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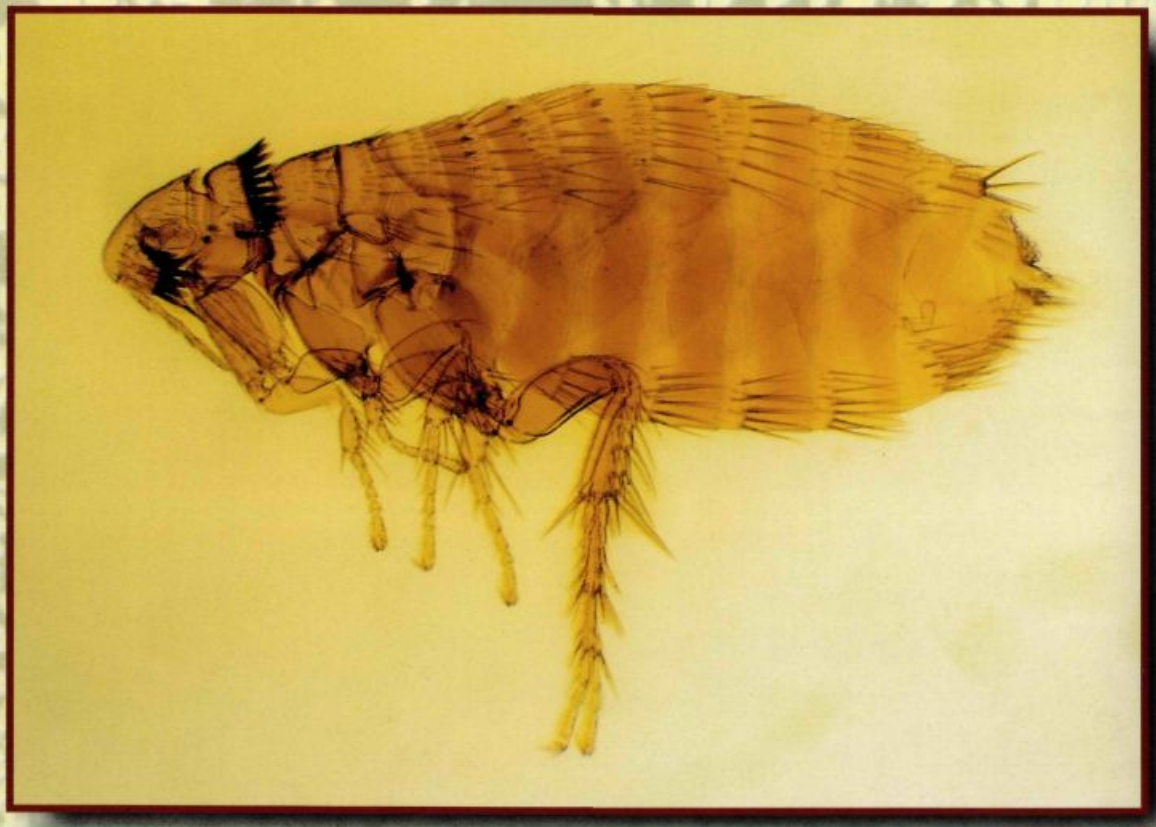

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Scopolia No 43: 1-22 (2000)

New Data on Siphonaptera from *Dinaromys bogdanovi* (Rodentia: Muridae)

Savo BRELIH[1] & Tomi TRILAR[2]

UDC(UDK) 576.89:599.32(045)

ABSTRACT

Described is one new species and two new subspecies: *Rhadinopsylla dinaromydis* sp. n., *Ctenophthalmus nifetodes rosickyi* ssp. n. and *Ctenophthalmus nifetodes milenkovici* ssp. n. from *Dinaromys bogdanovi*. Also described is a female of *Ctenophthalmus nifetodes krystufeki*. New data are presented, relating to the distribution of some known taxa from this host. *Amphipsylla rossica* was found on *Dinaromys bogdanovi* for the first time and we present new data on the host of the subspecies *Ctenophthalmus nifetodes tvrtkovici*.

Key words: Siphonaptera, *Dinaromys bogdanovi*

IZVLEČEK

Novi podatki o bolhah z reliktne voluharice (*Dinaromys bogdanovi*, Rodentia: Muridae) - Z reliktne voluharice (*Dinaromys bogdanovi*) sva opisala eno novo vrsto in dve novi podvrsti: *Rhadinopsylla dinaromydis* sp.n., *Ctenophthalmus nifetodes rosickyi* ssp. n. in *Ctenophthalmus nifetodes milenkovici* ssp. n. Opisala sva tudi samico vrste *Ctenophthalmus nifetodes krystufeki*. Podajava nove podatke o razširjenosti nekaterih že znanih taksonov s tega gostitelja. Na reliktni voluharici sva prvič ugotovila vrsto *Amphipsylla rossica*. Podajava nove izsledke o podvrsti *Ctenophthalmus nifetodes tvrtkovici*.

Ključne besede: bolhe, *Dinaromys bogdanovi*

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Introduction

This contribution continues the series "Ectoparasitical entomofauna of Yugoslav mammals", of which the first two parts have been published (BRELIH & PETROV, 1987; BRELIH, 1986). Due to the well-known political changes the Socialist Federative Republic of Yugoslavia has disintegrated into five new states, so the title of the series is no longer appropriate. However, we intend to continue the publishing on this topic as we have collected over 10 000 flea specimens from this geographical region.

WAGNER (1933; 1938), SMIT (1957), HOPKINS & ROTHSCHILD (1966) and BRELIH (1986) cite 13 species and 8 subspecies of fleas on the Balkan snow vole (*Dinaromys bogdanovi* (V. & E. MARTINO, 1922)) (=*Dolomys bogdanovi*). This vole is a major host to 3 species and 5 subspecies. BRELIH (1986) also cites 5 taxa which remain unidentified. We managed to identify and describe 3 taxa after obtaining the comparative material and finding the slides that had been lost while on loan. Two taxa remain unidentified as we were unable to collect males.

This contribution is a supplement to the »Ectoparasitical entomofauna of Yugoslav mammals: II. Siphonaptera from *Dinaromys bogdanovi* and *Chionomys nivalis* (Rodentia: Cricetidae)« (BRELIH, 1986). We do not repeat the material cited in the previous contribution, so an overview of both contributions of should be considered.

BRELIH (1986: 41) provided a key for the determination of all subspecies of *Ct. nifetodes*. However, »*nifetodes* ssp. (Štirovnik)« should be replaced with »*n. milenkovici*« and »*nifetodes* ssp. (Galičica)« with »*n. rosickyi*«. In this way, the current taxonomical knowledge is duly taken into account.

Material and Methods

The material and methods are described in detail by BRELIH (1986).

Sites are identified by UTM co-ordinates (given in the first column). The major localities (the province, mountain, etc.) are given first, then the exact survey site. If separated by a comma (,), the exact locality is situated close to the major one (e.g. Vilusi, Obodina). If separated by a colon (:), the survey site is situated at the major locality or represents its component (e.g. Sutorman: Čukuljeri). If separated by a dash (-), the survey site is situated between the two places (e.g. Čemerno - Orlovac).

Survey sites (localities):

HRVATSKA (CROATIA):
XH79 Dalmacija: Biokovo: Sošići

BOSNA I HERCEGOVINA (BOSNIA AND HERZEGOVINA):
BP90 Zelengora: Čemerno - Orlovac

JUGOSLAVIJA: CRNA GORA (YUGOSLAVIA: MONTENEGRO):
CN01 Orjen
CN02 Orjen: sedlo (saddle)
BN91 Orjen: Štirovnik

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DN32 Čakor
CM29 Lovčen: Jezero
CM46 Sutorman: Čukuljeri

JUGOSLAVIJA: SRBIJA: KOSOVO (YUGOSLAVIA: SERBIA: KOSOVO):
DN33 Žljeb: Kula

MAKEDONIJA (MACEDONIA):
DM70 Bistra
DM83 Galičica

Survey of the stated species and subspecies

HYSTRICHOPSYLLIDAE

Hystrichopsylla (Hystrichopsylla) orientalis orientalis SMIT, 1956

Jugoslavija: Crna Gora:
1 ♀ Orjen, 1100 m,13. 10. 1990, from *Dinaromys bogdanovi*, leg. B. Kryštufek

This species is found on the same host in the cave Obodina near Vilusi in Montenegro (BRELIH, 1986).

