 25.6. - 4.7.1894, NHMW: 1 m.

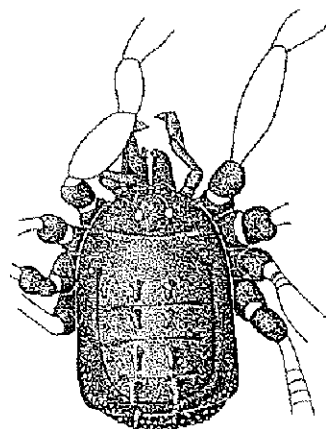


Fig./Slika 5: *Histricostoma dentipalpe*.

(externally similar to *T. tricarinatus*); 3 iuv. (belonging to two different species!) - JG "

Anelasmaocephalus hadzii MARTENS, 1978

The species is expected to be found at the NE border of the region. The nearest finding place is Snežnik (VL54).

ISCHYROPSALIDIDAE

Ischyropsalis hellwigi hellwigi (PANZER, 1794)

The species is expected to be found at the NE border of the region. The nearest finding place: Grmada (VM51).

Ischyropsalis muellneri HAMANN, 1898

The species is an endemic to the Julian Alps and Venezia Giulia and can occur in caves at the very northern part of the region. The nearest finding place: caves in the neighbourhood of Kobarid (UM82).

Martens (1978) presumed that *I. muellneri* inhabited the Dinaric karst, but this is not so. His provisional map has been accepted by Marcellino (1982) and, after our critical remarks (Novak *et al.*, 1984), by Rambla and Juberthie (1994). To avoid further mistakes we repeatedly comment on the problem and add the distributional map of *I. muellneri* and *I. hadzii* (Fig. 9).

Many specimens have been erroneously determined as *I. muellneri* and some localities were erroneously referred to as the finding places for the species (Martens, 1969; 1978). Besides, much confusion has arisen from misinterpretations of the native names of the localities by foreign investigators (Hadži, 1954). It should be pointed out that many collectors of the Balkans' hypogean fauna used fictitious names of localities to prevent other collectors to find these places for commercial reasons (Pretner, 1974; 1976). Hadži (1942) described a

male (figure for a female -!?) which Kratochvil had allegedly picked up in a cave at Bjelašnica mountain (Herzegovina), but Kratochvil (1946) explicitly noticed that no *Ischyropsalis* had been found in 120 explored caves of Bosnia, Hercegovina, Dalmatia and Montenegro. In the revised collections of the Balkans we have not found that particular one nor any other *Ischyropsalis* specimen from any of more than 100 caves south of Slovenia.

Ischyropsalis kollari C.L. KOCH, 1839, Fig. 10

The species is expected to be found at the NE border of the region. The nearest finding place: Kredarica (VM13).

PHALANGIDAE

Phalangium opilio LINNAEUS, 1761

Brda, UL 89, ground, 13.8.1973: 1 f. - 479/1981 TN det.; Sečovlje, UL 93, 8.1970: 3 iuv. - 41/1982 TN det.; ibid., 9.1971: 2 ff. - 82/1982 TN det.; Markovec, Koper, VL 04, 223 m alt., AŽ leg., 7.1993: 1 m. - 73/1995 TN det.; Strunjan, UL 94, JH leg., 9.1973: 1 m., 1 f. - 88/1982 TN det.; ibid., JH leg., 9.1965: 2 iuv. - 586/1983 TN det.; Bilje - Miren, UL 98, NS leg., 19.9.1973: 1 iuv. - 389/1982 TN det.; Nova Gorica, UL 98, grape-trellis, NS leg., 14.8.1973: 1 m. subad., 1 f. subad. - 198/1981 TN det.; Rožna dolina pri Novi Gorici, UL 98, NS leg., 13.7.1973: 1 m. - 113/1982 TN det.; ibid., NS leg., 28.8.1973: 2 ff., 2 iuv. - 84/1982 TN det.; ibid., NS leg., ground, location 4, 8.9.1973: 1 f. - 129/1982 TN det.; ibid., NS leg., 20.9.1973: 1 m. - 201/1981 TN det.; Šempeter pri Novi Gorici, Lada, UL 98, field ground, NS leg., 3.8.1973: 2 mm., 1 f., cf. 1 iuv. - 102/1982 TN det.; ibid., field ground, NS leg., 10.8.1973: 1 f. - 415/1981 TN det.; ibid., field ground, NS leg., 24.8.1973: 3 iuv. - 391/1982 TN det.; ibid., field ground, NS leg., 14.9.1973: 4 iuv. - 177/1982 TN det.; ibid., field ground, NS leg., 21.9.1973: 1 iuv. - 179/1982 TN det.; ibid., field ground, NS leg., 28.9.1973: 1 f. - 477/1981 TN det.; ibid., field ground,

