

Lauterbornia 43: 121-129, D-86424 Dinkelscherben, 2002-04-25

Ecology, morphology and distribution of *Ptilocolepus granulatus* (PICTET 1834) (Insecta: Trichoptera) in Austria

Johann Waringer and Wolfram Graf

With 4 figures and 1 table

Schlagwörter: Ptilocolepus, Trichoptera, Insecta, Österreich, Taxonomie, Ökologie, Verbreitung, Morphologie

Keywords: Ptilocolepus, Trichoptera, Insecta, Austria, taxonomy, ecology, distribution, morphology

The distribution of *Ptilocolepus granulatus* (PICTET 1834) in the federal states of Austria is figured and some zoogeographical notes and the phenology of this species are included. In addition, information on larval ecology, abiotic parameters of the breeding sites and vertical distribution patterns in Austria are given, and morphological pros and cons for the taxonomical status of *P. granulatus* in families Glossosomatidae versus Hydroptilidae are briefly discussed.

1 Introduction

The subfamily Ptilocolepinae is classified either among the Hydroptilidae (e.g. BOTOSANEANU & LEVANIDOVÁ 1987, MARSHALL 1979, SCHMID 1998, WIGGINS 1996) or the Glossosomatidae (MALICKY 1983a, 1999). The subfamily consists of two genera: *Palaeagapetus*, which is known from Baltic amber, the Nearctic (two species), eastern Asia (one species) and Japan (five species), and *Ptilocolepus*, containing six extant Palaearctic species (ITO 1998, MALICKY & CHANTARAMONGKOL 1996, MARSHALL 1979, SCHMID 1990). *Ptilocolepus granulatus* (PICTET 1834) is the only representative of its genus in Austria (MALICKY 1999), with the other European Ptilocolepinae being restricted to the Caucasus and northern Iran (*P. colchicus* MARTYNOV 1913), the Caucasus (*P. dilatatus* MARTYNOV 1913) and to the Iberian peninsula (*P. extensus* McLACHLAN 1884). Whereas most taxonomists consider *P. dilatatus* as species, it is seen as subspecies of *P. granulatus* by other workers (e.g. MALICKY 1983a). The two remaining *Ptilocolepus* species have been described from India (*P. atiloma* SCHMID 1990) and Thailand (*Ptilocolepus nam-nao* MALICKY & CHANTARAMONGKOL 1996). In this paper the distribution of *P. granulatus* in Austria is briefly discussed and information on its ecology is presented. In addition we summarize morphological features which might be helpful in the discussion on family allocation of Ptilocolepinae.

2 Geographical distribution

The geographical distribution of *P. granulatus* in Europe ranges from southern Italy to northern Jutland and from the Pyrénées to the Carpathians (CASPER & al. 1977, CIANFICCIIONI 2000, JAQUEMART & COINEAU 1962, MALICKY 1983a, b, 1999, MEY & al. 1979, NOVAK & OBR 1977, ROBERT 2001, SCHRANKEL & al. 2002, STROOT 1984, TOBIAS 1964, TOBIAS 1986, WIBERG-LARSEN & al. 1991). In Germany, *P. granulatus* is known from all federal states except Saarland, Schleswig-Holstein and Mecklenburg-Vorpommern (ROBERT 2001). In Austria, this species is reported from all federal states except Burgenland (MALICKY 1999), although more recent recordings (1970-2001) were made in Vorarlberg, Tyrol, Carinthia, Styria and Lower Austria only (Fig. 1).