Rhadinopsylla (Actenophthalmus) dinaromydis sp.n.
(Figs. 1, 2, 3, 4, 5, 6, 7)

Rhadinopsylla (Actenophthalmus) sp. BRELIH, 1986, Scopolia **11**: 9, Figs. 4, 5, 8 (Žljeb, from *Dinaromys bogdanovi*).

Jugoslavija: Srbija: Kosovo:
1 ♀ Žljeb: Kula, 1750 m, 14. 6. 1977, from *Dinaromys bogdanovi*, leg. B. Petrov
1 ♀ ibidem, 28. 5. 1979, from *Dinaromys bogdanovi*, leg. M. Milenković

Holotype female (PMSL-IA-P-5523) and paratype female (PMSL-IA-P-4537) from Kula at Žljeb Mt. (Kosovo, Serbia, Yugoslavia), all other data are given above. The type material is kept at the Slovenian Museum of Natural History in Ljubljana (PMSL - Prirodoslovni muzej Slovenije v Ljubljani, coll. S. Brelih).

Diagnosis:

Genal comb of 6 spines as in *Rh. mesa*, but differ in a shorter distance between the frontal tubercle and the oral angle; three antepygidial bristles and a deep sinus in the apical margin of

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tergum VII; suture separating metanotum from metepimeron extending to metepisternum; sterna III to VII with 1 to 8 short or intermediate bristles in front of long bristles. Male unknown.

Description:

Female: Head and prothorax are given in Figs. 1 and 2. Genal comb of 6 spines as in *Rh. mesa*. Labial palp 5-segmented, reaching to about three-quarters of fore coxa. Pronotal comb of 21 (holotype) and 19 (paratype) spines. Metathorax is given in Fig. 3. No bristles on the inner surface of hind femur and tibia. Longest bristle of segment II of hind tarsus extending about to the middle of segment IV. Tergal pleurite of segment IX without Smit's organ. Terminal segments of abdomen are given in Figs. 4 and 5, spermatheca in Fig. 6. Sterna III to VI usually with 5 (4 to 6) long bristles on each side, in front of them an incomplete row with 1 to 5 short or intermediate bristles.

Male: unknown.

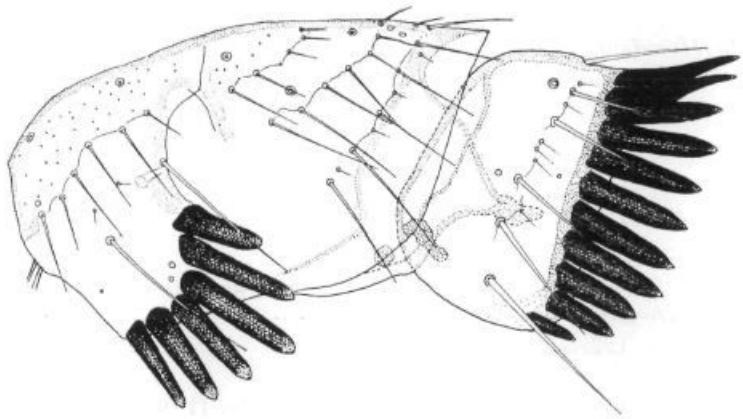

Fig. 1. *Rhadinopsylla (Actenophthalmus) dinaromydis* sp.n., head and pronotum of female holotype.

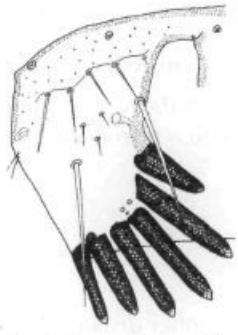

Fig. 2. *Rhadinopsylla (Actenophthalmus) dinaromydis* sp.n., portion of head of female paratype.

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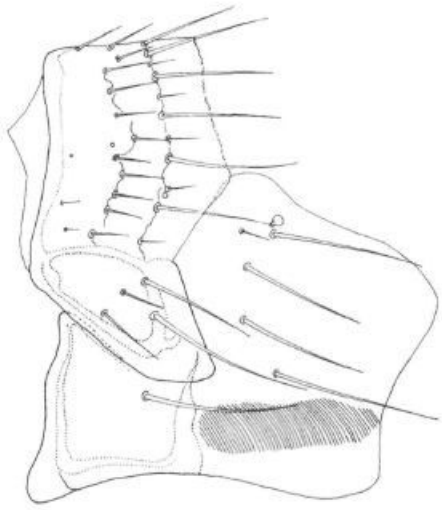

Fig. 3. *Rhadinopsylla (Actenophthalmus) dinaromydis* sp.n., metathorax of female holotype.

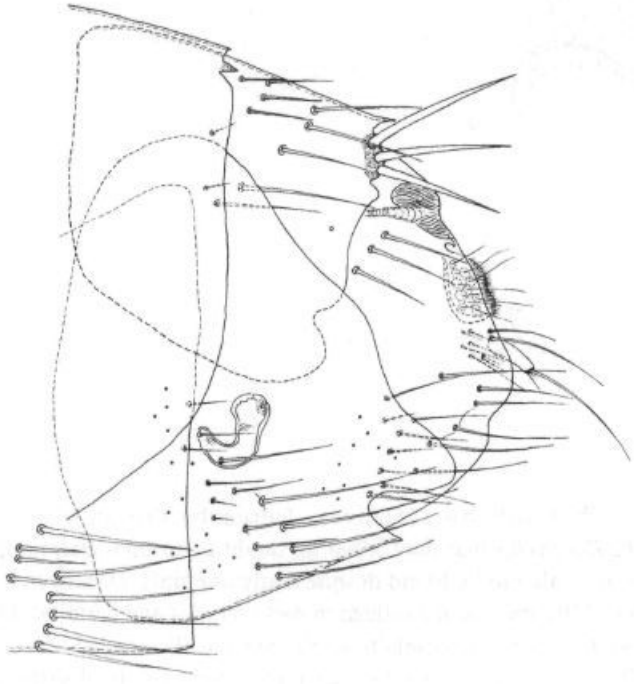

Fig. 4. *Rhadinopsylla (Actenophthalmus) dinaromydis* sp.n., terminal segment of female holotype.

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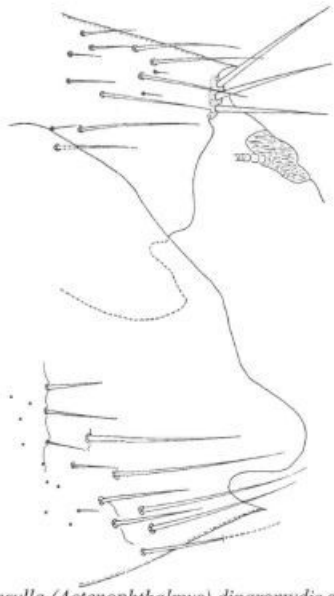

Fig. 5. *Rhadinopsylla (Actenophthalmus) dinaromydis* sp.n., tergum VII and sternum VII of female paratype.

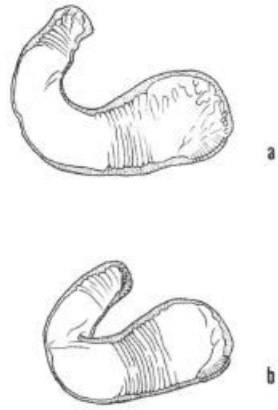

Fig. 6. *Rhadinopsylla (Actenophthalmus) dinaromydis* sp.n., spermatheca of female: a. holotype, b. paratype.

The new species is described on the basis of only two females but they are so distinctive from all others of the genus *Rhadinopsylla* that they leave no doubt as to their belonging to a new species. A male of the species failed to be found despite many attempts. *Dinaromys bogdanovi*, undoubtedly the major host of the species, nests deep in rocky cracks and cavities. The nests are inaccessible, especially in wintertime when the adults are abundant. Collecting additional specimens will probably be impossible for a longer period because of current political difficulties in the region of the only survey site.