NS leg., 28.9.1975: 1 iuv. - 170/1982 TN det.; Šempeter pri Novi Gorici, Lutman, UL 98, ground, NS leg., 28.9.1973: 1 f. - 414/1981 TN det.; Šempeter pri Novi Gorici, UL 98, ground, NS leg., 28.9.1975: 5 iuv. - 196/1981 TN det.; Nova Gorica, UL 99, pit-fall trap 2, NS leg., 7.10.1973: 1 iuv. - 139/1982 TN det.; Bertoki, VL04, AŠ leg., 10.7.1993: 1 f. - 72/1995 TN det.; Čezarji, Bertoki, VL04, KP leg., 9.7.1993: 1 f. - 69/1995 TN det.; Koper, VL 04, 9.1973: 1 m., 1 f. - 88/1982 TN det.; Motel Rižana, VL 04, on a tree, LS, TN leg., 30.9.1990: 1 m. - 38/1990 TN det.; Škocjan pri Kopru, VL04, ground, NS leg., 3.7.1973: 1 iuv. - 159/1981 TN det.; Mlini, VL 13, at trees, under a bridge, LS, TN leg., 30.9.1990: 1 m., 1 f. - 53/1990 TN det.; Socerb - Kozina, VL 14, under stones, in bushes, LS, TN leg., 30.9.1990: 1 f. - 42/1990 TN det.; Kubed, VL14, DD leg., 18.9.1995: 1 m. subad. - 53/1995 TN det., Vaša, Zelenica, Loka - Črni kal, VL 14, CK leg., 17.10.1990: 1 f. - 72/1990 TN det.; Socerb, VL14, ND leg., 8.1995: 1 f., 3 iuv. - 68/1995 TN det.; Vipava, VL17, K leg., NMW 3792: 1 m., 1 f. - FR det.; Ajdovščina, VL 18, 10.8.1973: 1 m. - 478/1981 TN det.; Škocjanske jame, Divača, VL 25, 25.5.1964: 1 f. - 223/1983 TN det.

Metaphalangium cirtanum (C. L. KOCH, 1839)

The name *M. propinquum* (LUCAS, 1846) has only recently been established (Starega, 1984) as a synonym of *M. cirtanum* (C.L. KOCH, 1839), therefore we accept this synonymy.

Rožna dolina pri Novi Gorici, UL 98, NS leg., 13.7.1973: 2 mm., 3 ff. - 114/1982 TN det.; ibid., NS leg., 28.8.1973: 1 f. - 85/1982 TN det.; ibid., NS leg., 28.8.1973: 2 iuv. - 157a/1982 TN, JG det.; ibid., NS leg., ground, location 4, 8.9.1973: cf. 12 iuv. - 130/1982 TN det.; ibid., NS leg., 5.10.1973: 1 iuv. - 131/1982 TN det.; Šempeter pri Novi Gorici, Lutman, UL 98, tla, NS leg., 21.9.1973: 1 iuv., - 140/1982 TN det.; ibid., tla, NS leg., 21.9.1973: cf. 1 iuv., - 141/1982 TN det.; ibid., park ground, NS leg., 21.9.1973: 1 iuv., - 260/1982 TN det.; Nova Gorica, UL 99, pit-fall trap 2, NS leg., 12.7.1973: 1 m., 1 f. - 331/1982 TN det.; ibid., pit-fall trap 2, NS leg., 10.9.1973: 2 iuv. - 193/1982 TN, JG det.

Opilio parietinus (DE GEER, 1778)

The species can be expected in the region.

Opilio saxatilis C.L. KOCH, 1839

Brda, UL 89, ground, NS leg., 19.9.1973: 1 iuv. - 225/1982 TN det., rev. 1995; ibid., NS leg., 5.10.1973: 1 iuv. - 392/1982 TN det.; Rožna dolina pri Novi Gorici, UL 98, NS leg., 28.8.1973: 1 iuv. - 157/1982 TN, JG det.; Nova Gorica, UL 99, pit-fall trap 2, NS leg., 12.7.

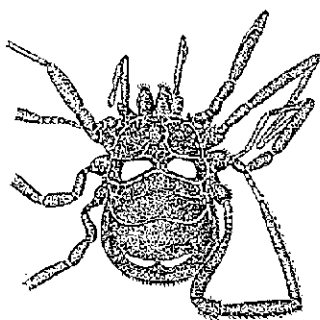


Fig./Slika 6: *Carinostoma carinatum*.

1973: 1 f. - 352/1982 TN, JG det.; Luka Koper, VL 04, NS leg., 24.7.1973: 2 mm., 5 ff. - 38/1982 TN det.; ibid., NS leg., 2.8.1973: 1 f. - 365/1982 TN det.; Osp, Mlinarji, VL 04, pit-fall trap 14, FP leg., 11.4.1990: 1 iuv. - 36/1990 TN det.; Škocjan pri Kopru, VL04, ground, NS leg., 3.7.1973: 3 mm. - 197/1981 TN det.; Mlini, VL 13, around trees, under a bridge, LS, TN leg., 30.9.1990: 1 m., 2 iuv. - 55/1990 TN det.; Črni kal, VL 14, 17.10.1984: 1 m. - 79/1985 TN det.; 1 km northern from Hrastovlje, VL 14, under an oak, LS, TN leg., 29.9.1990: 1 m., 1 f., 2 iuv. - 49/1990 TN det.; Hrastovlje, VL 14, under stones, around trees, sieve, LS, TN, 29.9.1990: cf. 1 iuv. - 40/1990 TN det., rev. 1995; at the road-crossing Kozina - Koper - Socerb, VL 14, under stones, sieve, LS, TN leg., 30.9.1990: 2 mm., 1 f. - 73/1990 TN det.; VL 14, way to the tower, LS, TN leg., 29.9.1990: 1 m., 1 f. - 55/1990 TN det.; Socerb, VL 14, pit-fall trap 1, FP, 10.4.1990: 2 iuv. - 69/1990 TN det.; Socerb - Kozina, VL 14, under stones, in bushes, LS, TN leg., 30.9.1990: 1 f., 1 iuv. - 41/1990 TN det.

