

The adventive genus *Xantholinus* Dejean (Coleoptera, Staphylinidae, Staphylininae) in North America: new records and a synthesis of distributional data

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Academic editor: Volker Assing | Received 25 August 2010 | Accepted 8 October 2010 | Published 29 October 2010

Citation: Brunke AJ, Majka CG (2010) The adventive genus *Xantholinus* Dejean (Coleoptera, Staphylinidae, Staphylininae) in North America: new records and a synthesis of distributional data. *ZooKeys* 65: 51–61. doi: 10.3897/zookeys.65.574

Abstract

New distributional and bionomic data are provided for species of the genus *Xantholinus* in North America. *Xantholinus elegans* (Olivier, 1795) (= *X. jarrigei* Coiffait, 1956) is recorded from North America for the first time, based on specimens collected in Ontario, Canada from 2007–2010. The armature of the internal sac of the aedeagus *in situ* is illustrated to aid in identification. *Xantholinus linearis* (Olivier, 1795), known previously from the Maritime Provinces of Canada and the eastern United States, is newly recorded from Ontario. *Xantholinus longiventris* Heer, 1839 is still only known from western North America. A key is provided to allow recognition of all three species.

Keywords

exotic, Coleoptera, *Xantholinus elegans*, Xantholinini

Introduction

The genus *Xantholinus* Dejean (Staphylininae: Xantholinini) is a diverse, mainly Palearctic group and contains several species that prefer open, disturbed areas, where they often dominate the staphylinid assemblage (Daccordi and Zanett 1989; Balog and Marko 2007). These habits have likely facilitated the accidental importation and

subsequent establishment of *Xantholinus* species into North America. Smetana (1982) reported *X. linearis* (Olivier, 1795) from both eastern and western portions of the North America and *X. longiventris* (Olivier, 1795) only from western regions. Since then, several publications have presented either new provincial and state records, or additional locality data for these two species (Smetana 1988, 1990; Majka and Klimaszewski 2008a; Majka et al. 2008).

Recent collections and surveys in Ontario have resulted in the recognition of one additional species in North America and a range extension for *X. linearis*. We here summarize all available data for *Xantholinus* species in North America, present distributional maps, and provide a key for identification of the species known from the continent.

Material and methods

The aedeagus of *X. elegans* (Olivier, 1795) was prepared for examination as in Smetana (1982) and photographed using an imaging system by Visionary Digital. The specimen photograph of *X. elegans* was taken with the same system. Maps were created using ARC-GIS and Adobe Photoshop software. The institutions (and their abbreviations) from which material was examined are as follows:

- ACPE** Agriculture and Agri-Food Canada, Prince Edward Island, Canada (Christine Noronha)
- CBU** Cape Breton University, Sydney, Nova Scotia, Canada (David. B. McCorquodale)
- CGMC** Christopher G. Majka Collection, Halifax, Nova Scotia, Canada (Christopher G. Majka)
- DEBU** University of Guelph, Guelph, Ontario (Stephen Marshall)
- DENH** University of New Hampshire, Durham, New Hampshire, USA (Donald Chandler)
- DHWC** David H. Webster Collection, Kentville, Nova Scotia, Canada (David. H. Webster)
- NBM** New Brunswick Museum, Saint John, New Brunswick, Canada (Donald McAlpine)
- NSMC** Nova Scotia Museum, Halifax, Nova Scotia, Canada (Christopher G. Majka)
- NSNR** Nova Scotia Department of Natural Resources, Shubenacadie, Nova Scotia, Canada (Jeffrey Ogden)
- SMU** Saint Mary's University, Halifax, Nova Scotia, Canada (Doug Stongman)
- UMNB** Université de Moncton, Moncton, New Brunswick, Canada (Pauline Durr)

Results

Xantholinus elegans (Olivier, 1795)

Staphylinus elegans Olivier 1795:19; as *Xantholinus elegans*: Smetana in Löbl and Smetana 2004.

