

GENUS *MACRONEMURUS* COSTA, 1855 IN THE NORTHWESTERN PART OF THE BALKAN PENINSULA (NEUROPTERA: MYRMELEONTIDAE)*

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ABSTRACT

Distribution of two ant-lion species, Macronemurus appendiculatus (Latreille) and M. bilineatus Brauer, in the northwestern part of the Balkan Peninsula is described and preliminary analysis of food supply of M. appendiculatus is carried out.

Key words: *Macronemurus*, Neuroptera, distribution, Balkan, feeding

INTRODUCTION

The NW part of the Balkan Peninsula has a rich fauna of Myrmeleontidae (ant-lions), comprising about 20 species in 15 genera (Aspöck *et al.*, 1980; Tröger, 1988; Devetak, 1992a, 1992b). The genus *Macronemurus* Costa, 1855 is represented in the region with two species, *Macronemurus appendiculatus* (Latreille) (Fig. 1) and *M. bilineatus* Brauer. Both species can easily be distinguished (Hölzel, 1987). In *M. appendiculatus* the pronotum is characterized by a dark median stripe, which never occurs in *M. bilineatus*, but two lateral stripes are present in the latter species.

Macronemurus contains about 40 species, distributed all over Africa, southern Europe and SW Asia (Hölzel, 1986, 1987). Palearctic species of the genus are revised by Hölzel (1987).

Feeding habits of the pit-building ant-lion larvae have been described from different aspects (see Gepp & Hölzel, 1989), but information concerning adults is scarce. The intestinal content of adults was investigated by Stelzl & Gepp (1990), Stelzl (1991) and Devetak (1996).

In this paper distribution of the genus *Macronemurus*

in the northwestern part of the Balkan Peninsula and some information concerning food supply are presented.

MATERIAL AND METHODS

Specimens are deposited in the Natural History Museum, Zagreb (coll. Museum ZG), Insect Collection of the Slovene Academy of Sciences and Arts (coll. SAZU LJ) and the author's collection (Maribor). The ant-lions have been collected by the following entomologists (in order to save space, abbreviations of their names are used in the text): J. Carmelutti (JC), D. Devetak (DD), M. Devetak (MD), M. Filipović (MFI), M. Franković (MFR), P. Jakšić (PJ), F. Janžeković (FJ), P. Prosenjak (PP), J. Staudacher (JS), T. Šoljan (TŠ) and F. Velkovrh (FV).

Six males and six females of *M. appendiculatus* originating from the island of Brač and preserved in 70% ethanol were dissected and the digestive tract was isolated. The partially digested food particles suspended in alcohol were examined microscopically. The best results were obtained without staining. The insects' activity was recorded in field with a Sony video camera recorder CCD-TR750E.

* Dedicated to the memory of Dr Narcis Mršić (1951-1997).

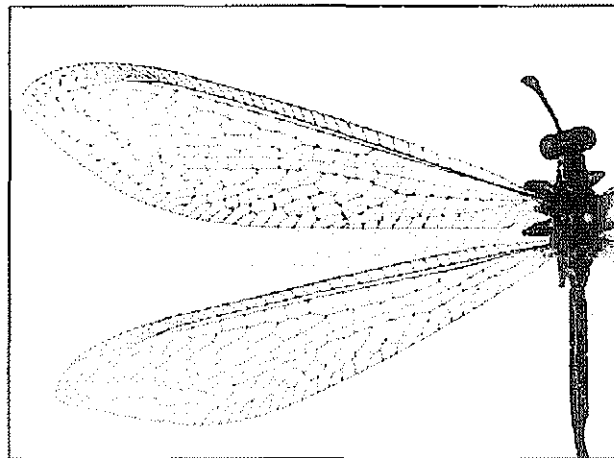
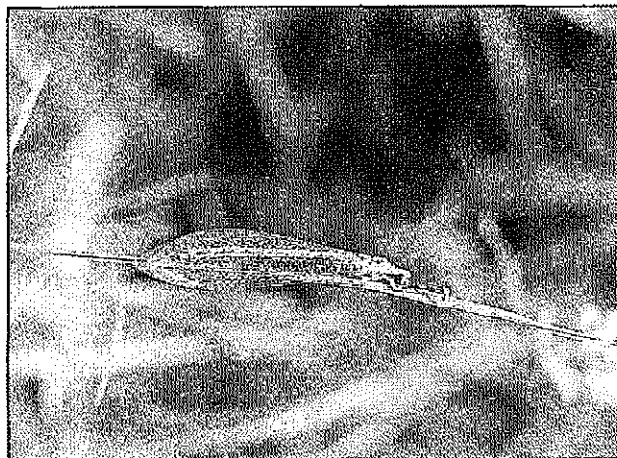


Fig. 1: *Macronemurus appendiculatus* (Latreille, 1807)
(A) Male in resting position. (B) Right wings of a male.
Fore wing length 23 mm.