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Fig. 7.

Map of the central Balkans with the *locus typicus* (Žljeb Mt.) of *Rhadinopsylla (Actenophthalmus) dinaromydis* sp.n.

Rhadinopsylla (Actenophthalmus) dolomydis SMIT, 1957

Bosna i Hercegovina:

1♂ Zelengora: Čemerno - Orlovac, 1350-1650 m, 23. 10. 1988, from *Dinaromys bogdanovi*, leg. B. Kryštufek

Jugoslavija: Crna Gora:

1♀ Orjen: sedlo (saddle), 1700 m, 13. 10. 1990, from *Dinaromys bogdanovi*, leg. B. Kryštufek

Makedonija:

1♂ Bistra, 1800 m, 3. 6. 1989, from *Dinaromys bogdanovi*, leg. B. Kryštufek

2♂ Galičica, 1750 m, 9. 7. 1978, from *Dinaromys bogdanovi*, leg. B. Petrov, S. Brelih & B. Kryštufek

WAGNER (1930), SMIT (1957) and BRELIH (1986) found the species at 12 sites in Croatia, Bosnia, Herzegovina, Montenegro, Kosovo, and Macedonia. According to the latest statements, its distribution area extends from the South Velebit Mts. and Trebević Mt. near Sarajevo to the Galičica Mt. near Ohrid, almost on the whole territory of their major host *Dinaromys bogdanovi*, with the exception of the North and Central Velebit Mts.

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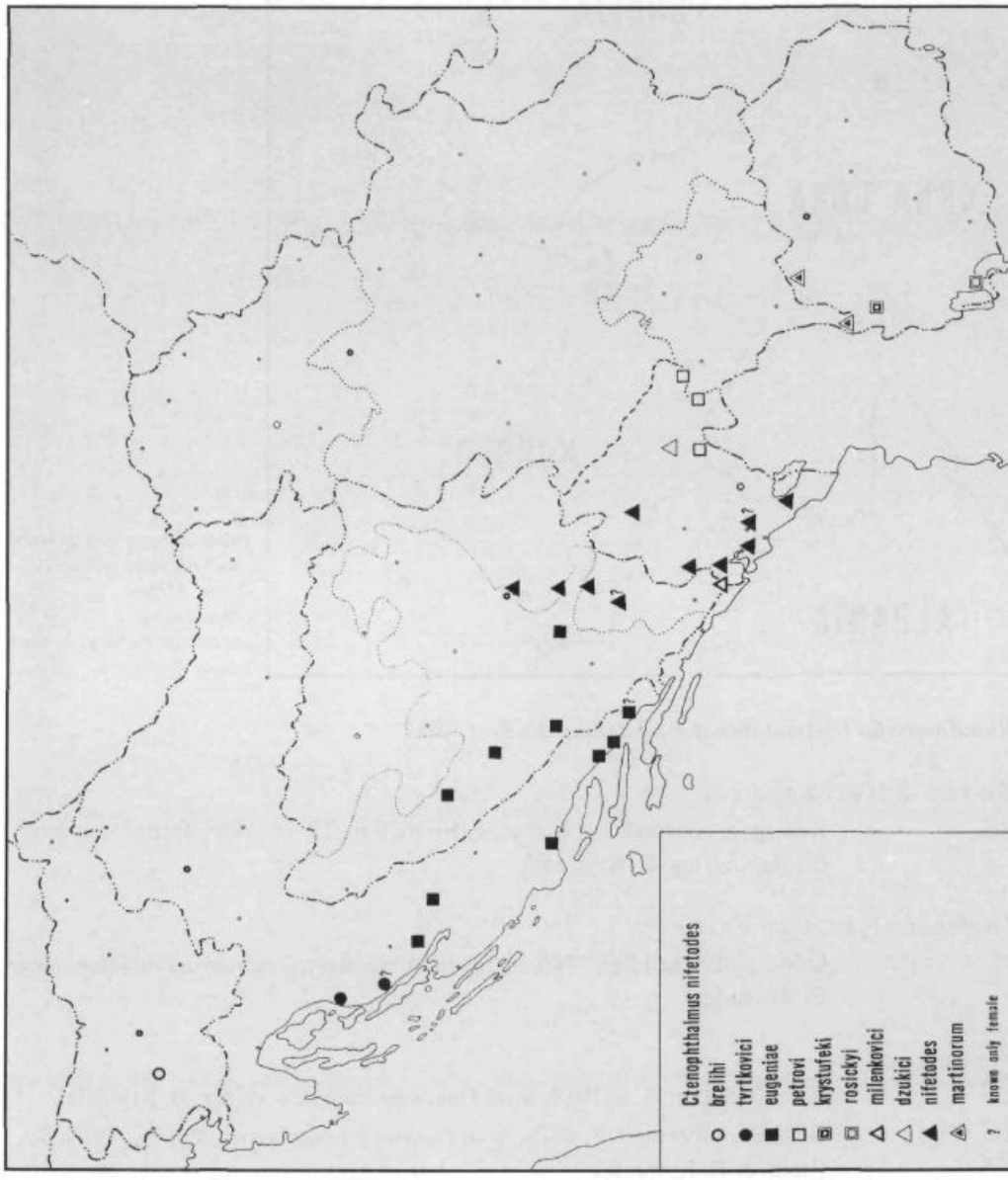

Fig. 8. Map of disribution of *Ctenophthalmus (Mediоctenophthalmus) nifetodes* (WAGNER)

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Ctenophthalmus (Ctenophthalmus) agyrtes ohridanus WAGNER, 1930

Jugoslavija: Crna Gora:
1♂ Orjen: sedlo (saddle), 1700 m, 13. 10. 1990, from *Dinaromys bogdanovi*, leg. B. Kryštufek

Ssp. *ohridanus* is recorded from *Dinaromys bogdanovi* only from the Galičica Mt. in Macedonia (BRELIH, 1986).

Ctenophthalmus (Medioctenophthalmus) nifetodes tvrtkovici BRELIH, 1986
(Fig. 8)

Despite the fact that all specimens from the *locus typicus* on the North Velebit Mts. (Zavižan: Vučjak, 1550 m, and Modrića dolac, 1460 m) were collected from *Chionomys nivalis* (MARTINS), BRELIH (1986) assumes that the major host of the subspecies is *D. bogdanovi*, although not known from the *locus typicus*. In the North Velebit Mts. it was collected only from Klada at an altitude of 350 m. Later TVRTKOVIĆ (pers. comm.) also collected *D. bogdanovi* at Zavižan. This finding supports the assumption that *D. bogdanovi* could also be the major host for ssp. *tvrtkovici*, as it is the major host for all the subspecies of *Ct. nifetodes* with the exception of ssp. *brelihi*.

Ctenophthalmus (Medioctenophthalmus) nifetodes eugeniae WAGNER, 1938
(Fig. 8)

Hrvatska:
2♂ Dalmacija: Biokovo: Sošići, 750 m, 7. 12. 1975, from *Dinaromys bogdanovi*, leg. N. Tvrtković

Ctenophthalmus (Medioctenophthalmus) nifetodes krystufeki BRELIH, 1986
(Figs. 8, 19, 20a)

Makedonija:
2♂ 5♀ Bistra, 1800 m, 3. 6. 1989, from *Dinaromys bogdanovi*, leg. B. Kryštufek

Ssp. *krystufeki* is described on the basis of one male only. We later got two more males identical to the holotype. We add a description of a female.

Description: Female: The apical margin of the sternum VII (Fig. 19) is the same as in ssp. *martinorum*, spermatheca in Fig. 20a.

Ctenophthalmus (Medioctenophthalmus) nifetodes rosickyi ssp.n.
(Figs. 8, 9, 15, 16a, 18, 20b)

Ctenophthalmus (Medioctenophthalmus) nifetodes ssp. BRELIH, 1986, Scopolia **11**: 28, Figs. 10, 20 (Galičica, from *Dinaromys bogdanovi*).