Opilio dinaricus ŠILHAVY, 1958

Nova Gorica, UL 99, pit-fall trap 2, ground, NS leg., 10.9.1973: 2 ff. - 194/1982 TN det.; Motel Rižana, VL 04, on a tree, LS, TN leg., 30.9.1990: 1 m. - 39/1990 TN det.; Črni kal, VL 14, 17.10.1964: 3 mm., 6 ff., 1 iuv. - 14/1984 TN det.; Črni kal - Praproče, VL 14, 300 m from the road-crossing, under stones, sieve, LS, TN, 29.9.1990: 1 m. - 45/1990 TN det.; Praproče, VL 14, at trees, LS, TN, 29.9.1990: 2 mm. - 70/1990 TN det.; Socerb, VL 14, at trees, sieve, LS, TN, 29.9.1990: 1 m. - 63/1990; Nanos, VL 27, 8.8.1964: 1 m. - 206/1983 TN det.; Postojna, VL37 (Martens, 1978).

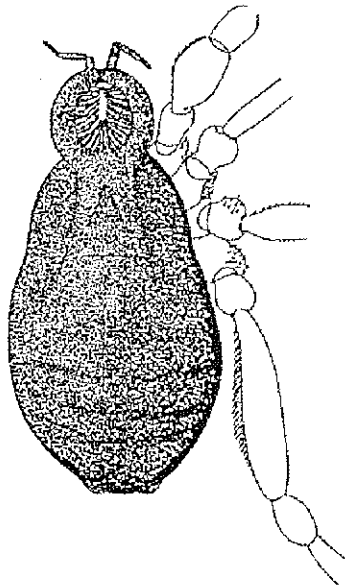


Fig./Slika 7: *Dicranolasma scabrum*.

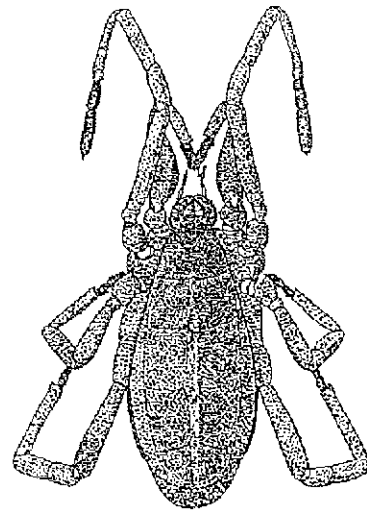


Fig./Slika 8: *Trogulus nepaeformis*.

Opilio canestrinii THORELL, 1876

The nearest finding place is Villach in Carinthia (Komposch, 1993), where the species occurs secondarily, synanthropically. Bezzacca at Lago di Garda lies probably within the primary, autochthonous range of the species (Gruber, 1984). The species can be perhaps expected in the region through secondary occurrence.

Opilio ruzickai ŠILHAVY, 1958

The species can be possibly expected in the considered region. The nearest finding place: Gruska (WM40). *O. ruzickai* and *O. canestrinii* are dichopatric species (Gruber, 1988), and if one occurs in the region the other one is probably missing there.

Opilio transversalis ROEWER, 1956

Brda, UL 89, tla, NS leg., 30.8.1973: 1 f. - 153/1982 TN, JG det.; Bilje - Miren, UL 98, NS leg., 23.7.1973: 1 iuv. - 417/1981 TN, JG det.; Nova Gorica, UL 99, tla, NS leg., 21.9.1973: 1 m. - 132/1982 TN, JG det.

Opilio sp.

Koper, VL 04, 9.1973: 2 iuv. - 91/1982 TN det.

Platybunus bucephalus (C.L. KOCH, 1835)

Predmeja, VL18, 7.-8.1962: 1 m. - TN det.

Metaplatybunus carneluttii HADŽI, 1973

The species is expected to be found at the NE border of the region. The nearest finding place: Snežnik (VL54).

Rilaena triangularis (HERBST, 1799)

Cave Škocjanske jame, VL25, 25.5.1964: 1 f. - TN det.; Zavrhek, VL25, 400 m alt., JM leg., 12.7.1974, JM 1320: 1 m., 1 f. - JM det.

Eudasylobus nicaeensis (THORELL, 1876)

Nova Gorica, UL 99, ground, NS leg., 10.9.1973: 1 iuv. - 137/1982 TN det.; Socerb, VL 14, FP leg., 10.4.1990: 1 iuv. - 37/1990 TN det.; ibid., pit-fall trap, FP leg., 10.4.1990: 1 m., 1 f. (inad.) - 68/1990 TN det.; Sovič, Postojna, VL37, SP leg., NMP O-009, 1.-5.7.1994: 1 m., 3 ff. - 4/1995 TN det.