Materials. All specimens studied are deposited in DEBU

CANADA: ONTARIO: *Peterborough County*: 5 Km SW of Marmora, under fresh horse dung, 31-VII-2010, A. Brunke (1). *Waterloo Region*: Blair, Rare Charitable Research Reserve, near Whistlebare Rd., soybean field, pitfall trap, 27-VII-2010, A. Brunke (1); *Wellington County*: Arkell, Arkell Research Station, under loose sod beside canola field, 20-VII-2007, A. Brunke (1); Eramosa, Eramosa Rd. and Wellington Rd. 29, soil in agricultural field, corn in previous year, 8-VI-2010, A. Brunke (1); Eramosa, Eramosa Rd. and Wellington Rd. 29, soybean field, pitfall trap, 13-VII-2010, A. Brunke (1); Eramosa, Eramosa Rd. and Wellington Rd. 29, soybean field, pitfall trap, 10-VIII-2010, A. Brunke (1); Guelph, Gordon St. and Wellington Ave, on sidewalk near dry field, 23-VIII-2008, A. Brunke and D.K.B. Cheung (1); Guelph, Arboretum, woods edge in leaf litter, 11-IX-2008, M. Bergeron, S. Paeiro and D.K.B. Cheung, (1); Guelph. University of Guelph campus, under rocks, 22-VII-2009, C. Ho and S.P.L. Luk, (2); Guelph, Victoria Rd. and Conservation Line, soybean field, pitfall trap, 4-VIII-2009, A. Brunke, (1). Guelph, Stone Rd., heavily disturbed forest edge under rock, coll. as larva 10-IV-2010, emerged 15-V-2010, A. Brunke (1).

Xantholinus elegans is newly recorded from North America based on the above specimens collected near Guelph and near Marmora, Ontario, Canada (Fig. 1). Dissected specimens key out to *X. jarrigei* Coiffait in Coiffait (1972), a species synonymized with *X. elegans* (Olivier) by Drugmand (1994). The aedeagus is illustrated in Fig. 2 and those of the other two species were illustrated by Smetana (1982). Most specimens were found in strongly disturbed areas and all individuals were brachypterous. One larva was found under a rock at the edge of a disturbed woodlot in April 10, 2010 and was subsequently reared to an adult on May 15th. The larva was provided with soil from the collection site which included oribatid mites and early-instar *Oniscus asellus*, although the larva was never observed to feed.

Xantholinus linearis (Olivier, 1795)

Staphylinus linearis Olivier 1795:19; as *Xantholinus linearis*: Smetana in Löbl and Smetana 2004.

Materials. CANADA: ONTARIO: *Huron County*: Auburn, 1km NE of Baseline Rd. and Londesboro Rd., wooded hedgerow, pitfall trap, 23-XI-2009, A. Brunke (1); Au-



Figure 1. Distribution of *Xantholinus elegans* in North America.

burn, Hullett-McKillop Rd. nr. Limekiln Rd., soybean field, pitfall trap, 4-VIII-2010, A. Brunke (1); Goderich, Sharpes Creek Line, wooded hedgerow, pitfall trap, 19-X-2009 (1), 16-XI-2009 (1), A. Brunke. *Waterloo Region*: Blair, Dickie Settlement Rd. nr. Whistlebear Golf Club, pitfall trap, soybean field, 15-XI-2009, A. Brunke (1); wooded hedgerow, 10-XI-2009, (1), 24-XI-2009 (15), A. Brunke; Blair: *rare* charitable research reserve, Fountain St. and Limerick Rd., pitfall trap, soybean field, 15-IX-2009, A. Brunke (1), wooded hedgerow, 27-X-2009 (2), 10-XI-2009 (6), 24-XI-2009 (14), A. Brunke; Blair, nr. Whistlebare Rd., soybean field, pitfall trap, 29-VI-2010 (2), 13-VII-2010 (6), 27-VII-2010 (2), A. Brunke; *Wellington County*: Eramosa, Eramosa Rd. and Wellington Rd. 29, agricultural hedgerow, pitfall trap, 18-V-2010, A. Brunke (1); Guelph, University of Guelph, debris under dead hawk, 27-VI-2008, A. Brunke (1), under patio stone, 2-IV-2009, S.P.L. Luk (1), leaf litter in woodlot, 2-IV-2009, A. Brunke (1), on brick wall, 9-XI-2009, S.P.L. Luk (1); Guelph, Victoria Rd. and Conservation Line, wooded hedgerow, pitfall trap, 20-X-2009 (2), 17-XI-2009 (2), A. Brunke.

Xantholinus linearis is newly recorded from Ontario based on numerous recent collections from the southern portion of the province. Specimens were collected mainly in agricultural or urban settings in open or forest edge habitat. The earliest Canadian records are from 1949 (in Nova Scotia and Newfoundland) and the earliest North



Figure 2. Aedeagus of *Xantholinus elegans*.

