Euvira micmac, a new species (Coleoptera: Staphylinidae: Aleocharinae), and first record of the genus in Canada

Jan Klimaszewski[1]

Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre, 1055 du PEPS, P.O. Box 10380, Stn. Sainte-Foy, Québec, Quebec, Canada G1V 4C7

Christopher G. Majka

Nova Scotia Museum of Natural History, 1747 Summer Street, Halifax, Nova Scotia, Canada B3H 3A6

Abstract—A new aleocharine species, *Euvira micmac* Klimaszewski and Majka, **sp. nov.**, from Nova Scotia, Canada, is described and illustrated. This is the first record of the genus *Euvira* for Canada. New data on bionomics and distribution are provided, including notes on the red oak gall environment where the species was found. A short diagnosis, description, colour habitus image, and black and white genital images are provided. The lectotype (male) and the paralectotypes (5 females) are designated for *E. quadriceps* (Casey). Two beetles, *Litargus tetraspilotus* LeConte (Mycetophagidae) and *Melanophthalma americana* (Mannerheim) (Latridiidae), found co-inhabiting red oak galls are newly recorded for Atlantic Canada.

Résumé—Une nouvelle espèce d'Aléocharinés, *Euvira micmac* Klimaszewski et Majka, **sp. nov.**, de la Nouvelle-Écosse, Canada, est décrite et illustrée. C'est la première mention du genre *Euvira* pour le Canada. De nouvelles données sur la biologie et la distribution de cette espèce sont fournies, incluant des notes sur l'environnement de la galle du chêne rouge où l'espèce a été récoltée. Une courte diagnose, une description, une photographie de l'habitus de l'espèce et des organes génitaux sont fournies. Le lectotype (male) et les paralectotypes (5 femelles) sont désignés pour *E. quadriceps* (Casey). Deux coléoptères, *Litargus tetraspilotus* LeConte (Mycétophagidés) et *Melanophthalma americana* (Mannerheim) (Latridiidés), récoltés dans les galles du chêne rouge, sont nouvellement mentionnés pour les provinces de l'Atlantique.

Introduction

Euvira Sharp (1883) is primarily a Neotropical group, with 19 described species occurring mainly from Mexico and the West Indies to Argentina (Ashe and Kistner 1989). The genus is represented in America north of Mexico by *Euvira quadriceps* (Casey) (Fig. 11), recorded from Mississippi (Casey 1911; Seevers 1978, genital illustrations; Ashe 2001, habitus illustration), and by a new species, *Euvira micmac* **sp. nov.**, described in this paper (Figs. 1–10). Seevers (1978) recorded an unidentified species of *Euvira* from Illinois and Ashe (2001) reported one species, as probably undescribed, from Michigan, Kansas, North Carolina, Ohio, and Florida. We were able to examine the specimens from Ohio (1 female) and Michigan (5 females) housed in The University of Kansas Natural History Museum, Lawrence, Kansas, and they proved to be conspecific with *E. micmac* from Nova Scotia. The occurrence of this genus and species in eastern Canada is surprising, and it adds to a rapidly expanding list of new aleocharine species in the Atlantic Canadian fauna. The taxonomic position of *Euvira* is not clear. Sharp (1883) assigned this genus to the former tribe Bolitocharini (presently Homalotini Heer) on the basis of 4–4–5-segmented tarsi, with a possible close affiliation with the genera *Autalia* Mannerheim and *Eudera* Fauvel. This relationship was considered questionable by Seevers (1978), who placed the genus in an isolated genus group, Euvirae. Ashe (in Ashe and Kistner 1989)

Received 21 November 2005. Accepted 6 November 2006.

[1]Corresponding author (e-mail: jklimasz@nrcan.gc.ca).

showed that *Euvira* shares only a tarsal formula with members of the tribe Homalotini and differs from them particularly in the structures of the mouthparts. He found that the highly derived adult mouthpart structures of *Euvira* adults and larvae are remarkably similar to those of adults of *Placusa* Erichson, and he suspected closer relationships between these two genera that accordingly deserve an isolated taxonomic position outside Homalotini. Our observation of the general form and structure of the median lobe of the aedeagus, broad and strongly developed flagellum about as long as the median lobe, general shape of the median lobe, internal sac with basal and apical lamelliform structures, and form of the spermatheca (large spherical capsule and short and reduced stem) would rather imply close affiliation to *Leptusa* Kraatz of the tribe Homalotini (for morphology of genital structures of *Leptusa*, see Pace (1989) and Klimaszewski *et al.* (2004)). It is very unlikely that the similarities between genital features of *Euvira* and *Leptusa* represent convergent evolution. On the other hand, the genital features of *Euvira* and *Placusa* are fundamentally different. We suspect that the similarity in mouthparts between *Euvira* and *Placusa* is due to convergent evolution and therefore we recommend that the genus *Euvira* be retained in the tribe Homalotini and the subtribe Leptusina Fenyes.