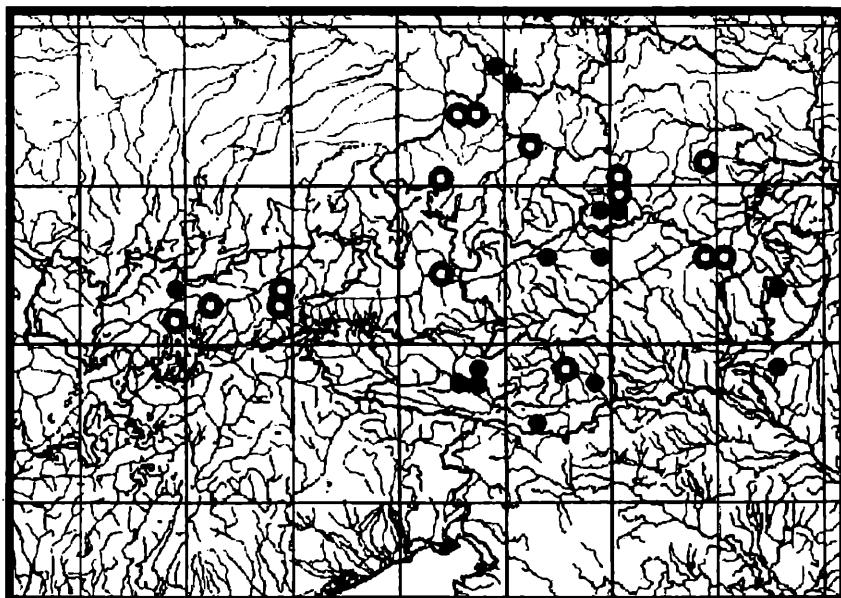


Fig. 1: Distribution of *Ptilocolepus granulatus* in Austria. Black dots: records from 1970 onwards; open circles: records before 1970. Courtesy Zobodat Linz with additions. Additional records of *P. granulatus* in Vorarlberg are given by MALICKY (1999) but have not yet been included in the map above.

3 Ecology

P. granulatus is a distinctly crenophilic species of montane to subalpine regions in central Europe (GRAF & al. 1995, ROBERT 1996, FISCHER 1996, ITO 1998). DITTMAR (1955) regards this species to be associated with *Fontinalis antipyretica*. In

contrast, ITO & HIGLER (1993) as well as DEPISCH (1999) mention the liverwort *Scapania undulata* (Family Scapaniaceae) to be the main feeding habitat as well as ressource for case-building activities. *Scapania undulata* seems to prefer acidic montane to alpine brooks and groundwater-fed fens, which coincides quite well with the habitats of *P. granulatus*. Due to its robust mandibles *P. granulatus* is the only species of the subfamily Ptilocolepiniae which is able to feed on *Fontinalis* sp. besides other bryophytes (ITO 1998). Maximum annual water temperatures at three springs in Carinthia and Lower Austria where the species was abundant were 4 to 8.5 °C with hardness values ranging from 1 to 3 German degrees. Other Trichoptera species observed at these locations were *Rhyacophila glareosa* McLACHLAN, *R. hirticornis* McLACHLAN, *R. laevis* PICTET, *R. producta* McLACHLAN, *R. pubescens* PICTET, *R. stigmatica* KOLENATI, *R. tristis* PICTET, *Agapetus fuscipes* CURTIS, *Synagapetus iridipennis* McLACHLAN, *Plectrocnemia conspersa* (CURTIS), *P. geniculata* McLACHLAN, *Philopotamus ludificatus* McLACHLAN, *P. montanus* (DONOVAN), *Wormaldia copiosa* McLACHLAN, *W. occipitalis* (PICTET), *Tinodes dives* (PICTET), *Drusus chrysotus* (RAMBUR), *D. destitutus* (KOLENATI), *D. monticola* McLACHLAN, *Allogamus uncatus* (BRAUER), *Chaetopteryx fusca* BRAUER, *C. major* McLACHLAN, *C. rugulosa* KOLENATI, *Chaetopterygopsis macclachlani* STEIN, *Halesus rubricollis* (PICTET), *Leptotauius gracilis* SCHMID, *Parachiona picornis* (PICTET), *Potamophylax cingulatus* (STEPHENSON), *P. nigricornis* (PICTET), *Pseudosiloptynx zimmeri* (McLACHLAN), *Lithax niger* (Hagen), *Cranoecia irrorata* (Curtis), *C. kempnyi* Morton, *Beraea pullata* (CURTIS), *Ernades articularis* (PICTET), *E. vicinus* (McLACHLAN) and *Sericostoma personatum* KIRBY & SPENCE. The life cycle appears to be univoltine (ITO & HIGLER 1993) with facultative semivoltinism. In Ardennes springbrooks the flight period lasts from March to April with a second emergence in autumn. Our records of adults of *P. granulatus* from Austria (Lower Austria, Styria and Carinthia) are dated from May and June. In Austria, *P. granulatus* has been recorded from as low as 200 m a.s.l. up to 1800 m a.s.l. (data courtesy Zobodat, Linz).