American ones are from 1930 (in Washington state) (Majka and Klimaszewski 2008a). The current distribution of *X. linearis* is summarized in Fig. 3.

***Xantholinus longiventris* Heer, 1839**

Xantholinus longiventris Heer 1839: 247; *Xantholinus longiventris*: Smetana in Löbl and Smetana 2004.

Distribution. The current distribution of *Xantholinus longiventris* is summarized in Fig 4.

Key to the *Xantholinus* species of North America

- 1 Body distinctly bicolored: head black, sharply contrasting with red-orange pronotum and elytra (Fig. 5, 6).....***Xantholinus elegans***
- 1' Body not distinctly bicolored: body entirely medium to very dark brown, with the elytra often slightly paler (Fig. 7).....**2**

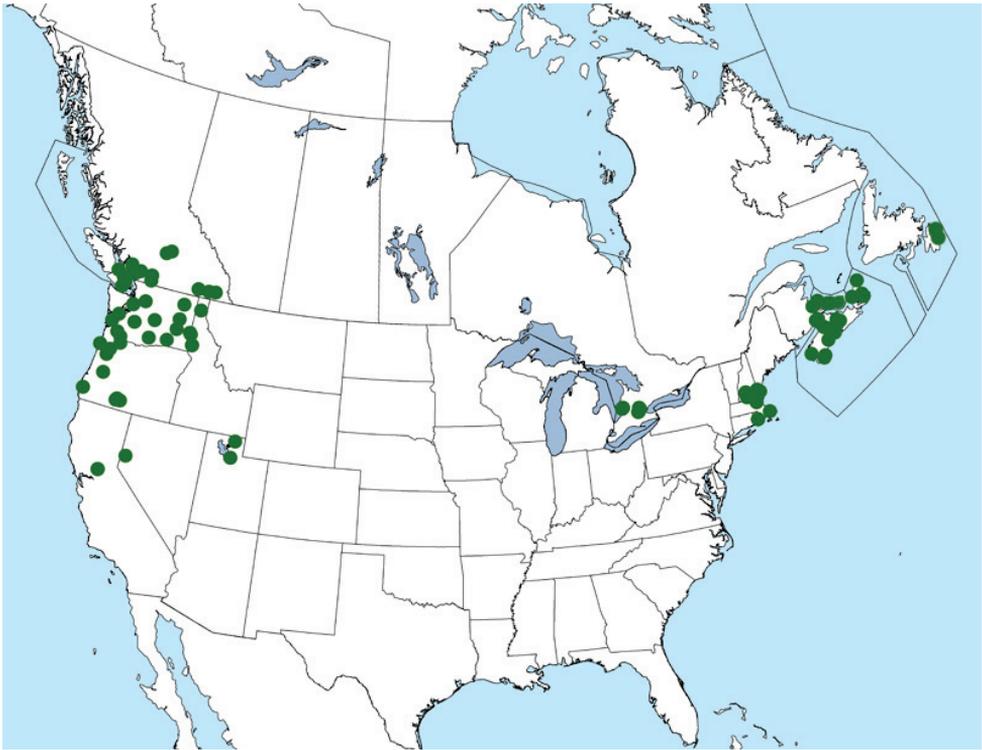


Figure 3. Distribution of *X. linearis* in North America. Distribution incorporates previous records from the literature (Smetana 1982, 1988, 1990; Sikes 2003, Majka and Klimaszewski 2008).

- 2 Pronotum with distinct microsculpture of transverse waves present on most of pronotum; occurring in eastern and western North America.... *X. linearis*
- 2' Pronotum with, at most, fragments of microsculpture on the anterior angles; known only from western North America..... *X. longiventris*

Discussion

Xantholinus elegans is certainly a recent accidental introduction to North America as it was not included in Smetana (1990), and the earliest specimen known is from 2007. In its native range, *X. elegans* is distributed widely in the western Palearctic region and recorded from Austria, Belgium, Bosnia Herzegovina, Czech Republic, France, Great Britain, Germany, Hungary, Ireland, Italy, Luxembourg, The Netherlands, Poland, Slovakia and Spain (Smetana in Löbl and Smetana 2004). In Europe, it prefers sandy soils and is a bivoltine species with most adults collected in spring and late summer (Dacordi and Zanetti 1989; Drugmand 1994). While most North American specimens were found on sandy soil, adults were collected throughout the summer and sparingly in spring and fall. Further collecting should help determine whether this is a collecting



Figure 4. Distribution of *X. longiventris* in North America. Distribution incorporates previous records from the literature (Smetana 1982, 1988).

artefact or a shift in seasonality in response to a different geographic area. The majority of specimens have been collected in disturbed habitats and it is unknown if this species will invade habitats with little to no recent human disturbance. It is unclear whether the easternmost record (Marmorata) (Fig. 1) represents an isolated population as a result of human-aided dispersal, or if it indicates an inadequately sampled, broader distribution in southern Ontario.