Lophopilio palpinalis (HERBST, 1799), Fig. 11

The species is expected to be found at the NE border of the region. The nearest finding place: Snežnik (VL54).

Oligolophus tridens (C.L. KOCH, 1836)

The species is expected to be found at the NE border of the region. The nearest finding place: Snežnik (VL54).

Lacinius horridus (PANZER, 1794)

Sečovelje, UL 93, 9.1971: 1 iuv. - 53/1981 TN det.; Osp, VL04, AZ leg., 8.1995: 1 iuv. - 66/1995 TN det.; Dol, VL 13, sieve, LS, TN leg., 29.9.1990: 1 m. - 51/1990 TN det.; Podpeč - Zazid, VL 13, at trees, sieve, LS, TN leg., 29.9.1990: 2 mm. - 4/1990 TN det.; Sočerga, VL 13, sieve, LS, TN leg., 28.9.1990: 2 ff. - 7/1990 TN det.; Črni kal, VL 14, 17.10.1964: 1 f. - 13/1984 TN, JH det.; Črni kal - Praproče, VL 14, 300 m from the road-crossing, under stones, sieve, LS, TN leg., 29.9.1990: 2 ff. - 5/1990 TN det.; Črnotiče, VL 14, sieve, in madow trees, LS, TN leg., 29.9.1990: 1 f. - 6/1990 TN det.; road-crossing Kozina - Koper - Socerb, VL 14, sieve, LS, TN leg., 30.9.1990: 2 mm., 1 f. - 3/1990 TN det.; Praproče, VL 14, under trees, LS, TN leg., 29.9.1990: 5 mm., 6 ff. - 43/1990 TN det.; Socerb, VL 14, pit-fall trap 9, FP leg., 10.4.1990: 1 iuv. - 67/1990 TN, LS det.; Vala, Zelenica, Loka - Črni kal, VL 14, catching sac, CK leg., 17.10.1990: 1 m., 1 f. - 71/1990 TN det.; Škoflje, VL25, JM leg., 12.7.1974, JM 1290: 4 iuv., JM det.; Sovič, Postojna, VL37, SP leg., NMP O-008, 1.-5.7.1994: 2 iuv. - 1/1995 TN det.

Lacinius dentiger (C.L. KOCH, 1848)

Mlini, VL 13, around trees, under a bridge, LS, TN leg., 30.9.1990: 1 m., 1 f. - 52/1990 TN det.; Osp, VL14, BT leg., 1994: 3 iuv. - 70/1995 TN det.; Praproče, VL 14, under trees, LS, TN, 29.9.1990: 2 mm., 2 ff. - 44/1990 TN det.; Sovič, Postojna, VL37, SP leg., NMP

O-009, 1.-5.7.1994: 2 ff. - 3/1995 TN det.

Lacinius ephippiatus (C.L. KOCH, 1835)

The species is expected to be found at the NE border of the region. The nearest finding place: Snežnik (VL54).

Odiellus spinosus (BOISC, 1792)

Sečovelje, UL 93, 9.1971: 1 m. - 18/1981 TN det.; ibid., 9.1971: 1 m. - 55/1981 TN det.; Rožna dolina, Nova Gorica, UL 98, ground, NS leg., 20.9.1973: 1 f. - 14/1981 TN det.; Luka Koper, VL 04, NS leg., 2.8.1973: 1 f. iuv. - 366/1982 TN det.; Veliki Badin pri Sočergi, VL 13, sieve, LS, TN leg., 28.9.1990: 1 m. - 2/1990 TN det.; 1 km northern from Hrastovlje, VL 14, under an oak, LS, TN leg., 29.9.1990: 2 ff. - 1/1990 TN det.; Socerb, VL 14, pit-fall trap 6, FP leg., 10.4.1990: 2 iuv. - 34/1990 TN det.

Mitopus morio (FABRICIUS, 1799)

Nanos - Farmance, VL 27, 7.11.1964: 1 m. - 250/1983 TN, JH det.

Gyas annulatus (OLIVIER, 1791)

Cave Jama pod Predjamskim gradom, Predjama, VL37, TN leg., 8.2.1975, IZRK 125: 3 iuv. - TN det. The zoogeographical map of the species in Lipovšek (1995).