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Makedonija:

1♂ Galičica, 1750 m, 3. 7. 1967, from *Dinaromys bogdanovi*, leg. B. Petrov

6♀ Galičica, 1750 m, 9. 7. 1978, from *Dinaromys bogdanovi*, leg. S. Brelih & B. Kryštufek

Holotype male (PMSL-IA-P-719), allotype female (PMSL-IA-P-4870) and 5 paratype females (PMSL-IA-P-4871 - 4875) from the Galičica Mt. (Macedonia), all other data are given above. The type material is kept at the Slovenian Museum of Natural History in Ljubljana (PMSL - Prirodoslovni muzej Slovenije v Ljubljani, coll. S. Brelih).

Fig. 9. *Ctenophthalmus (Medioctenophthalmus) nifetodes rosickyi* ssp.n., clasper and sternum IX of male holotype.

Diagnosis:

Ssp. *rosickyi* closely resembles ssp. *krystufeki*, differing primarily in a noticeably narrower movable process of clasper and 5 tetrad bristles. The females do not differ clearly from those of spp. *martinorum* and ssp. *krystufeki*.

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Description:

Male: Clasper is given in Fig. 9. Dorsal lobe (L^1) of fixed process of clasper rounded as in ssp. *martinorum*, ventral lobe (L^2) long as in nominate subspecies. Movable process of clasper is very narrow and high, which distinguishes it from all of the known subspecies of *Ct. nifetodes*. Anterior and posterior margin of movable process are more or less parallel, apical margin descends obliquely towards posterior apical angle, approximately 104^0; anterior apical angle of movable process is rounded; first small sclerotized knob ("wart") lies between its half and the second "wart" at the end of apical margin; posterior margin of movable process is almost straight and no short marginal bristles can be found on its upper portion immediately under the second "wart". Holotype has 5 tetrad bristles on each side. The lowest one is situated on the lower half of posterior margin, quite distant from the other four. Phallosome is given in Fig. 15. Apical margin of sternum VIII is broadly rounded (Fig. 16a).

Female: Apical margin of sternum VII (Fig. 18) is the same as in ssp. *martinorum*. Spermatheca is shown in Fig. 20b.

Ssp. *rosickyi* was only found on the Galičica Mt. in southwest Macedonia. Its major host is *Dinaromys bogdanovi*.

The new subspecies was named after our colleague and friend, academician Professor Bohumír Rosický from Prague, for his great contributions to the research into the siphonapterofauna of Central Europe, the Balkans, and Asia.

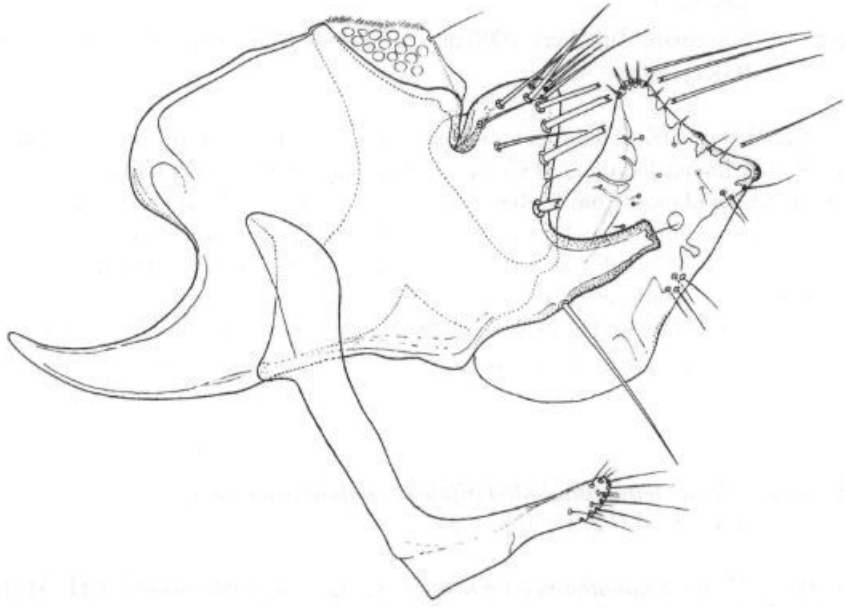

Fig. 10. *Ctenophthalmus (Mediocteno phthalmus) nifetodes petrovi* BRELIH, clasper and sternum IX of the male from Komovi Mts., Montenegro.

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Ctenophthalmus (Medioctenophthalmus) nifetodes petrovi BRELIH, 1986
(Fig. 8,10,14,17b)

Jugoslavija: Crna Gora:
3♂ 3♀ Čakor, 2000 m, 22. 6. 1965, from *Dinaromys bogdanovi*, leg. M. Mrciak

Ssp. *petrovi* was described from Kula at Žljeb Mt. (Kosovo), but is also found at Štavna in the Komovi Mts. (Montenegro) (BRELIH, 1986). The Čakor Mt. is the third survey site of the subspecies. To aid recognition, we add drawings of the clasper (Fig. 10), phallosome (Fig. 14), sternum VII of female and spermatheca (Fig. 17b) of the Komovi Mts. population.

Ctenophthalmus (Medioctenophthalmus) nifetodes nifetodes WAGNER, 1933
(Fig. 8)

Bosna i Hercegovina:
2♀ Zelengora, Čemerno - Orlovac, 1350-1650 m, 23. 10. 1988, from *Dinaromys bogdanovi*, leg. B. Kryštufek

Jugoslavija: Crna Gora:
2♂ 2♀ Orjen: sedlo (saddle), 1700 m, 13. 10. 1990, from *Dinaromys bogdanovi*, leg. B. Kryštufek
2♂ 1♀ Lovčen: Jezero, 1400 m, 25. 5. 1990, from *Dinaromys bogdanovi*, leg. B. Kryštufek
4♂ 3♀ Sutorman: Čukuljeri, 1000 m, 15. 5. 1990, from *Dinaromys bogdanovi*, leg. B. Kryštufek

WAGNER (1933) described the species *Ct. nifetodes* from the environs of Cetinje on the basis of only one female under the name of *Ct. nivalis nifetodes*. SMIT (1957) found the female to be identical with the population from Trebević Mt. near Sarajevo and gave her a new position as *Ctenophthalmus (Ctenophthalmus) nifetodes nifetodes*. The male was not collected in the *locus typicus*, but at several surrounding localities, i.e. Sutorman Mt., Lovčen Mt., Orjen Mt., Vilusi and Durmitor Mts. The outline of female sternum VII from Cetinje is identical with ssp. *nifetodes* and confirms Smit's hypothesis. The distributional area of the nominate subspecies of *Ct. nifetodes* is Bosnia and Herzegovina, east from the line Sarajevo – Boka Kotorska, and west and south Montenegro (Fig. 8).

Ctenophthalmus (Medioctenophthalmus) nifetodes milenkovici ssp.n.
(Figs. 8, 11, 12, 13, 16b, 17a)

Ctenophthalmus (Medioctenophthalmus) nifetodes ssp. BRELIH, 1986, Scopolia **11**: 31, Figs. 10, 19 (Orjen Mt.: Štirovnik, from *Dinaromys bogdanovi*).

Jugoslavija: Crna Gora:
3♂ 1♀ Orjen: Štirovnik, 1500 m, 1968, from *Dinaromys bogdanovi*, leg. B. Petrov

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Holotype male (PMSL-IA-P-713), allotype female (PMSL-IA-P-716) and 2 paratype males (PMSL-IA-P-714, 715) from Štirovnik at Orjen Mt. (Montenegro, Yugoslavia), all other data are given above. The type material is kept at the Slovenian Museum of Natural History in Ljubljana (PMSL - Prirodoslovni muzej Slovenije v Ljubljani, coll. S. Brelih).

Diagnosis:

Ssp. *milenkovici* is well distinguished from all of the known subspecies of *Ct. nifetodes* by a very broad movable process of clasper with a pronounced concave posterior margin; both "warts" are situated on the second half of the apical margin of movable process. Outline of sternum VII of the only known female as in ssp. *eugeniae*.