The method of introduction is unknown but may be related to the importation of plant stock or associated materials as *X. linearis* was intercepted twice in soil with primrose and moss shipments from Europe in the 1930's (Smetana 1982). Other predatory beetles are suspected to have become established via plant stock importation (Spence and Spence 1988). Although exotic staphylinids are typically considered to enter eastern North America via Atlantic Canadian introduction points in Nova Scotia, Newfoundland, and in Massachusetts – many associated with historic shipments of dry ballast material (Smetana 1995; Majka and Klimaszewski 2008b) – examination of recent material from the University of New Hampshire Insect Collection and numerous collections in Maritime Canada have not turned up specimens of this species. It appears that the North American occurrence of *X. elegans* represents an inland introduction, similar to that of the Emerald Ash Borer, which was first detected in



Figure 5. *In vivo* habitus of *Xantholinus elegans*, from Guelph, Ontario, Canada. Photo by D.K.B. Cheung.



Figure 6. Dorsal habitus of *Xantholinus elegans*.



Figure 7. *In vivo* habitus of *Xantholinus linearis*, from Guelph, Ontario, Canada. Photo by Stephen Marshall.

Michigan/southern Ontario in 2002 (Poland et al. 2006). Although *X. elegans* is a brachypterous species (Assing 1993; Drugmand 1994) and is unable to disperse aeri-ally, other beetles introduced to North America were found to disperse readily, despite their brachyptery (Spence and Spence 1988). The availability of suitable, open habitat in eastern North America may provide for the expansion of its range to include regions other than Ontario.

Xantholinus linearis was considered to be well-established in both eastern and western North America by Smetana (1982, 1988, 1990) and data presented in this paper demonstrate that it is continuing to expand its range towards the centre of the continent. This species was previously known from British Columbia, Nova Scotia, New Brunswick, Newfoundland and Prince Edward Island in Canada, and California, Idaho, Massachusetts, New Hampshire, Nevada, Oregon, Rhode Island, Utah, and Washington in the United States (Smetana 1982; Smetana 1990; Chandler 2001; Sikes 2003; Majka and Klimaszewski 2008a; Klimaszewski et al. 2010). While it has been known from Atlantic Canada since 1949, it appears to have only recently reached Ontario, as it is missing from collections made prior to 2008. Specimens from Pennsylvania and New York were clearly stated as 'interceptions' by Smetana (1982) and should not be considered as evidence that this species occurs there. Interestingly, recent surveys of open field habitat in both these states have not detected *X. linearis* (Byers et al., 2000). Further survey work is needed to fully delimit the eastern range of this species.

Xanthlinus longiventris is still known only from the western United States (California, Oregon, Washington) and has not been reported from additional states or any provinces since it was treated in Smetana (1982). In North America, habitat data from specimens suggests that *X. longiventris*, while it often co-occurs with *X. linearis*, prefers a higher level of moisture (in moss, near water etc.) as it has not been collected from drier urbanized places where the latter species is often found. This species' range in North America is probably confined by the Rocky Mountain system and will likely remain stable in the absence of secondary introductions.

Three species of *Xantholinus* are now known to have established themselves in North America via human activity. Of these, at least *X. linearis* is apparently continuing to expand its distribution towards the centre of the continent and may be detected in additional provinces and states in the future. This paper provides a current synthesis of distributional information and facilitates the identification of a previously unrecognized species for the North American fauna. A complete review and identification manual for the entire Xantholinini in eastern North America is currently in preparation.

Acknowledgements

A. Brunke would like to thank Stephen Marshall and D.K.B Cheung for use of their live photos. Many thanks to the Nature Conservancy of Canada and *rare* Charitable

Research Reserve for permission to conduct surveys on their properties. This research was partially supported by a NSERC PGS-M awarded to A. Brunke. C.G. Majka acknowledges the ongoing support of the Board of Governors of the Nova Scotia Museum. David Langor graciously provided the locality data for the Newfoundland specimens of *X. linearis*. Stephen Marshall read an earlier version of this manuscript and provided helpful comments and suggestions.

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