

## FIRST RECORD OF THE OAK TIMBERWORM, *ARRHENODES MINUTUS* (DRURY) (COLEOPTERA: BRENTIDAE) IN MANITOBA

Robert E. Wrigley<sup>1</sup> and Tim Arendse<sup>2</sup>

<sup>1</sup>505 Boreham Blvd., Winnipeg Manitoba R3P 0K2, [robertwrigley@mts.net](mailto:robertwrigley@mts.net)

<sup>2</sup>Box 663, Portage la Prairie, MB R1N 3C2, [tim.arendse@gmail.com](mailto:tim.arendse@gmail.com)

The Oak Timberworm, *Arrenodes minutus* (Drury 1773) is a saproxylic species widespread in hardwood forests throughout the eastern half of North America, from North Dakota (iNaturalist.org), southern parts of Ontario and Quebec (LaPlante *et al.* 1991; Bousquet *et al.* 2013) to New Brunswick and Nova Scotia (Majka *et al.* 2008,), south to Texas and Florida (Blatchley and Leng 1916; Downie and Arnett, 1996, Thomas 1996). The nearest records to Manitoba are in central Minnesota (iNaturalist.org; 7 km SE Toivola, St. Louis County, photo by Dexter Nienhaus, 09 Jun 2020) and Turtle River State Park, 5 km W Grand Forks, North Dakota (Bugguide.net; photo by Carl Barrentine, June 12, 2012). Of the three members of the subfamily Brentinae in Canada and the United States, *A. minutus* is the most northern. Since this species is by no means rare over its large range, numerous excellent photos of male and female specimens are available on bugguide.net and the Maryland Biodiversity Project (<https://www.marylandbiodiversity.com/view/11745>).



**Figure 1.** Dorsal view of the Oak Timberworm from Manitoba (photo by Thilina Hettiarachchi).



**Figure 2.** Lateral view of the Timberworm from Manitoba (photo by Thilina Hettiarachchi).

*Arrenodes minutus* is shiny, dark reddish-brown with yellow streaks on the deeply furrowed elytra, and characterized by an extremely thin, elongate body, large pear-shaped pronotum, and long, non-elbowed antennae held in the forward position alongside the rostrum. Males usually range from 13–25 mm, females 6–14 mm (Craighead 1950; Buchanan 1960; Downie and Arnett 1996); however, some exceptional males may reach 35 mm (Solomon *et al.* 1980; Thomas 1996). Riley (1874) described the larval, pupal and adult stages; Craighead (1950) illustrated the larval stage in great detail. Davis (2017) presented scanning electron micrographs and semithin images of the external and internal anatomy of the head and rostrum of *A. minutus* in a study of the phylogenetic relationships among the Curculionoidea.

On June 4, 2021, amateur entomologist Tim Arendse found a 16 mm male Oak Timberworm under his house-yard light at 7.2 km E Portage la Prairie (49.995, -98.178), in south-central Manitoba. This specimen extends the species' range 250 km north, presumably having dispersed into the province from North Dakota. Although the yard light had been checked almost daily around 10:30 PM. and 6:00 A.M. all spring and summer for years, only one Oak Timberworm was found. The property and surrounding area consists of agricultural fields, woodlots, and riparian forest along the Assiniboine River. Tree species include aspen poplar (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), Manitoba maple (*Acer negundo*), burr oak (*Quercus macrocarpa*), basswood (*Tilia americana*), and green ash (*Fraxinus pennsylvanica*). Numerous ash trees had been cut down recently, however, only the first five species have been reported as susceptible to attack by this weevil. We suspect this weevil has long been a resident

in Manitoba, but not reported previously due to its rarity. Here at the northern limit of its range, it may become more abundant with the warming of the climate. If so, it may increase competition with other saproxylic species in the province.



**Figure 3.** Male guarding in a pair of *Arrenodes minutus*. Note the differences in rostral length and mandibular size (photo by Ted MacRae).

*Arrenodes minutus* demonstrates striking sexual dimorphism in both body size and mandibular shape, with the large male having short, broad, well-developed mandibles, while the female has a greatly elongated, cylindrical rostrum with tiny pincer-like mandibles, specialized for boring holes in trees for oviposition. The male uses its mandibles to defend its position with a female during courting, mating and egg laying. Males are aggressive toward each other, and seldom toward females, with male dominance decided by size and strength (Buchanan 1960; Sanborne 1983; Anderson and Kissinger 2002).

Riley (1874) reported that should a strange male happen by a pair, a furious contest at once ensues, and continues sometimes for hours, until one or the other is thrown from the log or tree. The successful party then takes his position as guard. Leconte and Horn (1883) added that they result in no injury to either of the parties engaged, the dense chitinous covering affording protection. The weaker male, overcome by exhaustion, eventually flees and leaves to his more vigorous victor the honorable task of guarding and assisting the fair object of strife in her efforts to preserve the species. The etymology of *Arrenodes* is from the Greek *arrhenes*, meaning strong, fierce, brave, which well describes the male's vigorous defense of its mate.