Description:

Male: Dorsal lobe of fixed process of clasper broadly rounded, ventral lobe long (Figs. 11, 12). Foveo-apical portion of movable process of clasper irregularly pyramid-like, both "warts" situated on second half of apical margin, anterior apical angle rounded; second "wart" forms a posterior apical angle, immediately behind it there are 2 marginal and 1 to 2 submarginal short bristles; posterior margin of movable process concave and forms an obtuse angle in the middle; 5 tetrad bristles situated on second half of posterior margin. Phallosome is given in Fig. 13. Apical margin of sternum VIII (Fig. 16b) as in nominate subspecies.

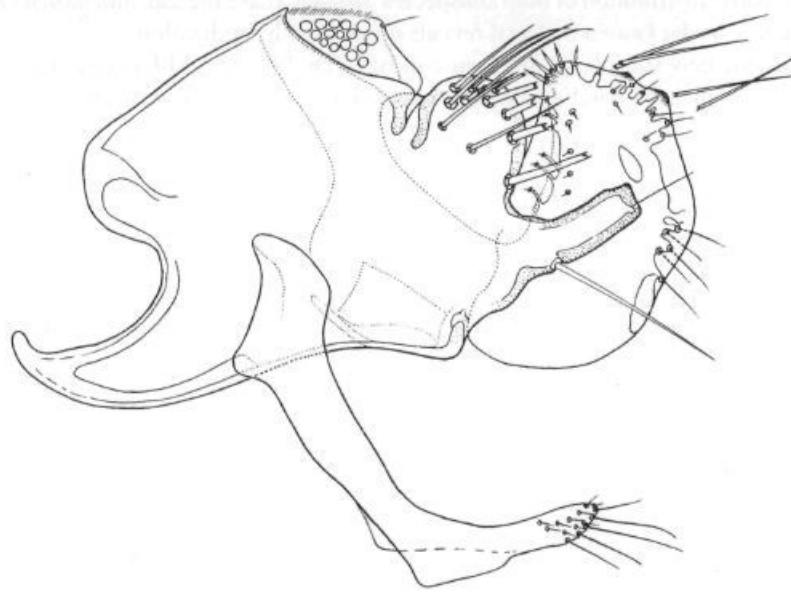

Fig. 11. *Ctenophthalmus (Medioctenophthalmus) nifetodes milenkovici* ssp.n., clasper and sternum IX of male holotype.

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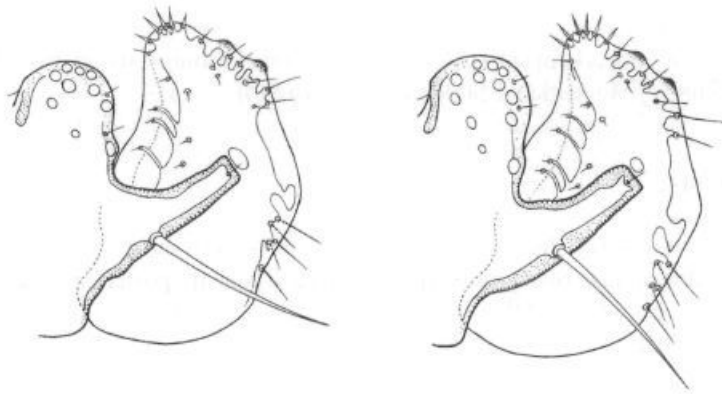

Fig. 12. *Ctenophthalmus (Medioctenophthalmus) nifetodes milenkovici* ssp.n., processes of clasper of two males paratypes.

Female:

Spermatheca and sternum VII are given in Fig. 17a. Outline of apical margin of sternum VII is, in principle, not distinguishable from ssp. *eugeniae* or *Ctenophthalmus (Medioctenophthalmus) orphilus dolomiticus* Jordan.

Ssp. *milenkovici* was found only on Štirovnik in western Orjen Mt. Štirovnik is only 5 kilometers away from the peak where the nominate subspecies was found. There is a question of a possible sympatric distribution of both subspecies. In such a case the ssp. *milenkovici* should be a separate species, as the known material reveals no signs of hybridization.

We named the new subspecies after our colleague Dr. Miroljub Milenković from Belgrade for his contributions to the research on Balkan mammals as well as for collecting their ectoparasites.

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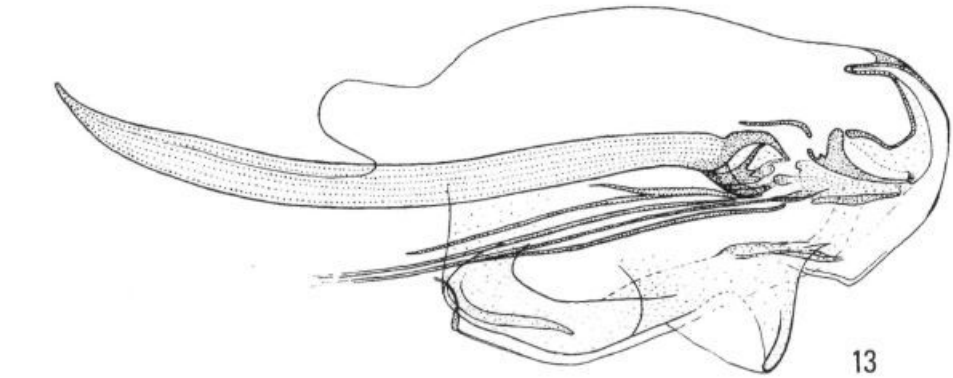

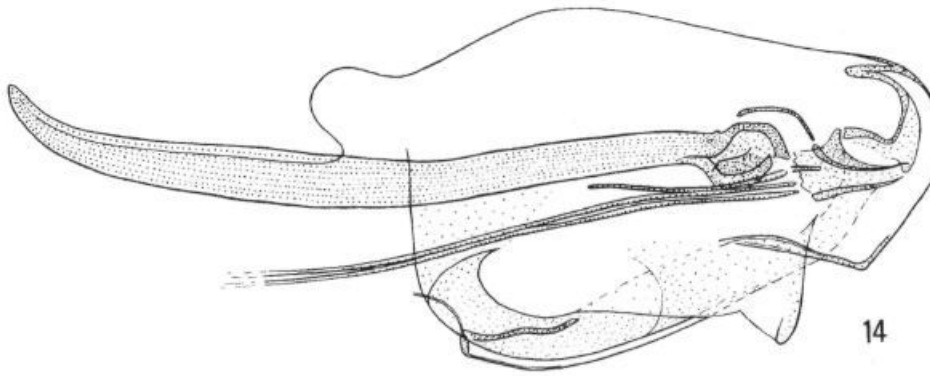

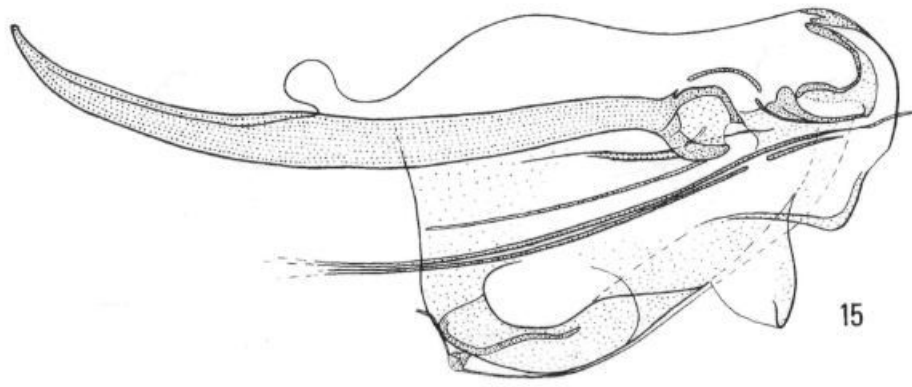

Figs. 13 - 15. Phallosome in *Ctenophthalmus (Medioctenophthalmus) nifetodes* sspp.: (13) *C. (M.) n. milenkovici* ssp.n., paratype; (14) *C. (M.) n. petrovi* BRELIH from Komovi Mts.; (15) *C. (M.) n. rosickyi* ssp.n., holotype.