Amilenus aurantiacus (SIMON, 1881)

Cave Jama v Martinjaku, Bač pri Materiji, VL 24, 27.1.1976: 1 f. - 342/1982 TN det.; cave Martinova jama, Bač pri Materiji, VL24, TN leg., 27.9.1995: 1 f. inad. - 54/1995 TN det.; cave Grajski kevderec, Bač pri Materiji, VL 24, 27.1.1976: 1 m., 1 f. - TN det.; cave Rešetnica, Bač pri Materiji, VL24, 27.1.1976: 1 f. subad. - TN det.; cave Škocjanske jame, Divača, VL 25, 25.5.1964: 3 mm., 1 f. - 224/1983 TN det.; ibid., date?: 2 mm. - TN det.; cave Volčja jama, Nanos, VL 27, 29.4.1914: 2 mm. - TN det.; ibid., 3.5.1965: 5 mm. - 127/1983 TN det.; cave Osojca, Postojna, VL36, RE and EC leg., 24.4.1976, NMW 6066: 8 mm. - JG det.; ibid., 20.4.1976: NMW 6067: 4 mm. - JG det.; cave "Schattenloch", Postojna, VL36, EC, RE leg., 14.4.1974, NHMW 3985: 12 mm., 1 f. - JG det.; cave Postojnska jama, Pisani rov, VL 36, 16.3.1977: 1 m., 4 ff. - 644/1983 TN det.; ibid., 23.3.1977, IZRK 10126: 1 f. - TN det. 1981; cave Črna jama, Postojna, VL 37, 27.4.1914: 1 m. - TN det.; cave Ledena jama pod Hrušico, VL 37, EP leg., 16.10.1966: 7 iuv. - TN det.

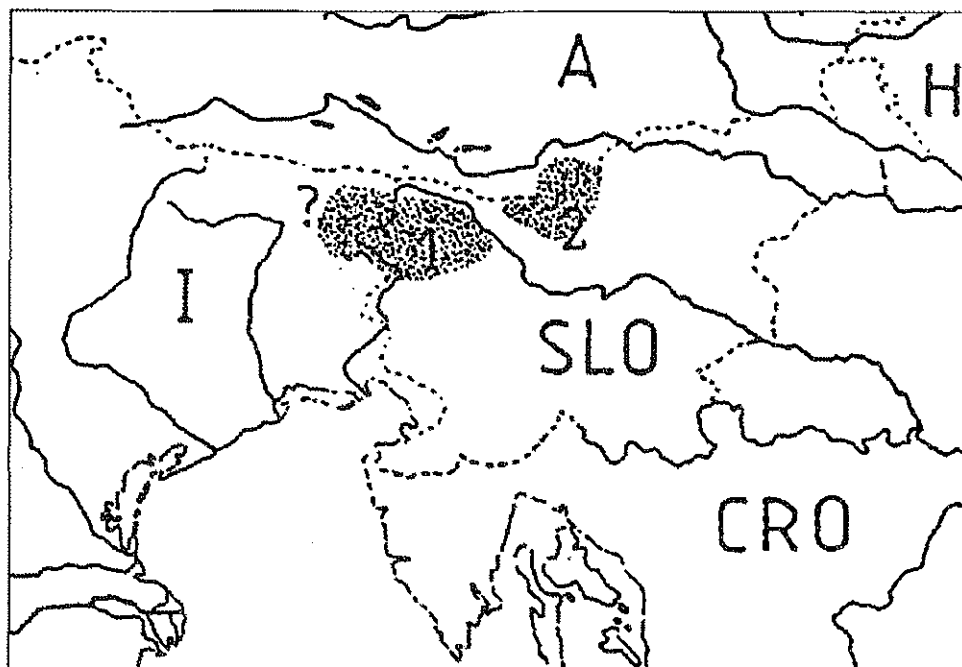


Fig. 9: The distribution of *Ischyropsalis muellneri* (1) and *I. hadzii* (2).
Slika 9: Razširjenost vrst *Ischyropsalis muellneri* (1) in *I. hadzii* (2).

Astrobus laevipes (CANESTRINI, 1872)

Brda UL 89, ground, NS leg., 19.9.1973: 1 f. - 460/1981 TN det.; Bilje - Miren, UL 98, ground, NS leg., 23.7.1973: 2 mm. - 463/1981 TN det.; ibid., ground, NS leg., 26.8.1973: 9 mm., 3 ff. - 446/1981 TN det.; ibid., ground, NS leg., 19.9.1973: 23 mm., 2 ff. - 7/1981 TN det.; ibid., ground, NS leg., 19.9.1973: 1 m. - 8/1981 TN det.; Miren, UL 98, ground, NS leg., 6.8.1973: 3 ff. - 473/1981 TN det.; ibid., pit-fall trap, NS leg., 20.8.1973: 1 m. - 421/1981 TN det.

Astrobus dinaricus ROEWER, 1915

The species is expected at the SE border of the region. The nearest finding place: Opatija (MARTENS 1978).

Astrobus helleri (AUSSERER, 1867)

Matavun, doline at Škocjanske jame cave, VL25, JM leg., 12.7.1974, JM 1281: 2 iuv. - JM det.; Zavrhek, VL25, 400 m alt., JM leg., 12.7.1974, JM 1319: 1 m. - JM det.; Nanos, VL 27, G leg., 25.6. - 4.7.1894, NHMW 3436: 1 f. - JG det.

Leiobunum limbatum L. KOCH, 1861

The species can be expected in the northern part of the region. The nearest finding place: Ljubljana (VM60).

Leiobunum roseum C.L. KOCH, 1839

Kozlov rob, Tolmin, VM01, a cavern, S leg., 11.8.1995: 2 mm. - 49/1995 TN det.