Sl. 1: *Macronemurus appendiculatus* (Latreille, 1807)
(A) Samec med mirovanjem. (B) Desni krili samca.
Dolžina sprednjega krila 23 mm.

RESULTS

Distribution of *Macronemurus* in the northwestern part of the Balkan Peninsula

Macronemurus appendiculatus (Latreille, 1807)

Literature records:

Croatia: Novak (1891): Hvar; Klapálek (1906): Vis; Werner (1920): Gruž, Pula, Korčula, Brač; Supetar and Milna; Esben-Petersen (1925): Gruž; Hölzel (1987): Gruž, Vis, Split; Saure (1989): Zaoštrog.

Bosnia and Hercegovina: Klapálek (1898, 1899, 1900): Hercegovina: Mostar; Spring of the Jasenica near Mostar

Doflein (1921) recorded the species in Macedonia without information on the locality.

Material examined (m, males; f, females):

Croatia:

Biograd na moru, 11.-19.VII.1973, 2m 5f, DD; Brač: Bol, 12.VII.1987, 1m 7f, 12.VII.1990, 1m 1f, VII.1997, 19m 51f, MD, DD; Cres: Belej, 27.VII.1997, 3f, MFf; Istria: Premantura, 18.VII.1986, 1f, DD; Istria: Pula: Stoja, 10.VIII.1983, 1f, DD; Istria: Rt Kamenjak, 13.VII.1986, 1f, 1.-4.VIII.1995, 2m 1f, DD; Kaštel Kambelovac, 4.VIII.1986, 1m, PP; Korčula: Korčula, 29.VII.-2.VIII.1980, 5m 6f, DD; Kornati: Levrnaka, VI.1978, 2m 1f, FV; Lošinj: Nerezine, 22.-30.VII.1993, 4m, DD; Makarska, 25.VI.1931, JS (coll. SAZU LJ); Mljet, VI.1980, 1m 1f, JC; 7.VIII.1980, 1f, DD; Obrovac: Golubić, rijeka Krupa, 2.VIII.1984, 1f, MF (coll. Museum ZG); Pag: Poveljana, 3.VII.1956, 1f, 30.VI.1960, 2f, 26.VII.1978, 3f (coll. Museum ZG); Planac, 1.VIII.1927, 1f, TŠ (coll. Museum ZG); Rab: Lopar, 21.VI.1976, 2f, DD; Unije, 7.VII.1964, 1f (coll.

Museum ZG); Vele Srakane, 11.IX.1961, 1f (coll. Museum ZG); Zadar, 17.VIII.1937, 1f, JS (coll. SAZU LJ).

Habitats: grassland and garrigue. In southern Istria and Dalmatia, *M. appendiculatus* is one of the most abundant ant-lion species.

World distribution: Holomediterranean element.

Macronemurus bilineatus Brauer, 1868

Literature records:

Pongracz (1923): Kosovo: Morina; Dimitrova (1924) and Dimitrova (1925): Macedonia: Bogdanci (Gevgelija) and Petrovska planina (Kavadarsko); Hölzel (1987): Macedonia: Drenovo-Kavadar, Ohrid, Petrina plan.

Brauer (1868) described the species from "Syra" in Dalmatia, but the meaning of this unnative (or fictive?) name and thus the position of this locality has not been solved. Pongracz (1923) refers to a female of *M. appendiculatus* from Morina, but from his illustration (p. 157) it obviously concerns *M. bilineatus*.

Material examined:

Macedonia: Dojransko Ezero: Dojran, 19.-24.VII.1975, 1 m; Dojransko Ezero: Djopčeli, 20.-23.VII.1975, 1f; Prilep: Pletvar (1000 m a.s.l.), 16.VII.1980, 1m 1f, 20.VII.1983, 1f, PJ.

Yugoslavia: Serbia: Kosovo: Kosovo polje, Caravica, 24.VII.1979, 1m, DD; Ibarska klisura: Košutovac, 24.VII.1987, 2m 2f, PJ.