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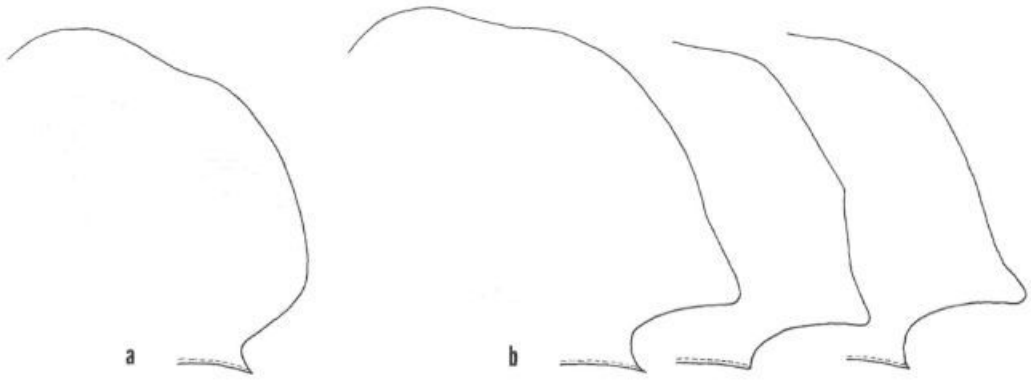

Fig. 16. *Ctenophthalmus (Medioctenophthalmus) nifetodes* sspp., outline of sternum VIII of males: a. *C. (M.) n. rosickyi* ssp.n., holotype; b. *C. (M.) n. milenkovici* ssp.n., holotype and two paratypes.

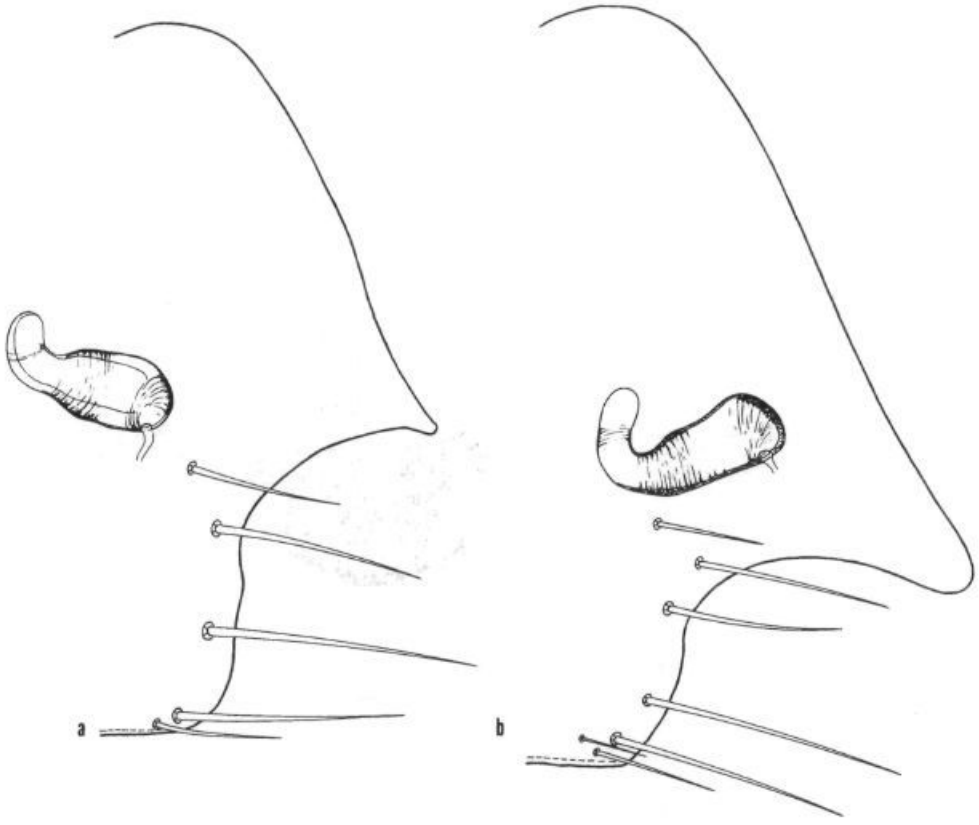

Fig. 17. *Ctenophthalmus (Medioctenophthalmus) nifetodes* sspp., sternum VII and spermatheca of females: a. *C. (M.) n. milenkovici* ssp.n., allotype; b. *C. (M.) n. petrovi* BRELIH from Komovi Mts.

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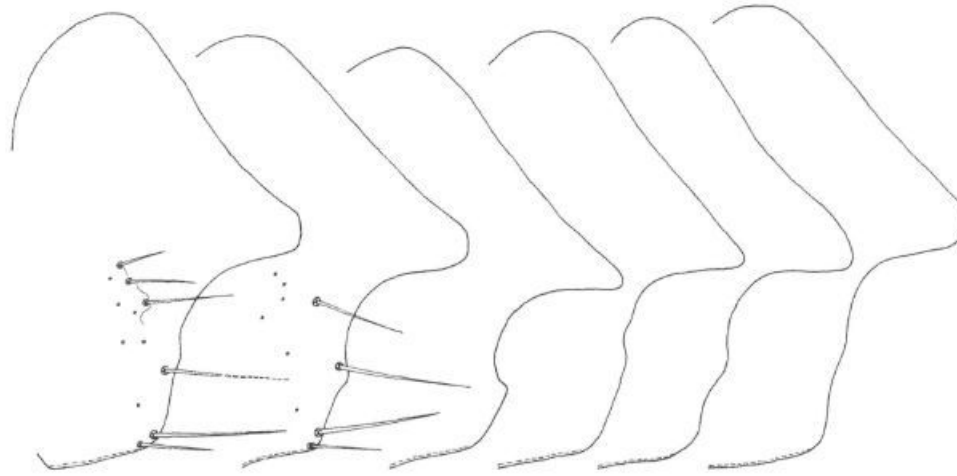

Fig. 18. *Ctenophthalmus (Medioctenophthalmus) nifetodes rosickyi* ssp.n., sternum VII of female allotype and outline of sternum VII of females paratypes.

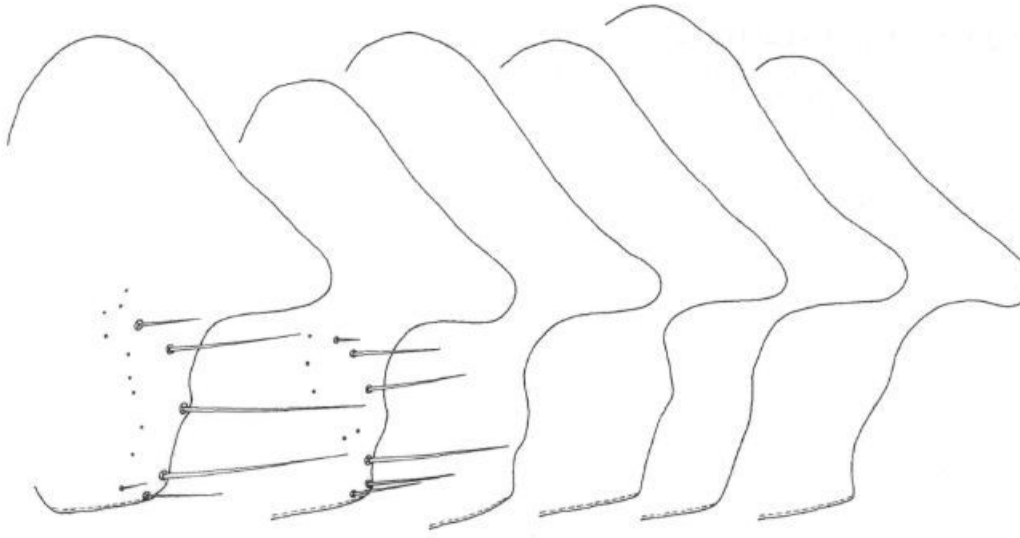

Fig. 19. *Ctenophthalmus (Medioctenophthalmus) nifetodes krystufeki* BRELIH, sternum VII of female and outline of sternum VII of females from Bistra Mt., Macedonia.