4 Taxonomical status

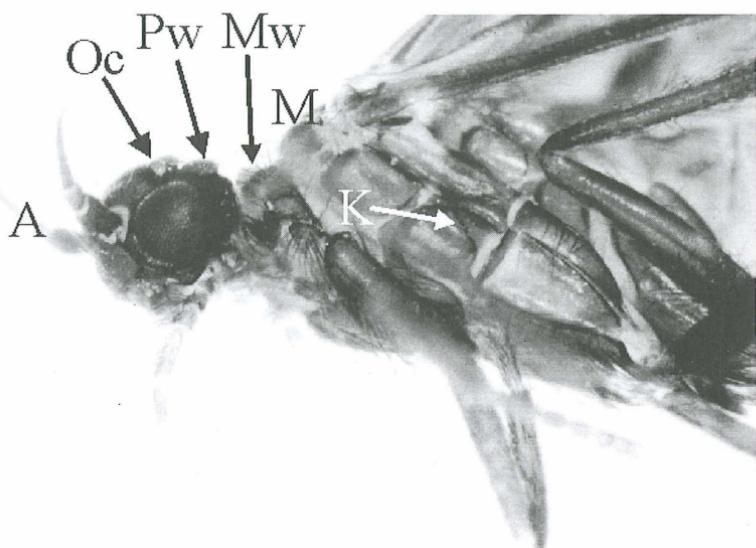
Based on larval and pupal morphology (THIENEMANN 1904a, b) as well as on hypermetamorphosis (NIELSEN 1948), the subfamily Ptilocolepiniae is widely regarded as primitive hydroptilid. In the adult, the shape and venation of the partly pubescent wings and the prominent sternal glands, among others, reflect the morphological basic status of this subfamily. On the other hand, MARSHALL (1979) clearly stated that there are marked differences between the two hydroptilid subfamilies Hydroptilinae and Ptilocolepiniae. The latter also resemble small glossosomatids and are classified among this family by some workers. Table 1 and figures 2-4 summarize morphological characters illustrating this inter-

mediate status of Ptilocolepinae. Based on larvae, *Ptilocolepus* clearly is a hydroptilid; based on adult morphology, the taxon shares many features typical for Glossosomatidae. This is why MALICKY (2001) recently suggested to raise the subfamily Ptilocolepinae to family rank Ptilocolepidae.

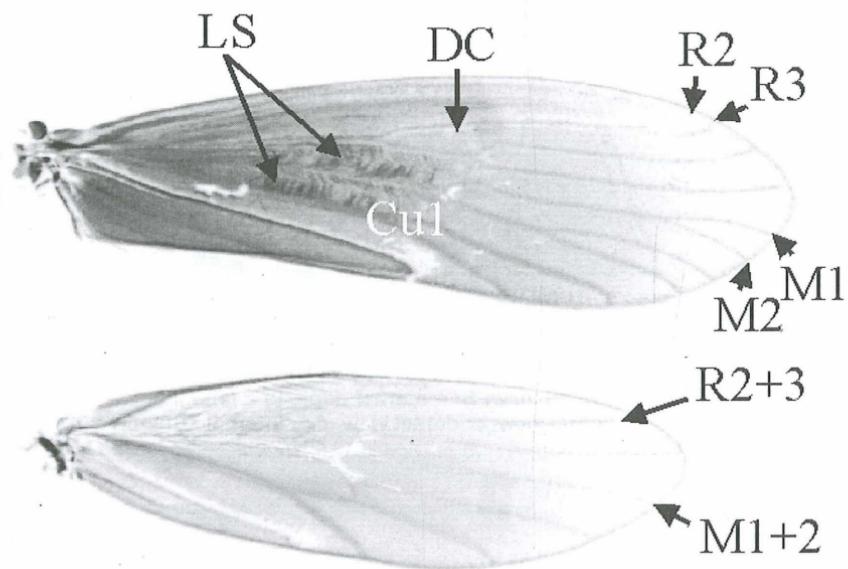
Tab. 1: Selected morphological characters of adult and larval Ptilocolepinae illustrating the intermediate status of this subfamily between Glossosomatidae and Hydroptilidae