Yugoslavia: Montenegro: Tuzi, 14.VIII.1982, 1f, 24.VIII.1982, 1f, FJ.

Habitats: grassland and garrigue.

World distribution: Pontomediterranean element.

The finding-places for both species in NW Balkan are shown in Fig. 2.

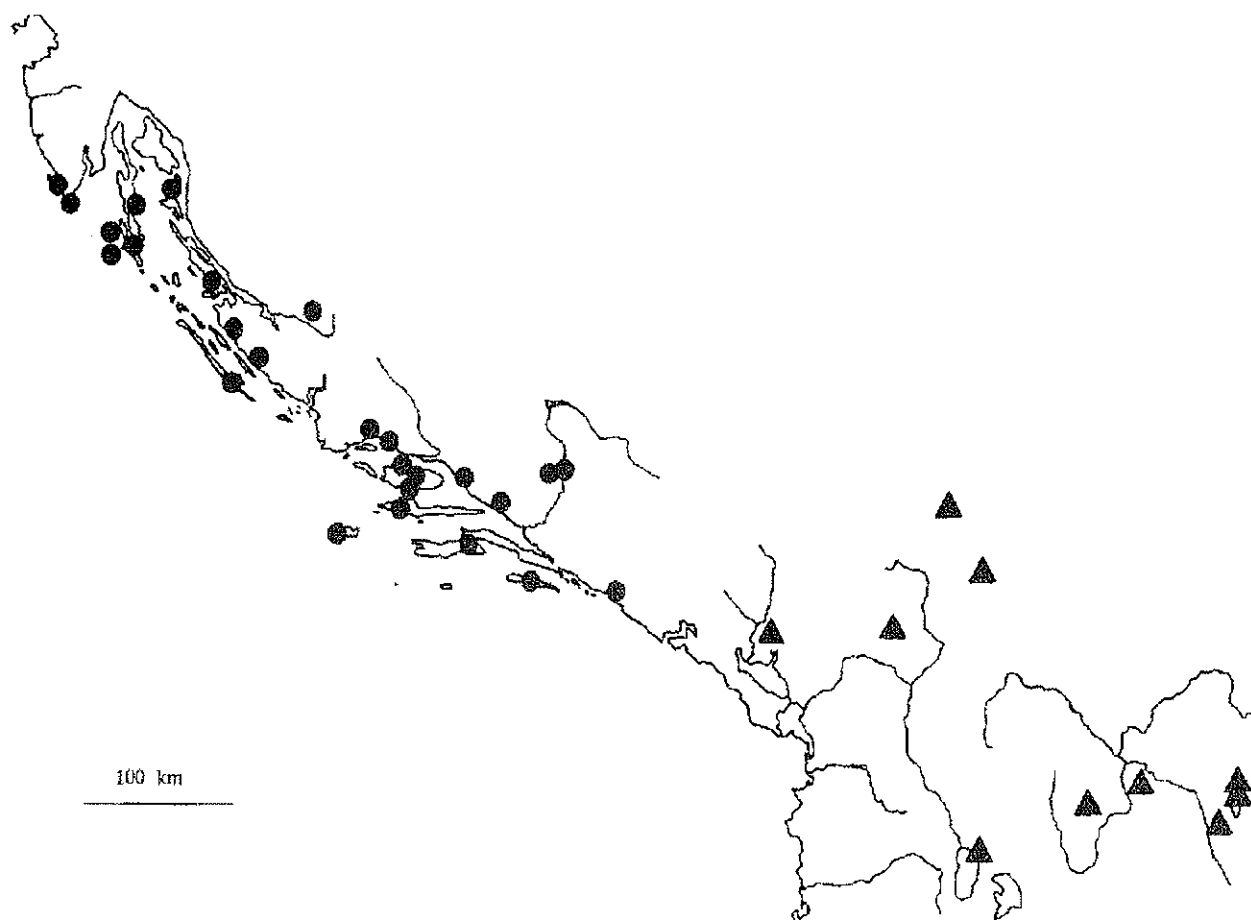


Fig. 2: Finding-places of *M. appendiculatus* (circles) and *M. bilineatus* (triangles) in the northwestern part of the Balkan Peninsula.

Sl. 2: Razširjenost volkcev *M. appendiculatus* (krogci) in *M. bilineatus* (trikotniki) v severozahodnem delu Balkanskega polotoka.