The natural history of adults and larvae of *Euvira* is noteworthy. Ashe and Kistner (1989) described a new species from Mexico, *Euvira diazbatresae* Ashe and Kistner, including adults and larvae, found in the nest of the communal pierid butterfly *Eucheira socialis* Westwood. The Canadian specimens of *Euvira* were found exclusively in oak forests, specifically inside red oak galls, indicating different host associations of different *Euvira* species.

Casey (1911) described *Crimalia quadriceps* (= *Euvira quadriceps*) based on several specimens but he did not designate any of the original specimens as the holotype; therefore, all his original specimens are considered syntypes. We examined six of his original specimens and designated the male from Casey's original series as the holotype (Mississippi; quadriceps-6, Paratype USNM 39596; Casey bequest 1925; SEMC) and the 5 remaining females as the paralectotypes (Mississippi, *Crimalia quadriceps* Csy., Type USNM 39596, Casey bequest 1925; same labels except quadriceps 2-5).

Material examined

Six adults of *Euvira* were found inside galls on red oak, *Quercus rubra* L. (Fagaceae), in August and four adults were found in a window trap hanging in an oak tree in June in Nova Scotia, Canada. All specimens were dissected. The genital structures were dehydrated in absolute alcohol, mounted in Canada balsam on celluloid microslides, and pinned with the specimens from which they originated. The photographs of the genital structures were taken using an image processing system (Nikon SMZ1500 stereoscopic microscope; Nikon DXM 1200F digital camera; Nikon View 5 (COOLPIX) software, Version 5.1.2; and Adobe Photoshop software). The images of entire beetles (Figs. 1, 2) were generated using an image processing system consisting of a Wild M420 stereoscopic microscope (Leica), SPOT RT™ slider camera (Diagnostic Instruments, Inc.), computer, and Adobe Photoshop software.

Terminology mainly follows that used by Ashe and Kistner (1989) and Seevers (1978). The ventral part of the median lobe of the aedeagus is considered to be that with the foramen mediale of the bulbus with ductus ejaculatorius and the opposite side is considered the dorsal part.

Institutional abbreviations

LFC	Nova Scotia Museum Collection, Halifax, Nova Scotia, Canada
NSMC	R. Martineau Insectarium, Natural Resources Canada, Canadian Forest Service, Laurentian Forestry Centre, Sainte-Foy, Quebec, Canada
SEMC	Snow Entomological Museum, University of Kansas, Lawrence, Kansas, United States of America

Tribe Homalotini Heer

Subtribe Leptusina Fenyes

Euvira Sharp, 1883

(Figs. 1, 2)

Euvira Sharp, 1883: 278; Casey 1911: 206 (as *Crimalia*, gen. nov.); Blackwelder 1952: 162; Ashe and Kistner 1989: 86.

Type species: *Euvira nigra* Sharp, fixed by Fenyes 1918: 22, by subsequent designation.

Diagnosis

This genus may be distinguished by the following combination of characters: tarsi 4–4–5-segmented, body small, length 1.4–3.5 mm, head angular posteriorly with a distinct and narrow neck, postocular carina absent; antennal segments 5–10 strongly transverse; mandibles with obliquely transverse rows of teeth on the dorsal molar region; ligula broadly rounded; mesocoxae narrowly separated, tergites VII–VIII granulose (for detailed description of adults and larvae, see Ashe and Kistner 1989).

Euvira micmac Klimaszewski and Majka, sp. nov.

