Zootaxa 3754 (2): 159–172
www.mapress.com/zootaxa/
Copyright © 2014 Magnolia Press

Article

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

http://dx.doi.org/10.11646/zootaxa.3754.2.5
http://zoobank.org/urn:lsid:zoobank.org:pub:4FCD8B04-C8CB-441C-93F1-8FD682A47972

Descriptions of immature stages of the weevil *Lixus punctiventris* Boheman, 1835 (Coleoptera, Curculionidae, Lixini)

RAFAŁ GOSIK[1] & MAREK WANAT[2,3]

[1]*Department of Zoology, Maria Curie-Skłodowska University, Akademicka 19, 20-033 Lublin, Poland*
[2]*Museum of Natural History, University of Wrocław, Sienkiewicza 21, 50-335 Wrocław, Poland*
[3]*Corresponding author. E-mail: wanatm@biol.uni.wroc.pl*

Abstract

Last instar larva of *Lixus punctiventris* Boheman is redescribed and illustrated, its pupa is described and illustrated for the first time. Biology of this species is analyzed in association with larval morphology and feeding habits. Overall larval and pupal morphological diagnoses of the genus *Lixus* and larval diagnosis of the tribe Lixini are updated.

Key words: weevils, Lixini, *Lixus*, taxonomy, morphology, chaetotaxy, larva, pupa, bionomics

Introduction

The knowledge of the morphology of mature larvae of the genus *Lixus* is based primarily on the recent studies by Nikulina (2001, 2007) and Nikulina & Gültekin (2011), as well as on some older works of Ter-Minassian (1936, 1943), Scherf (1964) and Lee & Morimoto (1988). Scherf (1964) listed the descriptions of larvae of 14 *Lixus* species, but only 4 of them are at least partially illustrated and can be regarded as detailed. Moreover the pupae have been described (more or less) precisely for only 3 species (Scherf 1964). Most of the hitherto described preimaginal stages are of the species distributed in the Far East or in Central Asia: 9 species (Nikulina 2001) and then 3 more species (Nikulina 2007), while those of the west Palaearctic species are still insufficiently known.

Lixus punctiventris Boheman (beetle on figures 1, 4) was for a long time an almost unknown weevil in Poland, with only several mostly old records from southern subregions of the country, and only one discovery after WWII (Burakowski *et al.* 1993; Stachowiak 1999). In 2011 one of us published results of field studies initiated after discovery of this species in 2005 in the Przedborski Landscape Park, and soon after in the neighbouring Świętokrzyskie Mts (Wanat 2011). The weevil appeared relatively common in both studied areas, which was realized after examination of its primary host plants, i.e. *Crepis biennis* L. and *Picris hieracioides* L. The former plant especially revealed approximately 100% presence of the larvae of *L. punctiventris* in every controlled site. In contrast, adult beetles were invariably found only sporadically using standard collecting methods and even by watching the proper plants specifically. Attempts at sweeping fields of the host plants by night did not bring much better results. The beetles turned out to be dedicated epigeic ground-dwellers, generally avoiding climbing vegetation, even their proper host plants.

While the former contribution by Wanat (2011) was focused on general biology and host preferences of *L. punctiventris* in Poland, in the present study we provide detailed morphological descriptions of mature larva and pupa. Although a larval description of this species can be found in Scherf (1964), we find it insufficient and lacking in a number of characters relevant in Lixini, particularly as regards chaetotaxy.

Material and methods

Material examined. POLAND: Chęciny, lat/long 50.8127N/20.4573E, 09.07.2007, pupae (1♂ 2♀♀), larvae (4 mature spec., 1 younger larval instar), leg. M. Wanat. All specimens deposited at collections of Department of Zoology of Maria Curie-Skłodowska University in Lublin.

Accepted by R. Anderson: 25 Dec. 2013; published: 14 Jan. 2014

After compilation of Scherf's (1964) verified descriptions, primarily of *L. paraplecticus*, and our present examination of the pupa of *L. punctiventris*, the following combination of pupal characters can be proposed, as diagnostic for the genus *Lixus*: 1) body slender, elongate, 2) setae on head, rostrum and pronotum placed on small protuberances; 3) thoracic segments II and III each with 6 dorsal setae (*d*); 4) AbI–VIII each with 5 pairs of ventral setae (*v*), 2 pairs of lateral setae and 6–9 pairs of dorsal setae; 5) some dorsal setae on AbIII–VIII replaced with thorn-like cuticular protuberances; 6) rostrum with 1–3 pairs of rostral setae (*rs*), and 3–5 pairs of postantennal setae (*pas*); 7) head with 1–2 pairs of orbital setae (*os*), 2–3 pairs of super-orbital setae (*sos*), and 1–2 pairs of vertical setae (*vs*); 8) pronotum with 1–2 pairs of apical setae (*as*), 2–5 pairs of lateral setae (*ls*), 1–3 pairs of discal setae (*ds*), 2 pairs of superlateral setae (*sls*), and 2 pairs of posterolateral setae (*pls*); 9) each femoral apex with 2 setae; 10) pseudocerci very short, triangular, well sclerotized.