Character	Pro Glossosomatidae	Pro Hydroptilidae
Wing venation well developed		+
Discoidal cell present		
Forewing: Cu1 forked		
Forewing: M3 and M4 separated		
Posterior mesothoracic katepisternal suture present		
Fifth abdominal segment with sternal ridge		
Spur formula 1-3-4 (as in <i>Stactobiella</i>)		
Postoccipital warts large, meeting medially		
Pronotal median warts close-set		
Larval case purse-shaped		
Hypermetamorphosis sensu NIELSEN (1948) present		+

Fig. 2. a: Head and thorax of a male of *P. granulatus*. Oc = lateral pair of ocelli situated close to the compound eyes, A = antennae, Pw = large, ovoid postoccipital warts meeting medially, M = mesonotum, Mw = median warts, K = katepisternal suture. **b:** Right fore and hind wing of a male of *P. granulatus*. DC = closed discoidal cell, LS = two rows of long setae bordering the median and thyridium cell; R2 and R3 and M1 and M2 are separated in the fore wing, fused in the hind wing; Cu1 is forked



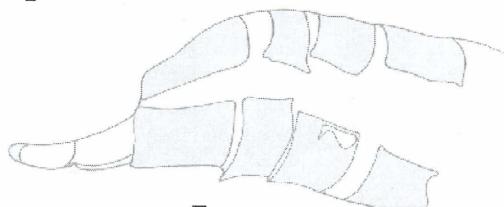
2a



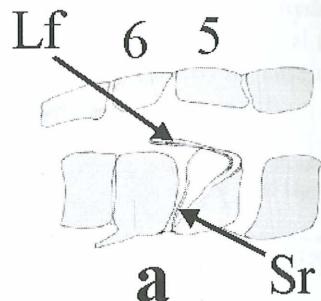
2b

Figure 3 follows after figure 4

4



b



a

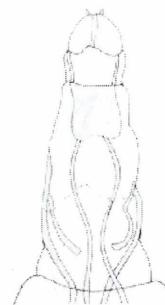
Sr



d



c



e

Fig. 4. a: Male abdomen, lateral view; Sr = sternal ridge, Lf = lateral filament. b-e: Details of oviscapts. b: right lateral view. c: dorsal view. d-e: internal structures in d: right lateral and e: dorsal view

3a

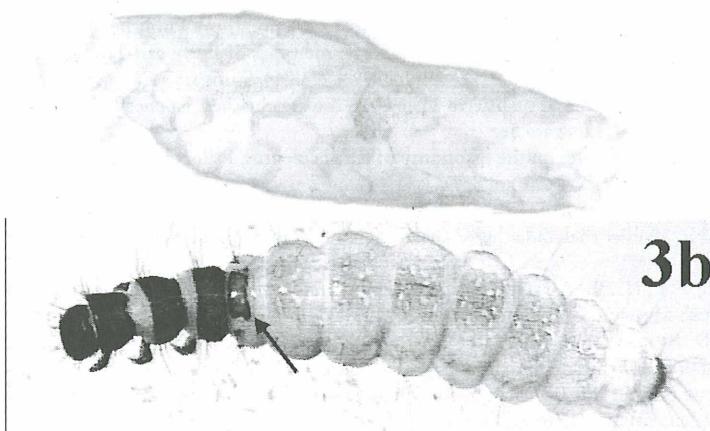


Fig. 3. a: Purse-type case of *P. granulatus* constructed of moss leaves. b: Final instar larva. Arrow: sclerotized first abdominal dorsum

Acknowledgement

We wish to thank Mr DI Michael Malicky (Linz) for providing information and the distribution map from the Zobodat zoogeographical database.

