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Lauterbornia 46: 125-134, D-86424 Dinkelscherben, 2003-04-10

We dedicate this paper to Ao. Univ. Prof. Dr. Mag. Uwe Humpesch on the occasion of his 60th birthday.

The Larva of *Ecclisopteryx asterix* Malicky, 1979 (Trichoptera: Limnephilidae: Drusinae)

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With 14 Figures

Keywords: Ecclisopteryx, Limnephilidae, Trichoptera, Insecta, larva, description, habitat, distribution
Schlagwörter: Ecclisopteryx, Limnephilidae, Trichoptera, Insecta, Larve, Beschreibung, Morphologie, Habitat, Verbreitung

The paper presents a description of the hitherto unknown larva of *Ecclisopteryx asterix* Malicky, 1979. Information for the identification of this species is given, and the most important diagnostic features are illustrated. Some zoogeographical and ecological notes are added.

1 Introduction

According to Malicky (1983), *Ecclisopteryx asterix* Malicky, 1979 is one of the four *Ecclisopteryx* species reported from Central Europe with another *Ecclisopteryx* species (*E. malickyi*) described by Moretti in 1991. Three of them (*Ecclisopteryx dalecarlica* Kolenati 1848, *E. guttulata* Pictet 1834 and *E. madida* McLachlan 1867) are included in the larval keys of Pitsch (1993) and Waringer & Graf (1997, 2000), whereas the remaining two species are unknown so far. Recently, however, larvae and pupae of an *Ecclisopteryx* species morphologically close to *Drusus annulatus* were collected from spring brooks Kamniška Bistrica, Kraški izvir and Hubelj (Northern and Western Slovenia) and from a springbrook of the Loiblbach, Carinthia, Southern Austria. Adults and ripe pupae clearly identified the unknown larvae as *E. asterix*.

2 Separation of *Ecclisopteryx asterix* from other Trichoptera

A summary of morphological features for the identification of limnephilid and Drusinae larvae is given in Waringer (1985). Within the framework of the limnephilid key by Waringer & Graf (1997, 2000), *E. asterix* is keyed out together with *Drusus annulatus* and *D. biguttatus* and separated from other limnephilid species by the following features:

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Single-filament gills only (Fig. 4)
Metanotum covered by three pairs of small sclerites (Fig. 1mt)
Head and pronotum without a thick layer of woolly hairs (Fig. 2)
Head capsule without groups of additional spines, without central concavity and rims surrounding the frontoclypeus (Fig. 2)
First abdominal sternum without a large median sclerotized patch bearing numerous (30 - 40) black setae (Fig. 7).
A prominent ridge or sharp keel is lacking on the pronotum (Figs. 5, 6a-c)
Mandibles lacking terminal teeth along edges as well as ridges in the central concavity (Fig. 3)
Additional setae present on the faces of mid- and hindleg femora (Fig. 8); dorsal setae on mid- and hindtibiae present at the distal third only (Fig. 8)
Metanotal sclerites large, ovoidal, their median separation being distinctly smaller than their maximum extension along the body axis (Fig. 1mt)
Median setae present at anterior border of pronotum (Fig. 2).

Finally, fifth instar larvae (head width >1.33 mm) of *E. asterix* can be easily separated from *Drusus annulatus* and *D. biguttatus* by the beginning of the lateral fringe at the anterior border of the third abdominal segment in the latter two species (Fig. 10); in fourth and fifth instar larvae of *E. asterix*, the lateral fringe does not start before the last third of this segment (Fig. 4). In Central European Drusinae larvae so far described, such a backward beginning of the lateral fringe is only the case in *Drusus monticola* McL. (which can be readily separated from *E. asterix* by the high pronotal keel and its deep median incision in anterior view as shown in Fig. 11) and in *D. chrysotus* (Rambur) (which is easily separated by the deep central concavity of the head capsule; Waringer, 1987). In the remaining Drusinae species, the lateral fringe starts between the middle of the second and the first third of the third abdominal segment. In addition, there are differences in the dorsal silhouette of the pronotum (Fig. 6a-c).