Regarding chaetotaxy, analogies between pupae of weevil genera *Lixus* and *Larinus* are observed only in the number of dorsal setae on meso-, metathorax (6 pairs of setae) and AbI–VIII (9 pairs of setae). On the other body parts the number of setae is different in both genera. Moreover, the setae of AbVIII are placed on elongated protuberances in *Larinus* pupae, while it has not been observed in studied *Lixus* pupae. Also the shape of pseudocerci is different in both genera: narrow in *Larinus*, short and triangular in *Lixus*. However, the very poor knowledge on pupae of Lixini does not allow us to generalize the differences listed above and this diagnosis must be considered as provisional and requiring confirmation based on a larger species number. Number and shape of setae make possible not only recognition of species or genera e.g.: *Otiorhynchus* (Gosik & Sprick 2012); *Lixus* (Nikulina 2001, 2007); *Bagous* (Gosik 2013); *Thryogenes* (Gosik 2011); *Hypera* and *Donus* (Skuhrovec 2004, 2006, 2007); *Ceutorhynchus* (Nikulina 2008); *Mogulones* (Gosik 2010). Moreover, studies based on comparisons of chaetotaxy of the larvae provide knowledge of phylogeny of some groups e.g. *Bagous* (Gosik 2013) and *Tychius* (Skuhrovec *et al.* in press). Of course, value of those studies increases proportionately to the number of species for which good descriptions are available.

References

Bodenheimer, F.S. (1928) Ist *Lixus algirus* L. ein Schädling. *Zeitschrift für Angewandte Zoologie*, 13, 477–482. http://dx.doi.org/10.1111/j.1439-0418.1928.tb00052.x

Brémond, P. (1938) Recherches sur la biologie de *Lixus junci*. *Revue de Pathologie Végétale et d'Entomologie Agricole de France*, 25, 59–73.

Burakowski, B., Mroczkowski, M. & Stefańska J. (1993) Chrząszcze (Coleoptera), Ryjkowce-Curculionidae, część 1. *Katalog Fauny Polski XXIII*, 19, 1–306.

Falcoz, L. (1926) Matériaux pour l'étude des Larves des Curculionides. *Annales des Épiphyties*, 12, 195–281.

Gosik, R. (2010) Description of the mature larvae of four species of the genus *Mogulones* (Coleoptera, Curculionidae). *Deutsche Entomologische Zeitschrift*, 57, 203–218. http://dx.doi.org/10.1002/mmnd.201000017

Gosik, R. (2011) Morphology of the developmental stages of *Thryogenes festucae* (Herbst, 1795) with comments on its biology, *Polish. Entomologica Journal*, 80, 475–484. http://dx.doi.org/10.2478/v10200-011-0035-y

Gosik, R. (2013) *Morphology of larval and pupal stages of selected species of Bagoinae THOMSON, 1895 with comments on their biology and taxonomy.* Wydawnictwo UMCS, Lublin, 127 pp.

Gosik, R. & Skuhrovec, J. (2011) Descriptions of mature larvae and pupae of the genus *Larinus* (Coleoptera: Curculionidae, Lixinae). *Zootaxa,* 3019, 1–25.

Gosik, R. & Sprick, P. (2012) Morphology and identification of the pupae of seven species of the genus *Otiorhynchus* Germar, 1822 (Coleoptera, Curculionidae, Otiorhynchini). *Zootaxa*, 3483, 39–57.

Lee, C.Y. & Morimoto, K. (1988) Larvae of the family curculionidae of Japan. Part 2. Hyperinae to Cioninae (Insecta: Coleoptera). *Journal of the Faculty of Agriculture, Kyushu University*, 33 (1–2), 131–152.