References

- BOTOSANEANU, L. & I. M. LEVANIDOVÁ (1987): The remarkable genus Palaeoagapetus Ulmer, 1912 (Hydroptilidae) pp: 43-46. In: TACHET, H. & M. BOURNARD (eds.): Proceedings of the 5th International Symposium on Trichoptera 1986: 43-46, Dordrecht
- CASPER, M., I. MÜLLER-LIEBENAU & W. WICHARD (1977): Köcherfliegen (Trichoptera) der Fließgewässer der Eifel. Gewässer und Abwässer 62/63: 111-120, Göttingen
- CIANFICCONI, F. (2000): The third list of Italian Trichoptera (1990-2000). - Presentation at the 10th International Symposium on Trichoptera, Potsdam
- DEPISCH, B. (1999): Hydrobiologische Untersuchungen des Radlbachsystems. Diploma Thesis, University of Agriculture, Vienna
- DITTMAR, H. (1955): Ein Sauerlandbach.- Archiv für Hydrobiologie 50: 305-552, Stuttgart
- FISCHER, J. (1996): Bewertungsverfahren zur Quellfauna.- Crunoecia 5: 227-240, Solingen
- GRAF, W., U. GRASSER & J. WARINGER (1995): Trichoptera.- In MOOG O. (ed.): Fauna Aquatica Austriaca, Lieferung Mai/95.- Wasserrirtschaftskataster, Bundesministerium für Land- und Forstwirtschaft, Wien
- ITO, T. & L. W. G. HIGLER (1993): Biological notes and description of little-known stages of *Ptilocolepus granulatus* (Pictet)(Trichoptera, Hydroptilidae).- Proceedings of the 7th International Symposium on Trichoptera 1992: 177-181, Umeå
- ITO, T. (1998): The biology of the primitive, distinctly crenophilic caddisflies, Ptilocolepinae (Trichoptera, Hydroptilidae). A Review.- In: BOTOSANEANU, L. (ed.): Studies in crenobiology, the biology of springs and springbrooks: 85-94, (Backhuys Publishers) Leiden