(Figs. 1–10)

Holotype (male): Canada, Nova Scotia, Queens Co., Little Ponhook L., 1.viii.1993, inside red oak gall on red oak, B. Wright (NSMC). **Paratypes:** Canada: Nova Scotia, Queens Co., Little Ponhook L., 1.viii.1993, inside red oak gall on red oak, B. Wright (LFC, NSMC) 4 females; Nova Scotia, Lunenburg Co., Bridgewater, 30.vi.1965, window trap in oak tree, B. Wright (LFC, NSMC) 4 females. United States: Ohio, Hollow St. Forest, 14.v.1983, R.S. Miller (SEMC) 1 female; Michigan, Allegan Co., Allegan S.G.A. T2N R14W sec. 19, 5.vii.1996, *Quercus nigra*, Leschen and Wilterding (SEMC) 2 females; Michigan, Eaton Co., R5W T1N, sec. 31 se 1/4, Olivet Coll. Biol. Res., 16.vii.1996, oak forest adj. meadow, UV light, R.A.B. Leschen (SEMC) 2 females; Ohio, Jackson Co., 2 mi NE of Parma, T2S R2W, sec. 22, wet meadow, hawthorn thicket, 15.vii.1996, UV, J.E. Zablotny (SEMC) 1 female.

Etymology

Named in honour of the Micmac First Nations and their long association with the natural environment of Nova Scotia, where this species is found. Little Ponhook Lake, where the holotype of *E. micmac* was collected, is adjacent to the Wildcat Reserve of the Acadia First Nation of the Micmac people. The word Micmac is variously thought to mean "people of the red earth" or "our kin friends". The name is also spelled Mi'kmaw (singular) or Mi'kmaq (plural); however, the spelling "Micmac" was selected because apostrophes are not employed in scientific nomenclature. "Ponhook" is a Micmac word meaning "the first lake in a chain".

Fig. 1. *Euvira micmac* in dorsal view (length 2.0 mm).

Diagnosis

This species may be distinguished from *E. quadriceps*, the only other known *Euvira* species from America north of Mexico, by the following features: body length 2.0–2.2 mm (*E. quadriceps* length 1.0–1.3 mm), uniformly black except for appendages (body light brown in *E. quadriceps*); apical part of tubus thin and evenly narrowly elongate in lateral view (Fig. 3) (sinuate and tapering apically in *E. quadriceps*, Fig. 20H in Seevers 1978), median part of tubus with large hump in lateral view (Fig. 3) (absent in *E. quadriceps*, Fig. 11); internal sac with differently formed structures

Fig. 2. *Euvira micmac* in lateral view, legs removed (length 2.0 mm).

(Figs. 3, 4; *E. quadriceps*, Fig. 11). It differs from the remaining species of *Euvira* by the genital features (for genital features of some Mexican species, see Ashe and Kistner 1989).