The food supply of *M. appendiculatus*

In the intestinal content of 3 males and 2 females arthropod fragments were found. One male consumed a large amount of pollen grains and in two individuals of both sexes fragments of plant tissue were recorded (Figs. 3-6). Only a few identifications of the arthropod fragments were possible, in other cases one can only speculate on the origin of these food remains. The following structures were recognized: compound eyes, antennal and leg segments, mandibles, cuticular fragments with bristles and lepidopteran scales. From the size of partially digested arthropod fragments and the size of the ant-lions it can be concluded that *M. appendiculatus* is able to consume smaller prey than the prey of *Palpares* (Devetak, 1996), which is the largest ant-lion species in the area.

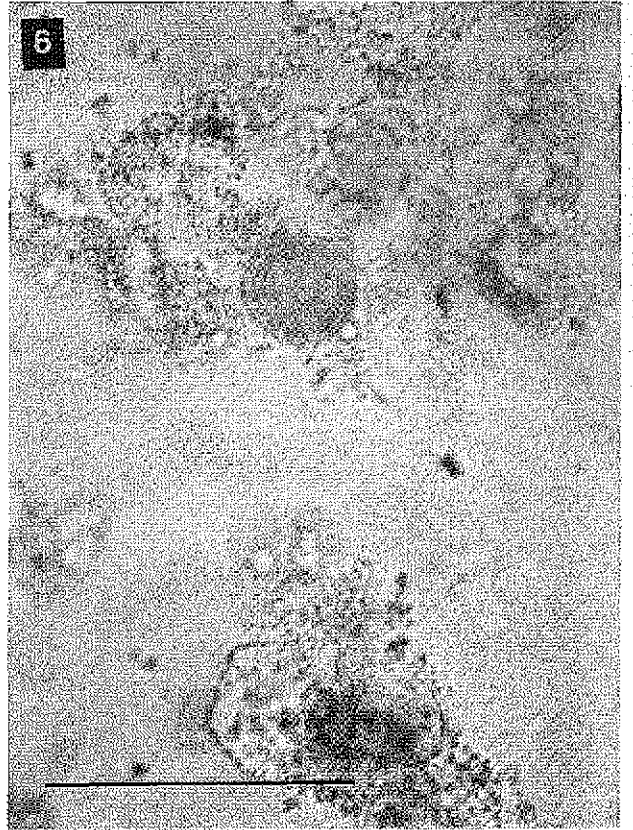
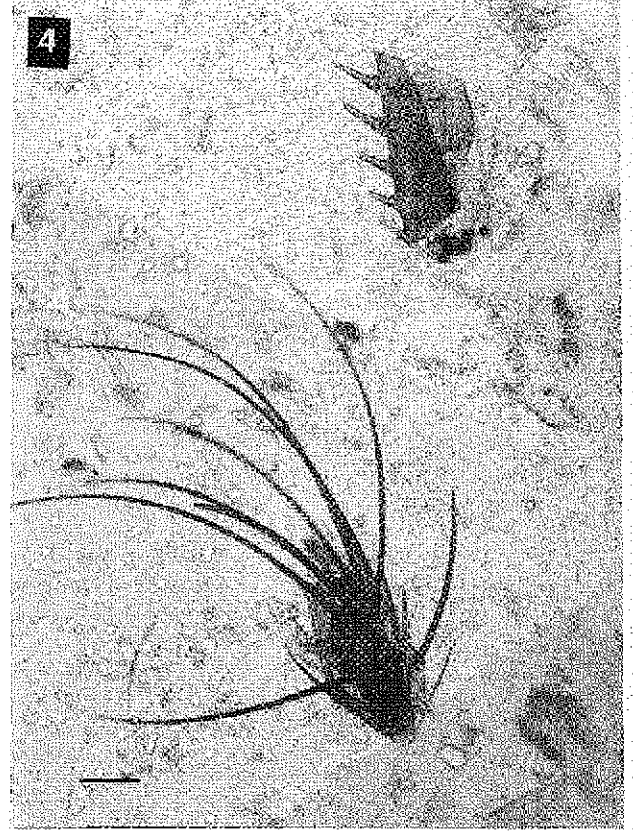
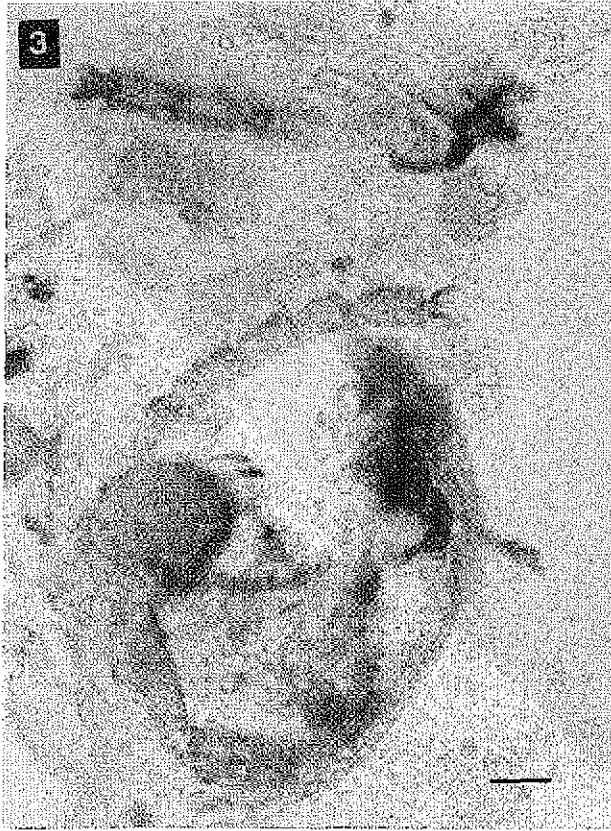
These results are very similar to the investigated feeding habits in four central European ant-lion species (Stelzl & Gepp, 1990; Stelzl, 1991) and in *Palpares*