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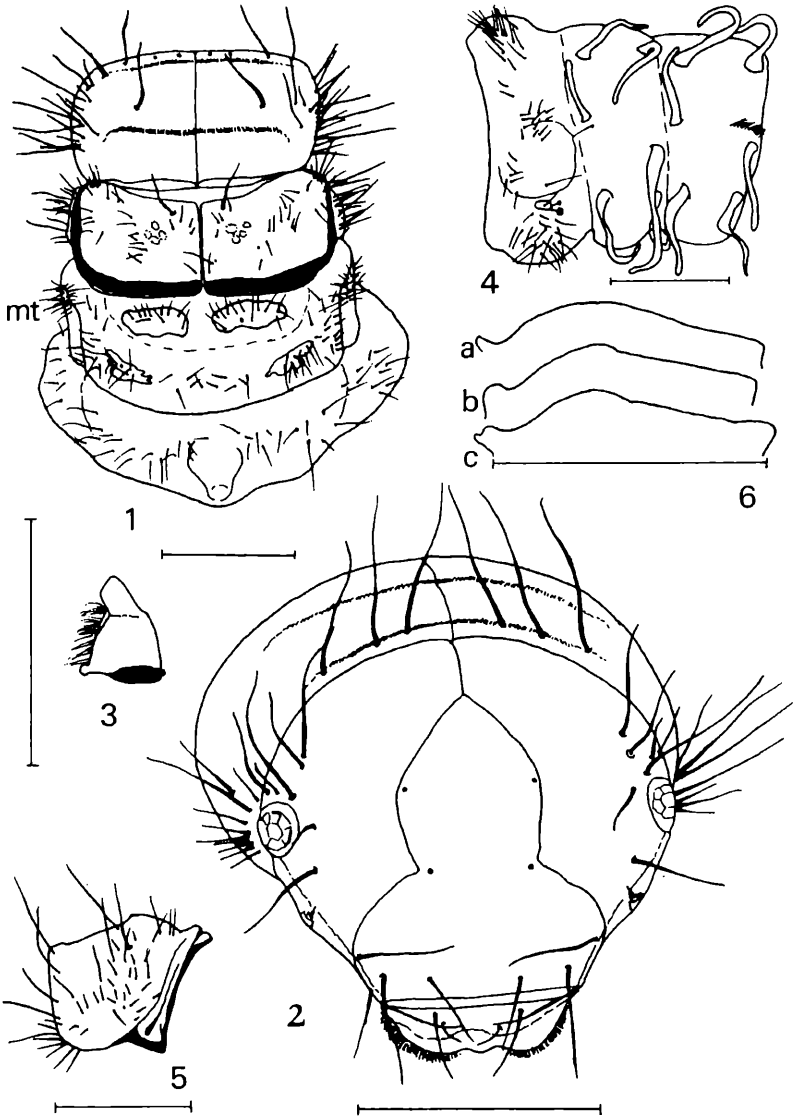

Fig. 1-5: ***Ecclisopteryx asterix*****, fifth instar larva. 1: thorax and first abdominal segment, dorsal view; 2: head capsule and pronotum, frontal view; 3: right mandible, lateral view; 4: first to third abdominal segment, left lateral view; 5: profile of left side of pronotum; Fig. 6: dorsal silhouettes of pronotum, right lateral view, a:** ***Drusus biguttatus*****, b:** ***Drusus annulatus*****, c:** ***Ecclisopteryx asterix*****. Mt = metanotum. Scale bars: 1mm**