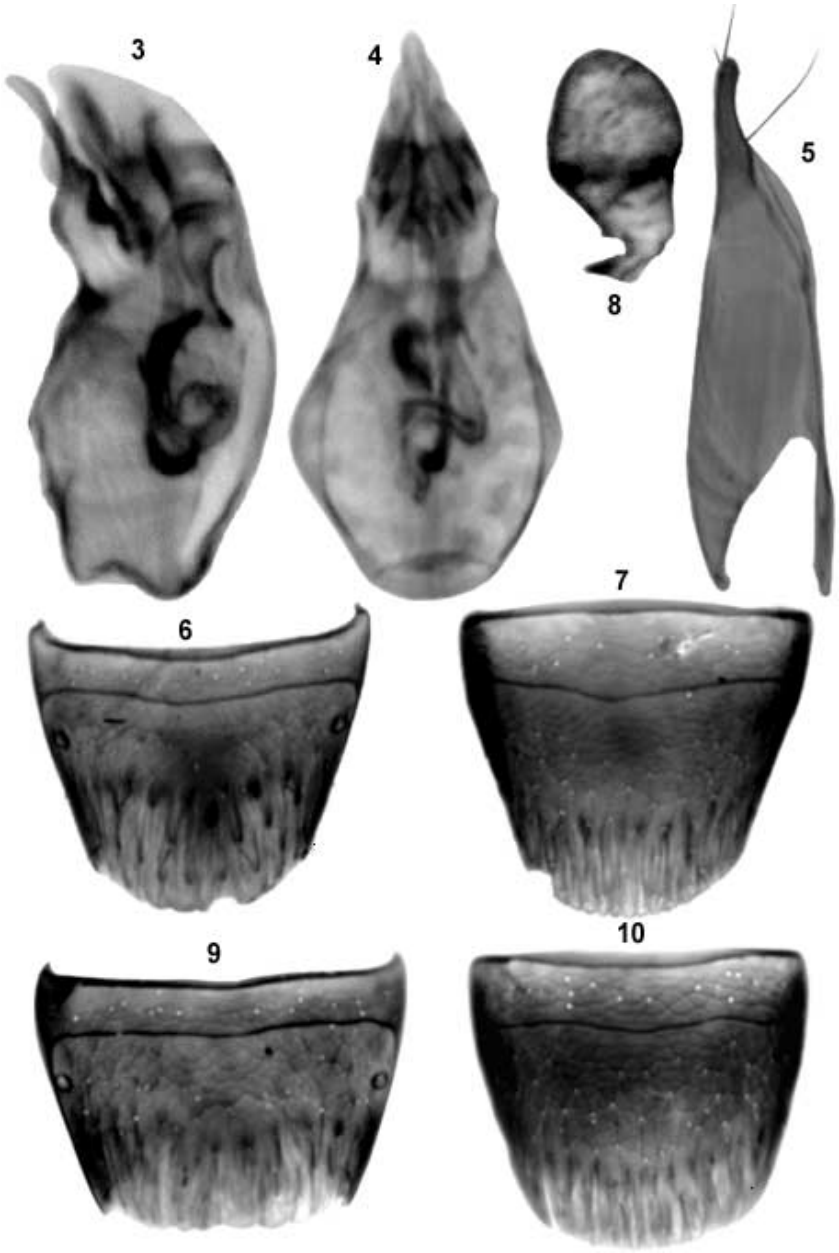
Description

Body length 2.0–2.2 mm, dark brown to black with tarsi, front tibiae, and antennal segments 1–9 yellowish brown (Figs. 1–2), integument with strong isodiametric microsculpture, sculpticells strongly convex, abdomen with tergites bearing pronounced tubercles, pubescence sparse, overall appearance as illustrated (Fig. 1); head strongly transverse, four fifths as broad as pronotum, eyes protruding laterally in dorsal view, pubescence directed laterad and anteriad (Fig. 1); antenna with basal three segments elongate, fourth approximately as long as wide or slightly transverse, segments 5–10 strongly transverse; pronotum strongly transverse, three quarters as broad as elytra, strongly angular posteriorly, pubescence directed obliquely posteriad (Fig. 1); elytra strongly elongate, about twice as long as pronotum, posterior margin approximately straight (Fig. 1); abdomen with four basal tergites deeply impressed, posterior tergites with strong tubercles (Fig. 1). **Male:** tergite eight transverse, rounded apically, bearing strong tubercles, antecostal suture slightly sinuate (Fig. 6); sternite eight slightly transverse, rounded apically, apex slightly dentate, antecostal line broadly separate from basal margin of disc and pointed medially (Fig. 7); median lobe of aedeagus with large bulbus and triangular tubus in dorsal view (Fig. 4), apical part of tubus thin and evenly narrowly elongate in lateral view (Fig. 3), median part of tubus with large hump in lateral view (Fig. 3); internal sac bearing basal and apical lamelliform structures, flagellum broad and strongly developed, about as long as the median lobe (Figs. 3, 4). Paramere as illustrated (Fig. 5). **Female:** tergite eight broadly transverse, arcuate apically, apex slightly dentate, antecostal suture slightly sinuate (Fig. 9); sternite eight slightly transverse, rounded apically, antecostal line broadly separate from basal margin of disc and sinuate (Fig. 10). Spermatheca consisting of large spherical capsule and short and reduced stem, extremely similar to those of some *Leptusa* species (Fig. 8).

Bionomics

Adults of *E. micmac* were found associated with red oak (*Quercus rubra*). In Bridgewater, they were collected in a window trap in a red oak forest. At Little Ponhook Lake, they were found inside spherical galls on red oak in a mixed hardwood forest about 100 m from the lakeshore. Unfortunately, neither the galls nor associated wasps were collected from this site; however, red oak galls are formed by wasps of the genus *Amphibolips* (Cynipidae) (Johnson and Lyon 1991), while species of *Andricus* (Cynipidae) form the similar "roly-poly" galls (Cranshaw 2004). B. Wright collected galls from red oaks at sites in Lequille, Wolfville, and Halifax from which emergent insects were collected. The gall-inducer wasps from these galls are an undescribed species of *Andricus* (*Callirhytis*), near *A.* (*C.*) *marginatus* Weld., and *A.* (*C.*) *rubidus* Weld. Other wasps to emerge from these galls include the following:

Figs. 3–10. Genital structures of *Euvira micmac*: 3, median lobe of aedeagus in lateral view; 4, median lobe of aedeagus in dorsal view (length 0.2 mm); 5, paramere (length 0.3 mm); 6, male tergite eight (length 0.2 mm); 7, male sternite eight (length 0.2 mm); 8, spermatheca (length 0.1 mm); 9, female tergite eight (length 0.2 mm); 10, female sternite eight (length 0.2 mm).