The species has not been found in apparently suitable rocky habitats (e.g. Osapska stena, Kraški rob, VL14) in the southern part of the region although according to Koch (1848) the neighbourhood of Trieste - Trst is the southernmost finding-place of the species.

Leiobunum rotundum (LATREILLE, 1798)

Postojna, VL37, M leg., NHMW 3527: 2 iuv. - FR det. - therefore a doubtful record.

Leiobunum rupestre (HERBST, 1799)

The species is expected at the NE border of the region. The nearest finding place: Rakov Škocjan (VL47).

Nelima semproni SZALAY, 1951

Sečovelje, UL 93, 9.1971: 1 m. - 165/1982 TN det.; ibid., 9.1971: cf. 1 f. - 166/1982 TN, LS det. 1995; Strunjan, UL 94, JH leg., 7.5.1953: 1 m. - 307a/1983 TN det.; ibid.: 1 f. - 307b/1983 TN det.; ibid., JH leg., 15.-21.5.1965: 1 f. - 320/1983 TN, LS det. 1995; ibid., JH leg., 16.-20.5.1964: cf. 1 f. - 377/1983 TN det.; ibid., JH leg., 9.1965: 1 m. - 26/1983 TN, LS det. 1995; Pridvor

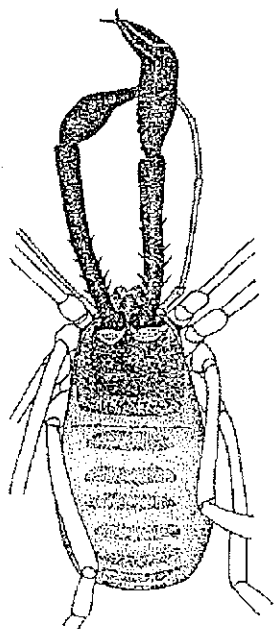


Fig./Slika 10: *Ischyropsalis kollari*.

(= Sv. Anton), Dekani, VL04, ST leg., 8.1995: 1 m., 1 f. - 67/1995 TN det.; Luka Koper, VL 04, NS leg., 2.8.1973: cf. 1 f. iuv. - 367/1982 TN, JG det.; Mlini, VL 13, around trees, under a bridge, LS, TN leg., 30.9.1990: 2 mm., 1f. - 54/1990 TN, LS det. 1995; Podpeč - Zazid, VL 13, around trees, sieve, LS, TN leg., 29.9.1990: 2 ff. - 62/1990 TN, LS det. 1995; Sočerga, VL 13, sieve, LS, TN leg., 28.9.1990: 1 iuv. - 59/1990 TN, LS det. 1995; ibid., sieve, LS, TN leg., 28.9.1990: 1 m. - 60/1990 TN, LS det. 1995; Veliki Badinj pri Sočergi, VL 13, sieve, LS, TN leg., 28.9.1990: 1 m. - 65/1990 TN, LS det. 1995; ibid.: 1 m. - 46/1990 TN, LS det. 1995; cave Osapska (Grajska) jama, Osp, VL 14, sieve, in grass, LS, TN leg., 30.9.1990: 1 f., 8 iuv. - 64/1990 TN, LS det. 1995; ibid.: 1 m. - 66/1990 TN, LS det.; Podgorje, VL 14, pit-fall trap 28, FP leg., 12.4.1990: 1 iuv. 61/1990 TN, LS det.; Podpeč, Osp, VL14, BT leg., 1994: 1 f., 1 iuv. - 71/1995 TN det.; 200 m from the quarry Črni kal towards Praproče, VL 14, by the road, LS, TN leg., 29.9.1990: 1 f. - 47/1990 TN, LS det. 1995; Črni kal - Praproče, VL 14, under stones, sieve, LS, TN leg., 29.9.1990: 1 iuv. - 57/1990 TN, LS det. 1995; Milski bori, Črnotiče, VL 14, by the road, sieve, under stones, LS, TN leg., 29.9.1990: 1 m. - 56/1990 TN, LS det. 1995; 1 km northern from Hrastovlje, VL 14, under an oak, LS, TN leg., 29.9.1990: 1 f. - 50/1990 TN, LS det. 1995; Predloka, VL 14, LS, TN leg., 29.9.1990: 1 f. - 48/1990 TN, LS det. 1995.

Nelima doriae (CANESTRINI, 1871)

The nearest known finding-places are Rovinj and the neighbourhood of Vittorio-Veneto (Martens, 1978). The species can be expected also in the region as well.

DISCUSSION AND CONCLUSIONS

In the Submediterranean region of Slovenia, 33 nominal harvestmen species and 1 subspecies have been found. Further 19 species are known from the vicinity of the region and can be expected there, too. Some of the species i.e. *Scotolemon doriae*, *Opilio canestrinii* and *Nelima doriae*, are potentially new to the fauna of Slovenia, and additionally an eyeless *Mitosoma* species can be expected there.

The regional vegetation has been drastically devastated in the past, beginning with the mediaeval period, so it is hard to establish the whole potential fauna of the region. Besides, some species inhabit inaccessible habitats, such as fissure systems. Anyway, the following species inhabiting other parts of Slovenia are not expected in the region: *Nemastoma triste*, *Paranemastoma bicuspidatum*, *Ischyropsalis hadzii*, *Megabunus armatus*, *Egaenus convexus*, *Gyas titanus*, *Dicranopalpus gassteinensis*. It is evident that in Slovensko primorje most of the Alpine species are missing as well as one of the southeastern European species (*E. convexus*) and one Balcan's species (*A. croaticus*).