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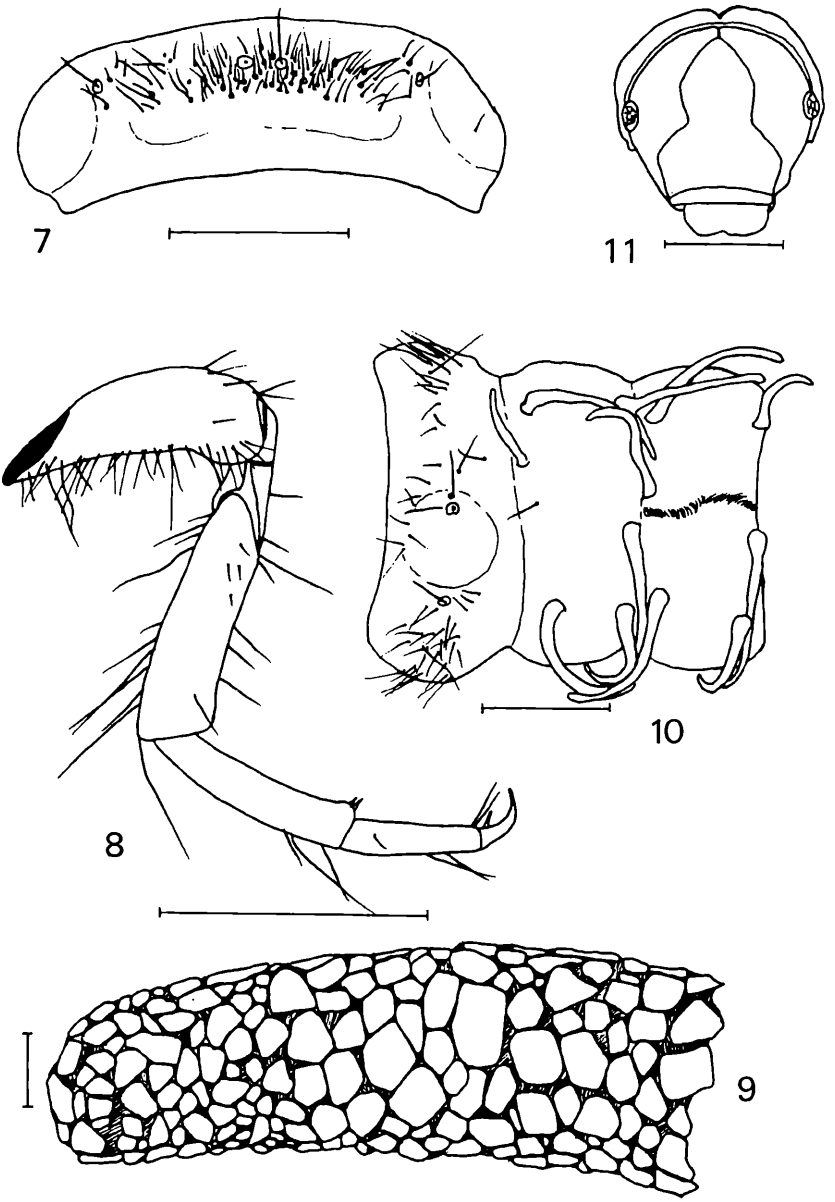

Fig. 7-9: *Ecclisopteryx asterix*, fifth instar larva. 7: first abdominal sternum; 8: right hind leg, anterior face; 9: case, right lateral view; Fig. 10: *Drusus annulatus*, first to third abdominal segment, left lateral view; Fig. 11: *Drusus monticola*, head capsule and pronotum, frontal view. Scale bars = 1 mm

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3 Description of the fifth instar larva of *Ecclisopteryx asterix* (head width ≥1.33 mm)

Material examined: *Ecclisopteryx asterix*: 42 fifth instar larvae from the spring brooks Kamniška Bistrica, Kraški izvir and Hubelj, collected by G. U. on 29.01.2000, on 11.06.2001 and on 08.05.2002, and 15 fifth and 2 fourth instar larvae from a spring brook of the Loiblbach, Carinthia, Austria, collected by W. G. on 03.-04.06.2000 and on 22.10.2000. In addition, 7 specimens of *Drusus annulatus* from the Schimmelbach, Bayerischer Wald, Germany (leg. A. Weinzierl) and 13 specimens of *Drusus biguttatus* from the Lunzer Seebach, Lower Austria (leg. J. Waringer), were checked for morphological charcaters in order to separate the species.

Body length of final instar larvae: 6.1-9.0 mm; head width: 1.33-1.66 mm. Length of larval case (Fig. 9): 5.5-11.1 mm. The smooth case is slightly curved and tapering posteriorly (the width at anterior opening is 2.1-3.1 mm and at the posterior opening 1.0–2.2 mm) and consists completely of mineral particles with grain sizes increasing distinctly in anterior direction.