(*i*) *Eurytoma* sp. (Eurytomidae), *Ormyrus* sp. (Ormyridae), and an unidentified species in the Eupelminae (Eupelmidae) (all in the Chalcidoidea). All are parasites of cynipid wasps (J. Liljeblad, personal communication).

(*ii*) An inquiline cynipid in the genus *Ceroptres*. Wasps of this lineage of Cynipidae (Synergini) do not induce galls themselves but oviposit into the galls of other wasps (Ronquist and Liljeblad 2001).

Fig. 11. *Euvira quadriceps* in dorsal view (length 1.0 mm).

(*iii*) An unidentified parasitic wasp in the Eucoilinae (Cynipoidea: Figitidae). These are koinobiont endoparasitoids that attack first-instar larvae of cyclorrhaphous Diptera (Fontal-Cazalla *et al.* 2002).
(*iv*) An unidentified species of Diptera.

Coinhabiting the red oak galls at Little Ponhook Lake with *E. micmac* were adults of *Litargus tetraspilotus* LeConte (Coleoptera: Mycetophagidae) (3 specimens, NSMC) and *Melanophthalma americana* (Mannerheim) (Coleoptera: Latridiidae) (13 specimens, NSMC), both newly recorded from Atlantic Canada. *Litargus tetraspilotus* has hitherto been reported in Canada from Manitoba to Quebec (Bousquet 1991*a*) and in the eastern and central United States northeast to Vermont and New Hampshire (Parsons 1975). It is widely distributed in Nova Scotia, with records from Colchester, Cape Breton, Halifax, Queens, Shelburne, Yarmouth, Digby, and Kings counties (C.G. Majka, unpublished data). Species of *Litargus* feed on moulds and mildews. Specific information on the bionomics of *L. tetraspilotus* is lacking.

Melanophthalma americana was reported in Canada from British Columbia, Ontario, and Quebec (Bousquet 1991*b*). It is widely distributed on the mainland of Nova Scotia, with records from Cumberland, Colchester, Pictou, Antigonish, Guysborough, Halifax, Queens, Yarmouth, Digby, and Hants counties (C.G. Majka, unpublished data). Latridiid adults and larvae feed on conidia of fungi and Myxomycetes (Andrews 2002). Specific information on the bionomics of *M. americana* is lacking.

Oak galls can host a diverse assemblage of insect species. Stone *et al.* (2002) identified five major ecological components of oak gall ecosystems: (1) gall-inducing cynipids, (2) inquilines (wasps and lepidopteran larvae), (3) parasitoids, (4) predators (Lepidoptera and vertebrates), and (5) endophytic fungi. Johnson and Lyon (1991) reported a study that found 16 species of insects in such galls, including five species of wasps parasitic on the gall-inducer wasps, two inquiline wasps coinhabiting the oak gall environment, and a lepidopteran caterpillar feeding on the gall tissue. Oak galls commonly host endophytic fungi such as *Discula quercina* (Westl.) Arx. (Coelomycetes) (Stone *et al.* 2002), which could provide a source of food for mycetophagous species such as *L. tetraspilotus* and *M. americana*. *Euvira micmac* might also be mycetophagous or else could be predaceous on other members of this unusual ecosystem. The ecological roles of both *E. micmac* and *L. tetraspilotus* in such environments remain unknown and are deserving of further research.

Distribution

Known from Nova Scotia, Canada, and Ohio and Michigan, United States.

Acknowledgements

We appreciate the assistance of the following individuals: K. Bolte, Canadian Forest Service, Ottawa, for executing two habitus images; P. Cheers, LFC, for editing the manuscript; K. Savard for dissecting all the specimens; J. Sweeney, Atlantic Forestry Centre, Canadian Forest Service, for reviewing the first draft; and B. Wright for supplying collection information.