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Fig. 20. *Ctenophthalmus (Medioctenophthalmus) nifetodes* sspp., spermatheca of females: a. *C. (M.) n. krystufeki* BRELIH from Bistra Mt.; b. *C. (M.) n. rosickyi* ssp.n., allotype.

Ctenophthalmus (Medioctenophthalmus) dolomydis SMIT, 1957

Bosna i Hercegovina:

1 ♀ Zelengora, Čemerno - Orlovac, 1350-1650 m, 23. 10. 1988, from *Dinaromys bogdanovi*, leg. B. Kryštufek

LEPTOPSYLLIDAE

Peromyscopsylla bidentata (KOLENATI, 1863)

Jugoslavija: Crna Gora:

1 ♂ Orjen: sedlo (saddle), 1700 m, 13. 10. 1990, from *Dinaromys bogdanovi*, leg. B. Kryštufek

Amphipsylla rossica WAGNER, 1912

Makedonija:

1 ♀ Bistra, 1800 m, 19. 9. 1990, from *Dinaromys bogdanovi*, leg. B. Kryštufek

This was the first finding of the species on *D. bogdanovi*.

CERATOPHYLLIDAE

Megabothris turbidus (ROTHSCHILD, 1909)

Makedonija:

1 ♀ Bistra, 1800 m, 3. 6. 1989, from *Dinaromys bogdanovi*, leg. B. Kryštufek

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Discussion

The picture of the ectoparasites of *D. bogdanovi* and their geographic distribution is becoming clearer with the newly collected material. There are not many mammalian species with 4 host-specific species and 9 host-specific subspecies of fleas. Also known are a specific mite *Laelaps dolomysi* MRCIAK, 1972 and an undescribed species from the genus *Leptinus* (Coleoptera). The other groups of parasites have not been investigated.

Among the fleas, only *Ct. nifetodes* inhabits the whole distributional area of *D. bogdanovi* but in the northwest, in Slovenia, the ssp. *brelihi* is distributed even outside its range. In Slovenia there are no known recent survey sites of *D. bogdanovi*. Pleistocene remains are encountered in the environs of Ilirska Bistrica and the fossil *Dinaromys dalmatinus* was found near Trieste in Italy (BARTOLOMEI, 1970). Both survey sites are about 40 km away from Hotedršica, the *locus typicus* of ssp. *brelihi*. According to the current knowledge it passed from the primary host to a new one, *Glis glis*.

The ssp. *tvrtkovici* inhabits the North and Central Velebit Mts. In this territory there are no other host-specific flea species or subspecies of *D. bogdanovi*.

The distributional area of ssp. *eugeniae* is larger than that of either mentioned subspecies: it extend from the South Velebit Mts. (Predzid, Buljma) to the river Neretva and Prenj Mt. in Bosnia. Predzid is in the extreme northwestern distribution area of *Rh. dolomydis*, which is sympatric with all subspecies of *Ct. nifetodes* distributed towards the east and south to the Galičica Mt. in Macedonia. The only exception is Štirovnik at Orjen Mt. (Montenegro), *locus typicus* of ssp. *milenkovici*, where *Rh. dolomydis* was not found.

The line Trebević Mt. near Sarajevo--peak of Orjen Mt. near Boka Kotorska represents the western border of the distribution of the nominate subspecies of *Ct. nifetodes*. In the west it borders on ssp. *eugeniae*, in the southwest on ssp. *milenkovici*, in the east on ssp. *dzukici* (Bjelasnica Mt. in Montenegro) and ssp. *petrovi* (Komovi Mts. and Čakor Mt. in Montenegro and Žljeb Mt. on Kosovo).

The western border of the distribution of the ssp. *nifetodes* is also the western border of *Ct. dolomydis*, whose territory extends from there to Galičica in Macedonia. *Ct. dolomydis* is sympatric with ssp. *nifetodes*, ssp. *dzukici*, ssp. *petrovi*, ssp. *krystufeki*, and ssp. *rosickyi*.

Three subspecies of *Ct. nifetodes* distributed in Macedonia are limited to a small distribution area. Ssp. *martinorum* is limited to the Korab and Šar Planina Mts., ssp. *krystufeki* to the Bistra Mt., and ssp. *rosickyi* to the Galičica Mt.

The newly described species, *Rh. dinaromydis,* has so far been found only in the Žljeb Mt. in Kosovo.

Summary

BRELIH (1986) cites the following species and subspecies for which *Dinaromys bogdanovi* (V. & E. MARTINO, 1922) is a major host: *Rhadinopsylla (Actenophthalmus) dolomidys* SMIT, 1957, *Ctenophthalmus (Medioctenophthalmus) nifetodes nifetodes* WAGNER, 1933, *Ct. (M.) n. eugeniae* WAGNER, 1938, *Ct. (M.) n. martinorum* SMIT, 1957, *Ct. (M.) n. petrovi* BRELIH, 1986, *Ct. (M.) n. krystufeki* BRELIH, 1986, *Ct. (M.) n. dzukici* BRELIH, 1986, and *Ct. (M.) dolomydis* SMIT, 1957.

We confirm the assumption that *D. bogdanovi* is also the major host of *Ct. (M.) n. tvrtkovici*

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BRELIH, 1986, despite the fact that all specimens from the *locus typicus* on Zavižan at the North Velebit Mts. were collected from *Chionomys nivalis* (MARTINS, 1842) (BRELIH 1986). Until 1986 *D. bogdanovi* had only been found at the North Velebit Mts. at an altitude of 350 m (Gornja Klada); later TVRTKOVIĆ (pers. comm.) found it also on Zavižan (1550 m). At this altitude *Ch. nivalis* is more abundant than *D. bogdanovi*, and as they inhabit the same habitats the fleas were able to pass, at least in part, to the new host.

Other species and subspecies were also found on *D. bogdanovi* that had passed to it from other hosts (BRELIH, 1986): *Rhinolophopsylla unipectinata unipectinata* (TASCHENBERG, 1880), *Hystrichopsylla (Hystrichopsylla) orientalis orientalis* SMIT, 1956, *Doratopsylla dasycnema dasycnema* (ROTHSCHILD, 1897), *Ctenophthalmus (Ctenophthalmus) agyrtes dinarus* ROSTIGAYEV, 1959, *Ct. (Ct.) a. ohridanus* WAGNER, 1939, *Ct. (Ct.) a. serbicus* WAGNER, 1930, *Ct. (Euctenophthalmus) uncinatus koshanini* ROSICKÝ & TODOROVIĆ ,1964, *Peromyscopsylla bidentata* (KOLENATI, 1863), *P. fallax* (ROTHSCHILD, 1909), *Leptopsylla (Leptopsylla) segnis* (SCHÖNHERR, 1811), *Megabothris turbidus* (ROTHSCHILD, 1909), and *Ceratophyllus (Monopsyllus) sciurorum sciurorum* (SCHRANK, 1781).

BRELIH (1986) also cites the following taxa that remained unidentified: *Rhadinopsylla (Actenophthalmus)* sp. from Žljeb Mt. at Kosovo, *Rh. (A.)* sp. from Vilusi in Montenegro, *Ctenophthalmus (Ctenophthalmus) agyrtes* ssp. from Šator planina Mt. in Bosnia, *Ct. (Ct.) agyrtes* ssp. from Vilusi in Montenegro, *Ct. (Medioctenophthalmus) nifetodes* ssp. from Galičica Mt. in Macedonia and *Ct. (M.) nifetodes* ssp. from Štirovnik in Montenegro.

Slides of the last two taxa that were lost whilst on loan were found, and on their basis we describe two new subspecies: *Ct. (M.) nifetodes rosickyi* ssp. n. and *Ct. (M.) nifetodes milenkovici* ssp. n.. We also describe the female of *Ctenophthalmus nifetodes krystufeki* from newly collected material.