Head capsule and all body sclerites dark brown to black brown. The head capsule (Fig. 2) lacks additional setae or spines and is very close to *D. annulatus*. Mandibles lacking terminal teeth along edges as well as ridges in the central concavity.

In profile, dorsal line of pronotum rounded in its posterior third (Fig. 5, 6c, 12), thereby creating a small dorsal hump. This hump, however, does not fit seamlessly with the curvature of the anterior two thirds of the pronotum as in *D. biguttatus* (Fig. 6a, 14), but is sharply offset, thereby creating a step-like interruption of the dorsal silhouette (Fig. 12), as it is also the case in *D. annulatus* (Fig. 6b, 13). Differences in dorsal hump curvature of *D. annulatus* and *E. asterix* are subtle, but consistent: in *D. annulatus*, the ascending part of the dorsal hump is much steeper than in *E. asterix*, and an additional low thickening runs along the anterior pronotal border (Fig. 6c). The dark brown pronotal surface is densely covered by black setae. Prosternite brownish, densely covered by spinules which extend posteriorly and anteriorly to the soft cuticle surrounding the prosternal horn. Mesonotum completely covered by two blackish brown sclerites. Metanotum partially covered by three pairs of sclerites; anterior metanotal sclerites large, ovoidal, their median separation being distinctly smaller than their maximum extension along the body axis (Fig. 1mt). First abdominal sternum with 90-110 black setae, some of them with sclerotized bases (Fig. 7

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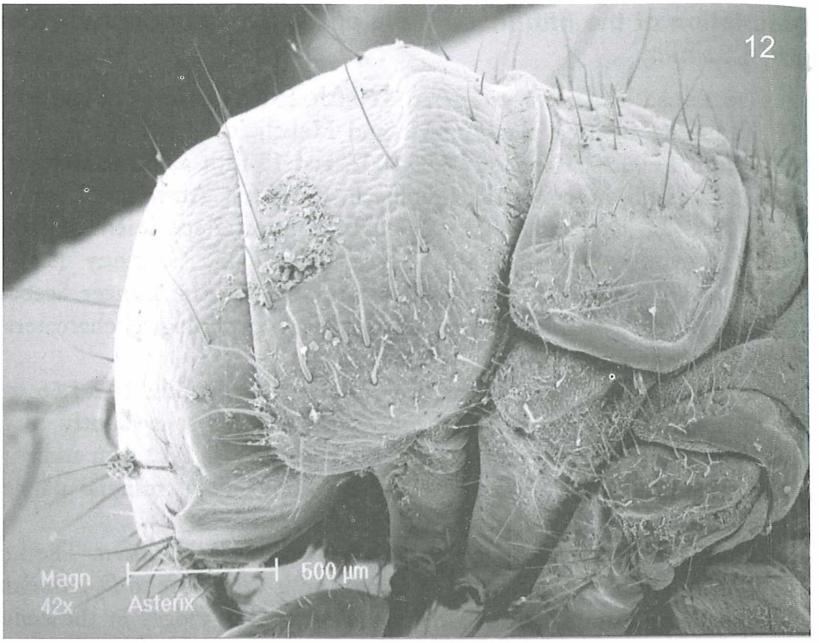