We thank G. Pelletier for the French translation of the English abstract and for providing the colour image of *E. quadriceps*. Special thanks are extended to J. Liljeblad (University of California, Riverside), who was kind enough to determine the specimens of wasps and supplied much useful information on their biology, and to W. Rücker (www.Latridiidae.de) for verifying the latridiid determinations. This work was assisted by a research grant from the Nova Scotia Museum of Natural History.

References

Andrews, F.G. 2002. Latridiidae Erichson 1842. *In* American beetles, Vol. 2. Polyphaga: Scarabaeoidea through Curculionoidea. *Edited by* R.H. Arnett, Jr., M.C. Thomas, P.E. Skelley, and J.H. Frank. CRC Press, Boca Raton, Florida. pp. 395–398.

Ashe, J.S. 2001. Keys to the tribes and genera of Nearctic Aleocharinae. *In* American beetles. Vol. 1. Archostemata, Myxophaga, Adephaga, Polyphaga: Staphyliniformia. *Edited by* R.H. Arnett, Jr. and M.C. Thomas. CRC Press, Boca Raton, Florida. pp. 299–374.

Ashe, J.S., and Kistner, D.H. 1989. Larvae and adults of a new species of *Euvira* (Coleoptera: Staphylinidae: Aleocharinae) from the nests of the communal pierid butterfly *Eucheira socialis* with a redescription of the genus *Euvira*. Sociobiology, **15**: 85–106.

Blackwelder, R.E. 1952. The generic names of the beetle family Staphylinidae, with an essay on genotypy. United States National Museum Bulletin, **200**: i–iv, 1–483.

Bousquet, Y. 1991*a*. Family Mycetophagidae: hairy fungus beetles. *In* Checklist of beetles of Canada and Alaska. *Edited by* Y. Bousquet. Publication 1861/E, Research Branch, Agriculture Canada, Ottawa, Ontario. pp. 242–243.

Bousquet, Y. 1991*b*. Family Lathridiidae: minute brown scavenger beetles. *In* Checklist of beetles of Canada and Alaska. *Edited by* Y. Bousquet. Publication 1861/E, Research Branch, Agriculture Canada, Ottawa, Ontario. pp. 239–241.

Casey, T.L. 1911. New American species of Aleocharinae and Myllaeninae. Memoirs on the Coleoptera 2. New Era Printing Co., Lancaster, Pennsylvania.

Cranshaw, W. 2004. Garden insects of North America. Princeton University Press, Princeton, New Jersey.

Fenyes, A. 1918. Genera Insectorum, 173 a. Coleoptera. Family Staphylinidae, subfamily Aleocharinae. Pasadena, California.

Fontal-Cazalla, F.M., Buffington, M.L., Norlander, G., Liljeblad, J., Ros-Farré, P., Nieves-Aldrey, J.L., Pujade-Villar, J., and Ronquist, F. 2002. Phylogeny of the Eucoilinae (Hymenoptera: Cynipoidea: Figitidae). Cladistics, **18**: 154–199.

Johnson, W.T., and Lyon, H.H. 1991. Insects that feed on trees and shrubs. 2nd ed., revised. Cornell University Press, Ithaca, New York.

Klimaszewski, J., Pelletier, G., and Majka, C. 2004. A revision of Canadian *Leptusa* Kraatz (Col., Staphylinidae, Aleocharinae): new species, new distribution records, key and taxonomic considerations. Belgian Journal of Entomology, **6**: 3–42.

Pace, R. 1989. Monografia del genere *Leptusa* Kraatz (Coleoptera, Staphylinidae). Memorie del Museo Civico di Storia Naturale di Verona II Serie Sezione Scienze della Vita A Biologica, **8**(1989).

Parsons, C.T. 1975. Revision of the Nearctic Mycetophagidae (Coleoptera). Coleopterists Bulletin, **29**(2): 93–108.

Ronquist, F., and Liljeblad, J. 2001. Evolution of the gall wasp – host plant association. Evolution, **55**(12): 2503–2522.

Seevers, C.H. 1978. A generic and tribal revision of the North American Aleocharinae (Coleoptera: Staphylinidae). Fieldiana Zoology, **71**: i–vi, 1–289.

Sharp, D. 1883. Biologia Centrali-Americana: Insecta, Coleoptera I. Pt. 2. Staphylinidae. London.

Stone, G.N., Schönrogge, K., Atkinson, R.J., Bellido, D., and Pujade-Villar, J. 2002. The population biology of oak gall wasps. Annual Review of Entomology, **47**: 633–668.