- JACQUEMART, S. & Y. COINEAU (1962): Missions S. Jaquemart dans la Pyrénées orientales (2e note). Les Trichoptères Hydroptilides des Albères.- Bulletin de l'Institut royal des Sciences naturelles Belge 38: 1-81, Bruxelles
- MALICKY, H. (1983a): Atlas of European Trichoptera. 298 pp., (Junk Publishers) The Hague
- MALICKY, H. (1983b): Chorological patterns and biome types of European Trichoptera and other freshwater insects.- Archiv für Hydrobiologie 96: 223-244, Stuttgart
- MALICKY, H. (1999): Eine aktualisierte Liste der österreichischen Köcherfliegen (Trichoptera).- Braueria 26: 31-40, Lunz am See
- MALICKY, H. (2001): Notes on the taxonomy of Rhadicoleptus, Ptilocolepus and Pseudoneureclisis.- Braueria 28: 19-20, Lunz am See
- MALICKY, H. & P. CHANTARAMONGKOL (1996): Neue Köcherfliegen aus Thailand (Trichoptera). Arbeit Nr. 19 über thailändische Köcherfliegen.- Entomologische Berichte Luzern 36: 119-128, Luzern
- MARSHALL, J. E. (1979): A review of the genera of the Hydroptilidae (Trichoptera).- Bulletin of the British Museum, Entomology series 39: 135-239, London
- MEY, W., D. BRAASCH, W. JOOST, R. JUNG & F. KLIMA (1979): Die bisher vom Gebiet der DDR bekannten Köcherfliegen (Trichoptera).- Entomologische Nachrichten 23: 81-89, Dresden
- NOVÁK, K. & S. OBR (1977): Trichoptera. - Acta faunistica entomologica Musei nationales Pragae 15, Supplementum 4: 135-141, Prague
- NIELSEN, A. (1948): Postembryonic development and biology of the Hydroptilidae.- Det kongelige Danske Videnskabernes Selskab, Biologiske Skrifter 5,1:1-200, Copenhagen
- ROBERT, B. (1996): Quelltypische Köcherfliegen (Insecta:Trichoptera) in Nordrhein-Westfalen (Deutschland) - Ein erster Überblick.- Crunoecia 5:125-127, Solingen
- ROBERT, B. (2001): Die Köcherfliegen-Fauna Deutschlands (Trichoptera). Ein kommentiertes Verzeichnis mit Verbreitungssangaben (7. Zusammenstellung seit 1988).- In: KLAUSNITZER, B. (ed.): Entomofauna Germanica 5.- Entomologische Nachrichten und Berichte, Beiheft 6: 107-151, Dresden
- SCHMID, F. (1990): Quelques nouveaux trichoptères indiens/Trichoptera).- Naturaliste Canadien 117: 239-251, Ottawa
- SCHMID, F. (1998): The Insects and Arachnids of Canada, Part 7. Genera of the Trichoptera of Canada and the Adjaacent United States: 1-319.- NRC Research Press, Ottawa
- SCHRANKEL, I., L. ETTELBRUCK & P. J. NEU (2002): Die Köcherfliegen-Fauna im Großherzogtum Luxemburg.- Lauterbornia 43: 45-62, Dinkelscherben
- STROOT, P. (1984): Les Trichoptères de Belgique et des regions limitrophes.- In: LECLERCQ, J., C. GASPAR & C. VERSTRAETEN (eds.): Atlas provisoire des Insectes de Belgique.- I.R.S.N.B., 75pp., Bruxelles
- THIENEMANN, A. (1904A): Ptilocolepus granulatus Pt., eine Übergangsform von den Rhyacophiliden zu den Hydroptiliden. I. Biologie.- Allgemeine Zeitschrift für Entomologie 9: 418-424, Neudamm
- THIENEMANN, A. (1904B): Ptilocolepus granulatus Pt., eine Übergangsform von den Rhyacophiliden zu den Hydroptiliden. III. Zur Stellung der Art im System.- Allgemeine Zeitschrift für Entomologie 9: 437-441, Neudamm
- TOBIAS, W. (1964): Ein Beitrag zur Trichopterenfauna des Fuldagebietes (Teil 1).- Entomologische Zeitschrift 74: 129-145, Essen
- TOBIAS, D. (1986): Köcherfliegen (Insecta: Trichoptera) des Landes Hessen, Bundesrepublik Deutschland.- Entomologische Zeitschrift 96: 49-64, Essen
- WIBERG-LARSEN, P., T. M. IVERSEN & J. THORUP (1991): First Danish record of Ptilocolepus granulatus (Pictet)(Trichoptera, Hydroptilidae).- Entomologiske Meddelelser 59: 45-50, Kopenhagen

WIGGINS, G. B. (1996): Larvae of the North American caddisfly genera (Trichoptera) 2nd edition.- 457 pp., (Toronto University Press) Toronto

Authors' addresses: Dr. Johann Waringer, Limnological Dept., Institute of Ecology and Conservation Biology, Althanstrasse 14, A-1090 Vienna, Austria.. Dr. Wolfram Graf, Dept. of Hydrobiology, University of Agriculture, Max-Emanuel-Strasse 17, A-1180-Vienna, Austria

Received: 2001-06-10

ZOBODAT - www.zobodat.at

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: [Lauterbornia](#)

Jahr/Year: 2001

Band/Volume: [2001_43](#)

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

Artikel/Article: [Ecology, morphology and distribution of Ptilocolepus granulatus \(Pictet 1834\) \(Insecta: Trichoptera\) in Austria. 121-129](#)