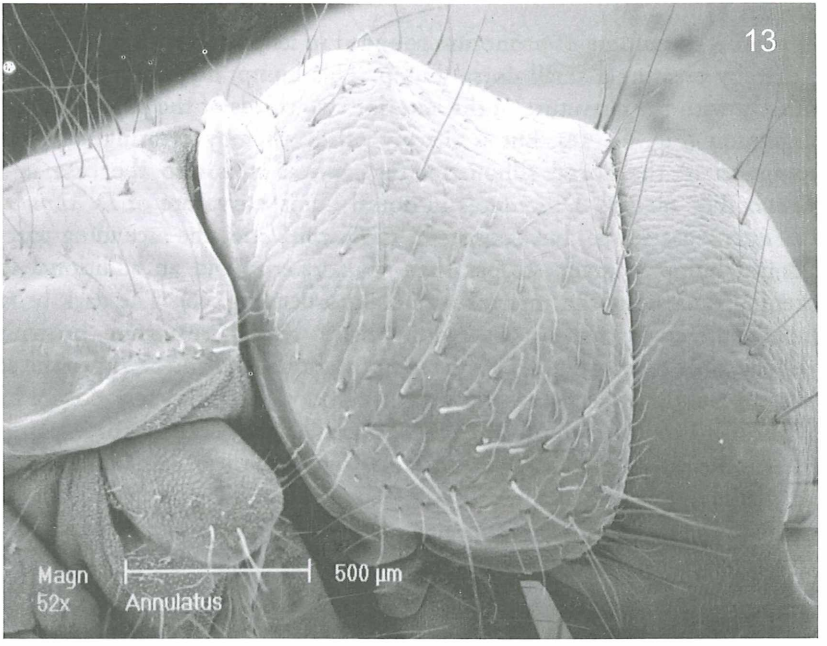

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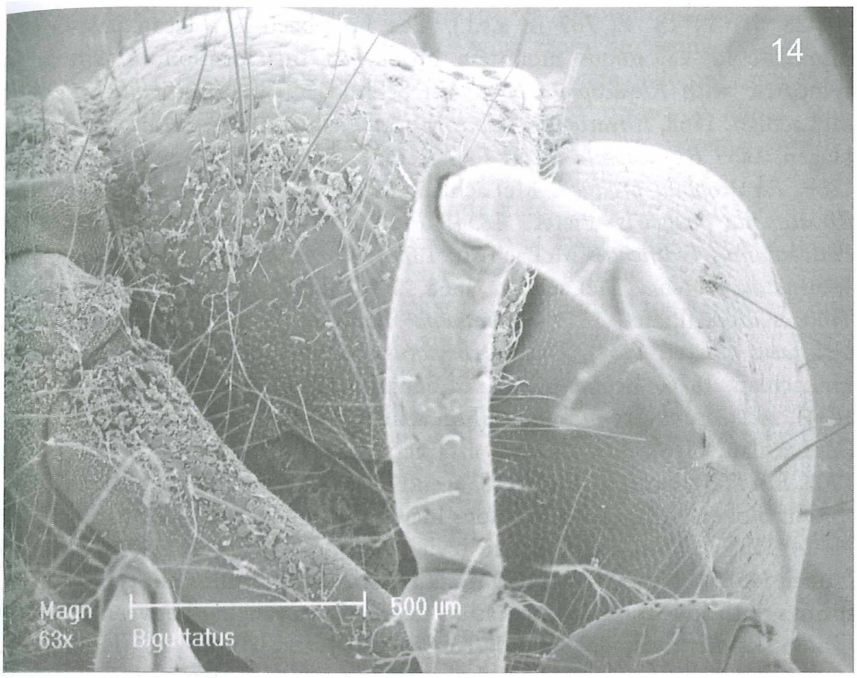

Fig. 12-14: Scanning photograps of pronotum profiles of 12: *Ecclisopteryx asterix* (from left); 13: *Drusus annulatus* (from right); 14: *Drusus biguttatus* (from right)

Dorsal gills are present from the second (presegmental position) to the sixth (postsegmental position). Ventral gills range from second (presegmental) to the seventh segment (presegmental) and lateral gills are present from the second (presegmental) to fourth segment (postsegmental position).

Lateral fringe present on last third of third to first third of eigth abdominal segment. Ninth abdominal sclerite with two central intermediate setae.

Femora of anterior legs with five ventral spines. Groups of setae are present at anterior and posterior faces of all femora.