Riley (1874) recorded that it takes from a few hours to a day for a female to drill a hole and deposit an egg, the male meanwhile standing guard and occasionally assisting his mate in extracting her rostrum should she become stuck. The female's antennae act like a fluttering brush around the mouthparts when drilling, which dislodge the accumulation of fine wood particles. Following egg laying, she then fills the hole with frass and secretions (Solomon 1995). Blazes and other wounds on trees over 15 cm in diameter are attractive egg-laying sites, with recent damage preferred to older ones.

Solomon (1995) indicated that adults are active from May to August over much of its range; iNaturalist shows records from March to September. The larva burrows (0.2 to 4 mm in diameter) in all directions deeply into the heartwood, often tunneling right through to the other side of the trunk before turning around. It maintains its tunnels free of frass and wood particles by pushing them out the exit hole. Feeding on both wood and fungal mycelia (Buchanan 1960; Sanborne 1983), the larva requires two to four years to develop, generally two (Solomon 1995). Pupation takes place near the exit hole of the larval gallery, and the adult emerges the following spring (Hopkins 1904; Buchanan 1960). Defense of the adult from predators is provided by the thick chitinous exoskeleton and the typical weevil habit of dropping to the ground and remaining immobile.

This species is not particular on which species of live, stressed, or dead (standing, logs and stumps) hardwood trees it attacks, including various oaks (red and white groups), basswood, aspen and balsam poplars, elm (*Ulmus americana*), American beech (*Fagus grandifolia*), and formerly American chestnut (*Castanea dentata*) (Riley 1874; Blatchley and Leng 1916; Thomas 1996). Ulyshen (2009) collected specimens of *A. minutus* in 29, 11-month-old snags and logs of water oak (*Quercus nigra*) and sweetgum (*Liquidambar styraciflua*) in bottomland and upland forests in South Carolina, and none from loblolly pine (*Pinus taeda*). Multiple specimens under loose bark of Manitoba maple and honey locust (*Gleditsia triacanthos*) indicate that additional hardwood species are susceptible (Solomon 1995). Wounds on trees are particularly attractive to this weevil, as adults feed at these sap flows and they also serve as oviposition sites (Solomon 1995). The female is likely attracted to volatiles emitted from wounded wood for oviposition, and is commonly found on the stumps and trunks of trees harvested for lumber or other reasons (Solomon 1995; MacRae 2011). The feeding activities of larvae not only result in economic pinhole damage to standing trees and unseasoned lumber (Solomon 1995), but the larvae are also a vector of the destructive fungus *Bretziella fagacearum*, which causes oak wilt (Bragard *et al.* 2019). Losses of valuable timber and unseasoned lumber have been described as enormous (Hopkins 1903). During the early summer peak larval activity in the Missouri Ozark's, Buchanan (1960) reported incidences of attack from 50 to 78% on blazed or wounded trees. Ives and Wong (1988) made no mention of this species in Manitoba in their comprehensive account of tree and shrub insect pests in the Prairie Provinces.

Majka *et al.* (2007) reported on a specimen intercepted in Nova Scotia in wooden furniture imported from Indiana. David Deng photographed two males in combat translocated far west of

the species' range on 06 May 2021 at Tahuya, Mason County, west of Seattle, Washington (iNaturalist). Other extralimital records are Montana and Central America (Wikipedia), and Ciudad de Mexico, Mexico (<http://bdi.conabio.gob.mx/fotoweb/archives/5037-Colección%20Zoológica/Animales/Invertebrados/LFSMCA0081%20Arrenodes%20minutus.jpg>. info). An individual was found in a shipment of oak products in France in 2005, but the species has not become established in Europe (Bragard *et al.* 2019). The European Food Safety Authority (EFSA Panel on Plant Health, 2019) decided that *A. minutus* meets all the criteria assessed for consideration as a potential Union quarantine pest, since there exists in Europe similar climatic conditions and wide distribution of potential host trees; consequently, phytosanitary requirements exist for *Quercus* and *Populus* (EFSA Panel on Plant Health 2019).

### ACKNOWLEDGEMENTS

We appreciate the assistance of the following curators who confirmed that there were no Manitoba records of *Arrenodes minutus* in their respective collections: Drs. Randy Mooi (Manitoba Museum, Winnipeg), Jason Gibbs (JB Wallis/RE Roughley Museum of Entomology, Winnipeg), Patrice Bouchard (Canadian National Collection of Insects, Arachnids and Nematodes, Ottawa), Andrew Smith (Canadian Museum of Nature, Ottawa), Greg Pohl and David Langor (Biodiversity Pest Management, Northern Forestry Centre, Canadian Forest Service, Edmonton), and David Larson (Saskatchewan). Drs. Gerald Fauske and Patrick Beauzey (Entomology Department, North Dakota State University, Fargo) checked for the presence of records in North Dakota. We thank Ted MacRae for permission to use his excellent photo of the mating pair of *Arrenodes minutus*. We appreciate the editorial contributions by Drs. Jason Gibbs and Patrice Bouchard.