The taxonomical knowledge about the nominal species *Peltonychia gabria*, *P. postumicola* and *P. tenuis* is scarce and the corrections through the synonymy of the two or all three species are expected in the future.

It is not clear whether *Leiobunum roseum* indeed inhabits the southern part of the region. More efforts are needed to obtain further relevant data.

ACKNOWLEDGEMENTS

The collections of J. HADŽI, J. MARTENS (JM), as well as those belonging to the Prirodoslovni muzej Slovenije, Ljubljana (BIOS and others), the Institut za raziskovanje krasa ZRC SAZU, Postojna (IZRK), the

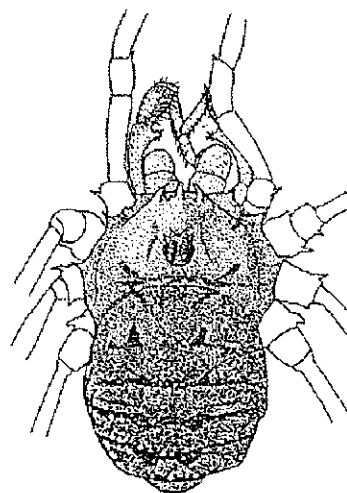


Fig./Slika 11: *Lophopilio papinalis*.

Naturhistorisches Museum Wien (NHMW), the Notranjski muzej Postojna (NMP) and some private collections have been revised. Further material in Zoologisches Museum Berlin (ZMB).

We are very grateful to the collectors who made this contribution possible: EC Erhard CHRISTIAN, DD Dušan DEVETAK, ND N. DOLENC, RE R. EDER, G GANGLBAUER, SJ Sonja JERAM, JG Jürgen GRUBER, JH Jovan HADŽI, WH W. HÜTHER, CK Ciril KRUŠNIK, K KAUFMANN, JM Jochen MARTENS, M MÜLLER, TN Tone NOVAK, HN H. NOPP, SP Slavko POLAK, FP Franc POTOČNIK, EP Egon PRETNER, KP K. PRIMOŽIČ,

FR Carl-Friedrich ROEWER, NS Nace SIVEC, LS Ljuba SLANA, MES M. E. SCHMID, VS Valerio SBORDONI, AŠ A. ŠALAMON, BT B. TOŠKAN, ST S. TOTH, TT Tomi TRILAR, KWV Karl W. VERHOEFF, AZ A. ZAJKO and AŽ A. ŽIVIN.

The original zoogeographical map of Slovenia and the original drawings of the harvestmen, made by Narcis MRŠIČ (Kranj), were friendly permitted for publishing by the author.

Our cordial thanks to Mr. Stojan SANCIN (Trieste) who kindly helped us in search for the geographical position of the are "Gabria jama".

POVZETEK

V svoji zoogeografski delitvi Slovenije je N. Mršič poleg geografskih in meteoroloških razmer upošteval tudi paleozoogeografske okoliščine. Po njem je submediteransko območje Slovenije treba razumeti kot podregijo dinarske regije.

V pregledu smo upoštevali vse znane zbirke suhih južnih slovenskega ozemlja in druge ustrezne podatke. Za submediteransko območje Slovenije smo našli 33 nominalnih vrst in 1 podvrsto, potencialno pa živi v Slovenskem primorju še 19 vrst. Zaradi močno uničene in spremenjene vegetacije v preteklosti, zlasti od srednjega veka naprej, je težko ugotavljati celotno potencialno favno te regije. Dodatno je presoja otežkočena zaradi težko dostopnih habitatov, npr. sistemov špranj v matični kamnini. Kljub temu je očitno, da živijo v regiji vsaj posamezne vrste iz vseh zoogeografskih območij Slovenije. V največji meri manjkajo alpski elementi (*Nemastoma triste*, *Paranemastoma bicuspidatum*, *Ischyropsalis hadzii*, *Megabunus armatus*, *Mitopus glacialis*, *Gys titanus* in *Dicranopalpus gasteinensis*) ter jugovzhodno evropska vrsta *Egaenus convexus* in balkanska vrsta *Astrobus croatus*. Po starih podatkih živi alpska vrsta *Leiobunum roseum* tudi v okolici Trsta, vendar je mi nismo našli. Nominalne vrste *Peltonychia gabria*, *P. postumicola* in *P. tenuis* so taksonomsko slabo raziskane. Pričakujemo, da se bo v prihodnje izkazalo, da pripadata vsaj dve - ali pa kar vse tri - dejansko isti vrsti.

Potencialno lahko v regiji pričakujemo še brezoko vrsto iz rodu *Mitostoma* in novosti po reviziji rodu *Trogulus*.