4 Habitat and distribution

Last instar larvae of *Ecclisopteryx asterix* were collected on 03-04. June, 2000 and on 22 October of the same year in a springbrook of the Loiblbach, southern Carinthia, with adults additionally collected in the nearby Hainischgraben and Gotschuchner Bach. In Slovenia larvae were collected on many occassions between 29 January 2000 and 08 May 2002 in different streams in Northern and Western Slovenia. The Austrian sampling location is at the Loiblbach

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(46°28' N, 14°15' E, 769 m a.s.l.). The Loiblbach is a clean, fast-flowing, summer-cold, calcareous mountain brook. At this location, *E. asterix* was sympatric with *Rhyacophila bonaparti* Schmid, 1947, *Rhyacophila intermedia* McLachlan, 1868, *Rhyacophila hirticornis* McLachlan, 1879, *Rhyacophila fasciata* Hagen, 1859 *Rhyacophila laevis* Pictet, 1834, *Rhyacophila stigmatica* Kolenati, 1859, *Rhyacophila producta* McLachlan, 1879, *Rhyacophila tristis* Pictet, 1834, *Rhyacophila vulgaris* Pictet, 1834, *Ptilocolepus granulatus* (Pictet, 1834), *Philopotamus ludificatus* McLachlan, 1878, *Wormaldia vargai* Malicky, 1981, *Wormaldia copiosa* McLachlan, 1868, *Wormaldia occipitalis* (Pictet, 1834), *Tinodes dives* (Pictet, 1834), *Micrasema morosum* (McLachlan, 1868), *Drusus biguttatus* (Pictet, 1834), *Drusus chrysotus* (Rambur, 1842), *Drusus monticola* McLachlan, 1876, *Metanoea rhaetica* Schmid, 1955, *Halesus rubricollis* (Pictet, 1834), *Melampophylax melampus* (McLachlan, 1867), *Pseudopsilopteryx zimmeri* (McLachlan, 1876), *Adicella filicornis* (Pictet, 1834), *Crunoecia kempnyi* Morton, 1901, *Ernodes articularis* (Pictet, 1834) and *Ernodes vicina* (McLachlan, 1879).

Our Slovenian sampling locations include streams Kamniška Bistrica (46°19' N, 14°35' E, 592 m a.s.l.), Kraški izvir (45°59' N, 14°02' E, 380 m a.s.l.) and Hubelj (45°54' N, 13°58' E, 320 m a.s.l.). All these streams are typical karstic springs with low annual temperature fluctuations, ranging between 4.9-5.8 °C (Kamniška Bistrica), 8.0-8.9 °C (Kraški izvir) and 7.9-9.8 °C (Hubelj). All streams have alkaline pH (7.4-8.3) and slight oxygen supersaturation over the whole year (101-109 %). Conductivity is low and only in the case of the stream Kraški izvir the value is higher than 300 µS/cm (320 µS/cm). At all these locations *E. asterix* was sympatric with *Metanoea rhaetica* Schmid, 1955, *Rhyacophila vulgaris* Pictet, 1834, *Tinodes dives* (Pictet, 1834) and *Potamophylax cingulatus* (Stephens, 1837). Sympatric species in Kamniška Bistrica only were *Rhyacophila producta* McLachlan, 1879, *Rhyacophila torrentium* Pictet, 1834, *Lithax niger* (Hagen, 1859), *Drusus discolor* (Rambur, 1842), *Drusus biguttatus* (Pictet, 1834) and *Halesus rubricollis* (Pictet, 1834). At the stream Hubelj *Rhyacophila fasciata* Hagen, 1859, *Rhyacophila tristis* Pictet, 1834, *Rhyacophila laevis* Pictet, 1834, *Wormaldia copiosa* McLachlan, 1868, *Plectrocnemia conspersa* (Curtis, 1834) and *Potamophylax nigricornis* (Pictet, 1834), and at stream Kraški izvir *Glossosoma bifidum* (McLachlan, 1879), *Micrasema minimum* McLachlan, 1876, *Lepidostoma hirtum* (Fabricius, 1775), *Silo pallipes* (Fabricius, 1781), *Beraeamyia schmidi* Botosaneanu, 1960, *Sericostoma schneideri* Kolenati 1848, *Athripsodes bilineatus* (Linnaeus, 1758) and *Odontocerum albicorne* (Scopoli, 1763) were collected together with *E. asterix*.