### REFERENCES

- Anderson, R.S. and D.G. Kissinger. 2002. Brentidae Billberg 1820. In American Beetles. CRC Press, Boca Raton, Florida. Volume 2: 711–719.
- Blatchley, W.S. and C.W. Leng. 1916. *Rhynchophora* or Weevils of North Eastern America. The Nature Publishing Company, Indianapolis. 682 pp.
- Bousquet, Y, P. Bouchard, A.E. Davies and D.S. Sikes. 2013. Checklist of Beetles (Coleoptera) of Canada and Alaska. Second Edition. Pensoft, Sofia-Moscow. 402 pp.
- Bragard, C., K. Dehnen-Schmutz, K. Serio, P. Gonthier, M.A. Jacques, J.A.J. Miret and P. Milonas. 2019. Pest categorization of *Arrenodes minutus*. European Food Safety Authority Journal 17(2): 1–26.
- Buchanan, W.D. 1960. Biology of the oak timber worm, *Arrenodes minutus*. Journal of Economic Entomology 53: 510–513.



- Craighead, F.C. 1950. Insect Enemies of Eastern Forests. US Department of Agriculture, Miscellaneous Publication 657: 679 pp.
- Davis, S.R. 2017. The weevil rostrum (Coleoptera: Curculionoidea): internal structure and evolutionary trends. *Bulletin of the American Museum of Natural History* 416: 76 pp.
- Downie, N.W. and R.H. Arnett. 1996. The Beetles of Northeastern North America. Volume Two. The Sandhill Crane Press, Gainesville, Florida. 1721 pp.
- European Food Safety Authority, Panel on Plant Health. 2019. Pest categorization of *Arrhenodes minutus*. *European Food Safety Authority Journal* 17(2): 5617.
- Hopkins, A.D. 1904. Insect injuries to hardwood forest trees. *Yearbook of the United States Department of Agriculture, 1903*: 313–328.
- Ives, W.G.H. and H.R. Wong. 1988. Tree and Shrub Insects of the Prairie Provinces. Information Report NOR-X-292, Northern Forestry Centre, Canadian Forestry Service. 327 pp.
- LaPlante, S., Y. Bousquet, P. Belanger and C. Chantal. 1991. List des espèce de coleopteres du Québec. *Fabriques supplement* 6: 1–136.
- Leconte, J.L. and G.H. Horn. 1883. Classification of the Coleoptera of North America. *Smithsonian Miscellaneous Collections* 26(4): 567 pp.
- MacRae, T. 2011. Different jaws for different jobs. [beetlesinthebush.com](http://beetlesinthebush.com), 7 October.
- Majka C.G., R.S. Anderson and E. Georgeson. 2007. Introduced Aprionidae and Brentidae (Coleoptera: Curculionoidea) in the Maritime Provinces of Canada. *Proceedings of the Entomological Society of Washington* 109(1): 66–74
- Majka, C.G., K. Neil and R. P. Webster. (2008). *Arrenodes minutus* (Drury, 1770) (Coleoptera: Brentidae) discovered in the Maritime Provinces of Canada. *Journal of Acadian Entomology* 4: 32–35.
- Riley C.V. 1874. The northern brenthian – *Eupsalis minutus* (Drury). (Ord. Coleoptera; Fam. Brentidae). Sixth annual report on the noxious, beneficial, and other insects, of the State of Missouri. Regan and Carter, Jefferson City, Missouri. (113–118): 169 pp.
- Sanborne, M. 1983. Some observations on the behaviour of *Arrhenodes minutus* (Drury) (Coleoptera: Brentidae). *The Coleopterists Bulletin* 37: 106–113.
- Solomon, J.D., F.I. McCracken, R.L. Anderson, R. Lewis, Jr., F.L. Oliveria, T.H. Filer and P.J. Barry. 1980. Oak Pests: A guide to major insects, diseases, air pollution, and chemical

injury. United States Department of Agriculture, Southern Forest Experimental Station, General Report SA-GR11. 69 pp.

Solomon, J.D. 1995. Guide to Insect Borers in North American Broadleaf Trees and Shrubs. United States Department of Agriculture, Forest Service Agriculture Handbook AH-706. Washington. 735 pp.

Thomas, M.C. 1996. The primitive weevils of Florida (Coleoptera: Brentidae: Brentinae). Florida Department of Agriculture. Division of Plant Industry. Entomology Circular 375. 3 pp. Updated 2007  
([https://entnemdept.ufl.edu/creatures/trees/beetles/primitive\\_weevils.htm](https://entnemdept.ufl.edu/creatures/trees/beetles/primitive_weevils.htm))

Ulyshen M.D. 2009. Relationships between dead wood and arthropods in southeastern United States. PhD Thesis, University of Georgia. 117 pp. (accessed 28 June 2022)  
[https://getd.libs.uga.edu/pdfs/ulyshen\\_michael\\_d\\_200905\\_phd.pdf](https://getd.libs.uga.edu/pdfs/ulyshen_michael_d_200905_phd.pdf)