libelluloides (Devetak, 1996). It is not clear whether the plant tissues in *Macronemurus* originated from the intestinal content of herbivorous prey (e.g. caterpillars) or had been digested directly. The ingestion of pollen has been also reported for some American species (Stange, 1970) and the European ant-lions (Stelzl & Gepp, 1990).

CONCLUSIONS

The ant-lions of the genus *Macronemurus* are common in the northwestern part of the Balkan. *M. appendiculatus* occurs in the coastal part of Croatia and in Hercegovina, and *M. bilineatus* inhabits Montenegro, Serbia (Kosovo) and Macedonia (Fig. 2).

M. appendiculatus feeds on insects, pollen and possibly on plant tissues (Figs. 3-6). Both species inhabit grassland and garrigue. In southern Istria and Dalmatia, *M. appendiculatus* is one of the most abundant ant-lion species.



Figures 3-6.

Slike 3-6.

Figs. 3-6: Food remains from the digestive tract of *M. appendiculatus*. Bar 100 μ m.

Fig. 3: Insect tarsi and a fragment of compound eye.

Fig. 4: Two arthropod fragments of unknown origin.

Fig. 5: A lepidopteran scale and two ommatidia.

Fig. 6: Pollen grains.

Sl. 3-6: Ostanki hrane iz prebavil *M. appendiculatus*. Merilo: 100 μ m.

Sl. 3: Tarzi žuželk in del sestavljenega očesa.

Sl. 4: Fragmenta členonožcev neznanega izvora.

Sl. 5: Luska z metuljevih kril in dva omatidija.

Sl. 6: Pelodna zrna.

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ROD *MACRONEMURUS* COSTA, 1855 V SEVEROZAHODNEM DELU BALKANSKEGA POLOTOKA (NEUROPTERA: MYRMELEONTIDAE)*

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POVZETEK

Rod volkcev *Macronemurus* je splošno razširjen v severozahodnem delu Balkanskega polotoka. Vrsta *M. appendiculatus* poseljuje obalno področje Hrvaške in Hercegovino, vrsta *M. bilineatus* pa Črno goro, Srbijo (Kosovo) in Makedonijo (sl. 2).

Pri analizi prežvečenih in deloma prebavljenih ostankov hrane iz prebavila vrste *M. appendiculatus* sem ugotovil, da se volkec hrani z žuželkami, cvetnim prahom in morda z rastlinskimi tkivi (sl. 3-6). Med ostanki žuželk so bili fragmenti nog, anten, sestavljenih oči, kutikularnih ploščic in lusk s kril metuljev.

Obe vrsti poseljujeta travnate habitate in garigo. V južni Istri in Dalmaciji je *M. appendiculatus* najpogostejši volkec.

Ključne besede: *Macronemurus*, Neuroptera, razširjenost, Balkan, prehranjevanje

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