Marvaldi, A.E. (1997) Higher Level Phylogeny of Curculionidae (Coleoptera: Curculionoidea) based mainly on Larval Characters, with Special Reference to Broad -Nosed Weevils. *Cladistics*, 13, 285–312. http://dx.doi.org/10.1111/j.1096-0031.1997.tb00321.x

Marvaldi, A.E. (1998) Larvae of Entiminae (Coleoptera: Curculionidae): Tribal diagnoses and phylogenetic key, with a proposal about natural groups within Entimini. *Entomologica Scandinavica*, 29, 89–98. http://dx.doi.org/10.1163/187631298x00212

Marvaldi, A.E. (2003) Key to larvae of the South American subfamilies of weevils (Coleoptera, Curculionoidea). *Revista Chilena de Historia Natural,* 76, 603–612. http://dx.doi.org/10.4067/s0716-078x2003000400005

May, B.M. (1993) Larvae of Curculionoidea (Insecta: Coleoptera): A systematic overview. *Fauna of New Zealand*, 28, 1–221.
May, B.M. (1994) An introduction to the immature stages of Australian Curculionoidea. *In:* Zimmerman E.C. (Ed.), *Australian weevils. Vol. II. Brentidae, Eurhynchidae, Apionidae* and *a chapter on immature stages by Brenda May*. CSIRO, Melbourne, 755 pp.
Mellini, E. (1950) Insetti del *Carduus nutans* L. I. *Lixus elongatus* Goeze. *Bolletino dell' Instituto di Entomologia della R. Università degli Studi di Bologna*, 18, 272–292.
Nikulina, O.N. & Gültekin, L. (2011) Larval morphology of *Lixus cardui* Olivier and *Lixus filiformis* (Fabricius) (Coleoptera: Curculionidae): biological control agents for scotch and musk thistles. *Australian Journal of Entomology,* 50, 253–257.
Nikulina, O.N. (2001) Larval morphology of the weevil genus *Lixus* (Coleoptera, Curculionidae) from Middle Asia. *Entomological Review*, 81, 809–823. [Original text published in Russian in *Zoologicheskiy Zhurnal,* 80 (10), 183–195.]
Nikulina, O.N. (2007) New data on larvae of weevils of the genus *Lixus* (Coleoptera, Curculionidae) from Central Asia. *Entomological Review*, 87, 750–756. [Original text published in Russian in *Zoologicheskiy Zhurnal*, 86 (9), 1086–1092.] http://dx.doi.org/10.1134/s0013873807060103
Nikulina, O.N. (2008) Larval morphology of the weevil genus *Ceutorhynchus* (Coleoptera: Curculionidae) from Middle Asia. *Entomological Review,* 88, 867–873. [Original text published in Russian in *Zoologicheskiy Zhurnal*, 87 (10), 1274–1280.] http://dx.doi.org/10.1134/s0013873808070117
Nikulina, O.N., Guc, S. & Gültekin L. (2004) Larval morphology of the capitulum weevil, *Larinus latus* (Herbst) (Coleoptera, Curculionidae). *New Zealand Journal of Zoology,* 31, 23–26. http://dx.doi.org/10.1080/03014223.2004.9518355
Scherf, H. (1964) Die Entwicklungstadien der Mitteleuropäischen Curculioniden (Morphologie, Bionomie, Ökologie). *Abhadlungen der Senckenbergischen Naturforschenden Gesellschaft*, 506, 1–335.
Skuhrovec, J. (2004) Descriptions of the larvae of the tribe Hyperini (Coleoptera: Curculionidae): I. Mature larvae of the nominotypical subgenus Hypera. *Acta Societatis Zoologicae Bohemicae*, 68, 245–280.
Skuhrovec, J. (2006) Identification of instars of *Hypera postica* by using chaetotaxy. *Journal of Economic Entomology*, 99, 2216–2218. http://dx.doi.org/10.1603/0022-0493-99.6.2216
Skuhrovec, J. (2007) Descriptions of larvae of the tribe Hyperini (Coleoptera: Curculionidae): III. Mature larvae of the genus *Donus* Jekel, 1865. *Zootaxa*, 1606, 1–28.
Skuhrovec, J., Gosik, R. & Caldara, R. (in press) Immatures of Palaearctic species of the weevil genus *Tychius* (Coleoptera, Curculionidae): new descriptions and new bionomic data with an evaluation of their potentiality in a phylogenetic reconstruction of the genus. *Zootaxa*.
Ter-Minassian, M.E. (1936) Description of larvae of two Curculionid beetles living on *Carduus uncinatus* MB. *Proceedings of the Zoological Institute of the Academy of Science of the USSR*, 4, 173–178. [in Russian]
Ter-Minassian, M.E. (1943) On the larvae of weevils of the genus *Lixus* F. (Coleoptera, Curculionidae). *Izvestiya Armyanskogo Filiala Akaemii. Nauk SSSR*, 1, 93–99. [in Russian]
Wanat, M. (2011) Biology and distribution of *Lixus punctiventris* Boheman, 1835 (Coleoptera, Curculionidae) in Poland. *Weevil News*, 64, 1–5.