According to Malicky (1983), *E. asterix* is an endemit of the Karawanken (Malicky 2000). Its distribution comprises a small area (Southern Austria, Slovenia) within Ecoregion 4 ("Alps"). Apart from our Carinthian location, the

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only other Austrian federal state where this species has been reported so far is Styria (Malicky 1999). *E. asterix* is on the wing from beginning of May to beginning of October. However, the most specimens were collected from May to July (Urbanič, unpublished). In Slovenia *E.asterix* occurs in alpine and prealpine regions of Southern, Southwestern and Western Slovenia mainly between 400 and 900 m. However, in the Julian Alps the species was caught also at 1611 m a.s.l., whereas at the most southern location the species occurs at 290 m. The reason that the species occurs also at such a low altitude most probably is the fact that the stream Hubelj has a karstic spring delivering waters from much higher elevations (higher than 1000 m) of the karstic plateau Trnovski gozd; this assumption is also supported by the low water temperatures and annual fluctuations mentioned before.

D. annulatus, the species morphologically closest to *E. asterix* in the larval stage, is lacking within alpine regions and is almost exclusively found in Ecoregion 9 ("Central European Highlands"). In Austria, *D. annulatus* is known only from Upper and Lower Austria (Malicky 1999) and Vorarlberg (Graf & Hutter 2002) and does not occur in Slovenia (Krušnik & Urbanič 2002).

Acknowledgements

We wish to thank Prof. Waltraud Klepal and Mag. Daniela Gruber for their assistance in preparing the scanning photographs and Armin Weinzierl for providing larval material.

References

Graf, W. & G. Hutter (2002): Köcherfliegen (Insecta: Trichoptera) aus Vorarlberg, I – Vorstellung des Projektes „Erforschung der Köcherfliegenfauna Vorarlbergs" und erste Ergebnisse.- Vorarlberger Naturschau 11: 223-226, Bregenz

Krušnik, C. & G. Urbanič (2002): Preliminary list of Slovenian Trichoptera.– Proceedings of the 10th International Symposium of Trichoptera– Nova Supplementa Entomologica 15: 359-364, Keltern

Malicky, H. (1983): Atlas of European Trichoptera.- 298 pp. (Junk Publishers) The Hague

Malicky, H. (1999): Eine aktualisierte Liste der österreichischen Köcherfliegen (Trichoptera).- Braueria 26: 31-40; Lunz

Malicky, H. (2000): Arealdynamik und Biomgrundtypen am Beispiel der Köcherfliegen (Trichoptera).- Entomologica Basiliensia 22: 235-259, Basel

Pitsch, T. (1993): Zur Larvaltaxonomie, Faunistik und Ökologie mitteleuropäischer Fließwasser-Köcherfliegen (Insecta: Trichoptera).- Landschaftsentwicklung und Umweltforschung-Schriftenreihe des Fachbereichs Landschaftsentwicklung, Sonderheft S8; 316 pp., Technische Universität Berlin

Waringer, J. (1985): The larva of Metanoea rhaetica Schmid, 1955 (Trichoptera: Limnephilidae: Drusinae) from an Austrian mountain brook.– Aquatic Insects 7: 243-248, Lisse

Waringer, J. (1987): The larva of Drusus chrysotus (Rambur, 1842) (Trichoptera: Limnephilidae: Drusinae) from an Austrian mountain brook.– Aquatic Insects 9: 21-25, Lisse

Waringer, J. & W. Graf (1997): Atlas der Österreichischen Köcherfliegenlarven.- 286 pp., (Facultas Univeritätsverlag) Wien

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Waringer, J. & W. Graf (1997): (2000): Ergänzungen und Berichtigungen zum "Atlas der österreichischen Köcherfliegenlarven unter Einschluß der angrenzenden Gebiete".- Beilage zum 1. unveränderten Nachdruck, 19 pp. (Facultas Universitätsverlag) Wien

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Received: 2002-12-27

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Autor(en)/Author(s): Urbanic Gorazd, Waringer Johann, Graf Wolfram

Artikel/Article: We dedicate this paper to Ao. Univ. Prof. Dr. Mag. Uwe Humpesch on the occasion of his 60th birthday. The Larva of Ecclisopteryx asterix Malicky, 1979 (Trichoptera: Limnephilidae: Drusinae). 125-134