BRELIH (1986: 41) provided a key for the determination of all subspecies of *Ct. nifetodes*. However, »*nifetodes* ssp. (Štirovnik)« should be replaced with »*n. milenkovici*« and »*nifetodes* ssp. (Galičica)« with »*n. rosickyi*«. Thereby, the current taxonomical knowledge is duly taken into account.

Rhadinopsylla (Actenophthalmus) sp. from Žljeb Mt. at Kosovo remained undescribed, as BRELIH (1986) did not posses any comparative material of the similar species *Rh. (A.) mesa* JORDAN & ROTHSCHILD, 1920. Dr. J.C. Beaucournu kindly gave us 2 males and 2 females, thus making it possible for us to describe *Rh. (Act.) dinaromydis* sp.n.

We were unable to collect males from the other mentioned taxa so they remain unidentified.

Povzetek

BRELIH (1986) v svojem delu navaja naslednje vrste in podvrste, za katere je reliktna voluharica (*Dinaromys bogdanovi* (V. & E. MARTINO, 1922)) (=*Dolomys bogdanovi*) pravi gostitelj: *Rhadinopsylla (Actenophthalmus) dolomidys* SMIT, 1957, *Ctenophthalmus (Medioctenophthalmus) nifetodes nifetodes* WAGNER, 1933, *Ct. (M.) n. eugeniae* WAGNER, 1938, *Ct. (M.) n. martinorum* SMIT, 1957, *Ct. (M.) n. petrovi* BRELIH, 1986, *Ct. (M.) n. krystufeki* BRELIH, 1986, *Ct. (M.) n. dzukici* BRELIH, 1986, and *Ct. (M.) dolomydis* SMIT, 1957.

Potrjujeva domnevo (BRELIH, 1986), da je *D. bogdanovi* glavni gostitelj tudi za *Ct. (M.) n. tvrtkovici* BRELIH, 1986, čeprav so bili vsi primerki iz Zavižana na Severnem Velebitu (tipično

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nahajališče) ujeti na snežni voluharici (*Chionomys nivalis* (MARTINS, 1842)). Do leta 1986 so reliktno voluharico na Severnem Velebitu našli le na nadmorski višini 350 m (Gornja Klada), kasneje pa jo je dr. Nikola Tvrtković (pers. comm.) našel tudi na Zavižanu (1550 m). Snežna voluharica je na tej nadmorski višini pogostejša od reliktne voluharice, vendar obe živita v enakih habitatih in tako so bolhe lahko delno prešle na novega gostitelja.

Poleg naštetih so na reliktni voluharici našli še druge vrste in podvrste bolh, ki so nanjo prešle z drugih gostiteljev (BRELIH, 1986): *Rhinolophopsylla unipectinata unipectinata* (TASCHENBERG, 1880), *Hystrichopsylla (Hystrichopsylla) orientalis orientalis* SMIT, 1956, *Doratopsylla dasycnema dasycnema* (ROTHSCHILD, 1897), *Ctenophthalmus (Ctenophthalmus) agyrtes dinarus* ROSTIGAYEV, 1959, *Ct. (Ct.) a. ohridanus* WAGNER, 1939, *Ct. (Ct.) a. serbicus* WAGNER, 1930, *Ct. (Euctenophthalmus) uncinatus koshanini* ROSICKÝ & TODOROVIĆ, 1964, *Peromyscopsylla bidentata* (KOLENATI, 1863), *P. fallax* (ROTHSCHILD, 1909), *Leptopsylla (Leptopsylla) segnis* (SCHÖNHERR 1811), *Megabothris turbidus* (ROTHSCHILD, 1909) in *Ceratophyllus (Monopsyllus) sciurorum sciurorum* (SCHRANK, 1781).

BRELIH (1986) omenja v svojem delu poleg naštetih še naslednje taksone, ki iz različnih vzrokov niso bili določeni: *Rhadinopsylla (Actenophthalmus)* sp. z Žljeba na Kosovu, *Rh. (A.)* sp. iz Vilusov v Črni Gori, *Ctenophthalmus (Ctenophthalmus) agyrtes* ssp. iz Šator planine v Bosni, *Ct. (Ct.) agyrtes* ssp. iz Vilusov v Črni Gori, *Ct. (Medioctenophthalmus) nifetodes* ssp. iz Galičice v Makedoniji in *Ct. (M.) nifetodes* ssp. iz Štirovnika v Črni Gori.

Preparati zadnjih dveh taksonov so bili založeni in ko smo jih našli, sva na njihovi podlagi opisala dve novi podvrsti: *Ct. (M.) nifetodes rosickyi* ssp. n. in *Ct. (M.) nifetodes milenkovici* ssp. n. Opisala sva tudi samico *Ct. (M.) nifetodes krystufeki* iz novo zbranega gradiva.

BRELIH (1986: 41) podaja ključ za določanje za vse podvrste *Ct. nifetodes*. V ključu je potrebno zamenjati »*nifetodes* ssp. (Štirovnik)« z »*n. milenkovici*« in »*nifetodes* ssp. (Galičica)« z »*n. rosickyi*«, tako bo ključ prilagojen zdajšnjemu taksonomskemu poznavanju.

Rhadinopsylla (Actenophthalmus) sp. z Žljeba ni bila opisana, ker nismo imeli primerjalnega materiala podobne vrste *Rh. (A.) mesa* JORDAN & ROTHSCHILD, 1920. Dr. J.C. Beaucournu nam je prijazno podaril 2 samca in 2 samici in nam s tem omogočil opis vrste *Rh. (Act.) dinaromydis* sp.n.

Od preostalih dveh naštetih podvrst nam še ni uspelo nabrati samcev in sta ostali nedoločeni.

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References

BARTOLOMEI, G., 1970: Primi contributi alla conoscenza dei *Dolomys* pleistocenici del Veneto e del Carso. Mem. Mus. Civ. Stor. Nat. Verona **17**: 79-139.

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BRELIH, S., B. PETROV, 1978: Ectoparasitical entomofauna of Yugoslav mammals. I. Insectivora and Siphonaptera stated on them. Scopolia **1**: 1-67.

BRELIH, S., 1986: Ectoparasitical entomofauna of Yugoslav mammals. II. Siphonaptera from *Dinaromys bogdanovi* and *Chionomys nivalis* (Rodentia: Cricetidae). Scopolia **11**: 1-47.

HOPKINS, G.H.E., & Miriam ROTHSCHILD, 1966: An illustrated catalogue of the Rothschild collection of fleas (Siphonaptera) in the British Museum (Nat. Hist.). Vol. IV. Hystrichopsyllidae. Trust. Brit. Mus. (Nat. Hist.), London, 549 pp, 12 pl.

MRCIAK, M., & S. BRELIH, 1972: To the fauna of mites (Gamasoidea - Parasitiformes) of small mammals in Yugoslavia. Biológia (Bratislava) **27**, 5: 333-352.

PETROV, B.M., 1992: Mammals of Yugoslavia. Insectivores and Rodents. Nat. Hist. Mus. in Belgrade, Supplementa, Special issues, Vol. 37, 186 pp.

ROSICKÝ, B., & J. CARNELUTTI, 1959: Přispěvěk k poznáni fauny blech (Aphaniptera) Slovinska. Českoslov. parasitol. **6** (2): 135-148.

SMIT, F.G.A.M., 1957: Fleas from *Dolomys*, the Yugoslav mountain vole. Ann. Mag. Nat. Hist. (12) **10** (112): 305-319.

WAGNER, J., 1930: Afanipterska fauna Jugoslavije. Glas. Jugosl. Druš. **3-4** (1-2) (1928-1929): 9-43.

WAGNER, J., 1933: Fünf neue palaearktische Flöhe. Konowia **11** (4): 373-280.

WAGNER, J., 1938: Aphanipterologische Notizen. V. Über die Rassen von *Ctenophthalmus orphilus* J. & R. und *Ct. nivalis* R. und die Vergleichung des *Ceratophyllus garei* R. mit *C. borealis* R., nebst einer Feststellung von *Ceratoph. garei islandicus* ssp. n. Konowia **16** (3-4): 252-257.

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