REFERENCES

- Carnelutti, J., 1981: Horološka, ekološka in zoogeografska analiza makrolepidopterov slovenskega ozemlja. Dissert. Univ. Ljubljana: 1-210.
- Carnelutti, J., 1992: Rdeči seznam ogroženih metuljev (Macrolepidoptera) v Sloveniji. Varstvo narave 17: 61-104.
- Chemini, C., 1984: Sulla presenza di *Trogulus closanicus* AVRAM in Austria, Baviera e Slovenia (Arachnida: Opiliones). Ber. nat.-med. Verein Innsbruck 71: 57-61.
- Duemilla Grotte, 1926, TCI, Milano.
- Gruber, J., 1984: Über *Opilio canestrinii* (THORELL) und *Opilio transversalis* ROEWER (Arachnida: Opiliones, Phalangidae). Ann. Naturhist. Mus. Wien, 86 B: 251-273.
- Gruber, J., 1988: Neunachweise und Ergänzungen zur Verbreitung von *Opilio canestrinii* (THORELL) und *Opilio transversalis*. Ann. Naturhist. Mus. Wien, 90 B: 361-265.
- Gruber J. et J. Martens, 1968: Morphologie, Systematik und Ökologie der Gattung *Nemastoma* C.L. KOCH (s. str.) (Opiliones, Nemastomatidae). Senckenberg. biol. 49: 137-172.
- Hadži J., 1930: Zoogeografski pregled. In: Kraljevina Jugoslavija. Geografski i etnografski pregled. (Esquisse zoogeographique. Royaume de Yougoslavie. Aperçu géographique et ethnographique.) Beograd: 1-15.
- Hadži, J., 1931: Zoogeografska karta kraljevine Jugoslavije. Zbirka karata Geogr. društva, Beograd.
- Hadži, J., 1942: Raziskovanja o ishiropsalidih (Opiliones). Razprave IV. cl. XXI, (Ljubljana): 5-114.

- Hadži, J., 1954:** Nadaljnja raziskovanja o ishiropsalidih. Dissert. IV. cl. SAZU, (Ljubljana): 139-196.
- Koch, C.L., 1848:** Die Arachniden. Getreu nach der Natur abgebildet und beschrieben. 16. Band, Nürnberg.
- Komposch, C., 1993:** Neue synanthrope Arachniden für Kärnten und Steiermark. Carinthia II, 183./103: 803-814.
- Kratochvil, J., 1946:** Přehled jeskynních sekaču Dalmacie a přilehlých částí Bosny, Hercegoviny a Černe Hory. Vest. Čsl. zool. spol. 10: 166-185.
- Lipovšek, S., 1995:** Prispevek k poznavanju biologije in ekologije vrst *Gys annulatus* (OLIVIER, 1791) in *G. titanus* SIMON, 1879 (Phalangidae, Opiliones). Pedag. Fac. Univ. Maribor.
- Marcellino, I., 1982:** Opilioni cavernicoli italiani. Lavori della Soc. Ital. di Biogeografia. 7: 33-53.
- Martens, J., 1969:** Die Abgrenzung von Biospezies auf biologisch-ethologischer und morphologischer Grundlage am Beispiel der Gattung *Ischyropsalis* C.L. KOCH 1893 (Opiliones, Ischyropsalididae). Zool. Jb. Syst. 96: 133-264.
- Martens, J., 1978:** Weberknechte. In: Die Tierwelt Deutschlands. Fischer Verlag.
- Martens, J., 1988:** Species Boundary Problems in Opiliones. Newsl. Br. arachnol. Soc. 52: 2-4.
- Mršić, N.** v pripravi. Zoogeografska delitev Slovenije.
- Neuffer, U., 1980:** Variabilität und Artgrenzen von *Trogulus nepaeformis* (Scopoli 1763) (Arachnida: Opiliones: Trogulidae). Manuscript, Univ. Mainz: 1-68.
- Novak T., J. Gruber & L. Slana, 1984:** Remarks on cave-dwelling Opiliones from Slovenia (Yugoslavia). Mem. biospeol. (Moulis) 11: 185-197.
- Pretner, E., 1974:** Zasluge Leona WEIRATHERJA za jugoslovansko biospeleologijo. Acta entomol. Jug. 10, 1-2: 7-13.
- Pretner, E., 1976:** Geschichte der biospeläologischen Forschungen in Bosnien, Herzegowina und angrenzenden Gebieten. Glasnik zem. muz. Sarajevo. N.S. 15:243-253.
- Rambla M. & C. Juberthie. 1994:** Opiliones. In: Encyclopaedia biospeologica. Moulis and Bucarest, 1: 215-230.
- Roewer, C. F., 1919:** Über Nemastomatiden und ihre Verbreitung. Arch. f. Naturgeschichte 83 A, 1: 140-160.
- Roewer, C. F., 1935:** Opiliones, fünfte Serie. Biospeologica. Arch. Zool. Exp. Gen. 78: 1-96.
- Starega, W., 1984:** Revision der Phalangidae (Opiliones), III. Die afrikanischen Gattungen der Phalanginae, nebst Katalog aller afrikanischen Arten der Familie. Annales Zoologici, Warszawa, 38, 1: 1-79.
- Stoch F. & S. Dolce. 1984:** Animali delle grotte del Carso Triestino. Lint, Trieste