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The great spruce bark beetle, *Dendroctonus micans* (Kugelann) (Fig. 1), is a widely distributed pest in Europe and Asia. The primary host of this species is spruce (*Picea*) but it will also infest a variety of other conifer species including pine (*Pinus*) and Douglas fir (*Pseudotsuga*). The adults and larvae feed in the cambium of the trunk (Figs. 2 and 4), damaging the tree by girdling it and spreading pathogenic fungi (Fig. 3).



Fig. 1: *Dendroctonus micans* in tree (photo by Jacques Regad, Département de la Santé des Forêts, Bugwood.org).

*Dendroctonus micans* is a member of the Curculionidae (subfamily Scolytinae) which is comprised of weevils and bark beetles. Members of this family are highly variable but almost all species share a distinct club on the end of their antennae consisting of three segments. The Scolytinae, to which *Dendroctonus* belongs, consists of the bark beetles. In general, members of Scolytinae are small (<10mm long) pill shaped beetles of a reddish brown or black color. Some authors consider Scolytinae to be a distinct family (Scolytidae).

The genus *Dendroctonus* contains twenty species, thirteen of which are native to North America. The genus is primarily Nearctic in its distribution with the six non-native species occurring in Eurasia. It can be distinguished by the procurved and armed elytral bases, a convex frons modified by grooves and ridges, hairlike vestiture, and a five segmented antennal funicle

*Dendroctonus micans* has not yet been detected in the United States. A quality, high powered microscope is required to examine the characters necessary to identify these beetles.



Fig. 2: *Dendroctonus micans* gallery (photo by Beat Forster, Swiss Federal Institute for Forest, Snow and Landscape Research, Bugwood.org).

This aid is designed to assist in the sorting and screening of *D. micans* suspect adults collected through visual survey in the continental United States. It covers basic Sorting of traps, Level 1, and Level 2 screening, all based on morphological characters. Basic knowledge of Coleoptera morphology is necessary to screen for *D. micans* suspects.



# Sorting

## Great Spruce Bark Beetle *Dendroctonus micans* (Kugelann)

Insects collected during *Dendroctonus micans* surveys should be sorted initially for the presence of beetles of the appropriate size color and shape.

1. Beetles are between 6 mm (0.5 inches) and 8 mm (0.7 inches) in length.
2. Beetles are pill-like in shape.
3. Beetles are black, reddish-brown, or tan colored.

Beetles meeting these requirements should be forwarded to Level 1 Screening (Page 3).



Fig. 3: Tree attacked by *Dendroctonus micans*. During a bark beetle attack trees will show little sign of damage other than a series of small bore holes. Often it is not apparent that bark beetles have infested a tree until after they have emerged from it (photo by Stanislaw Kinelski, Bugwood.org).



Fig.4: *Dendroctonus micans* larvae in gallery. Unlike most other scolytids, *Dendroctonus* larvae feed in a single large communal gallery rather than in individual galleries. Other unique behaviors include facultative inbreeding in *D. micans* and the closely related *D. punctatus* (photo by Louis-Michel Nageleisen, Département de la Santé des Forêts, Bugwood.org).



Suspect adults should be pointed and properly labeled. Level 1 Screening is based on characteristics of the antennae and general dorsal surface.

## Antennae

Scolytids have relatively stout, geniculate, clubbed antennae. The clubs are made up of three antennomeres and can be solid, annulated, or occasionally lamellate. The scape will always be noticeable if not well developed (Fig. 5). *Dendroctonus* species have a five segmented antennal funicle and an oblong flattened club.



Fig. 5: Antennae of *Dendroctonus* sp. Note the scape and large three part club and five segmented funicle.

## General Dorsal Surface

Beetles in the tribe Hylurgini have the basal margins of their elytra procurved and armed with a row of crenulations (Fig. 6). The scutellum of tribe members is usually large and flat and the head is usually concealed at least partially by an enlarged pronotum. The anteriolateral areas of the pronotum are unarmed.



Fig. 6: Pronotum, base of elytra and scutellum of *Dendroctonus* sp. Note the row of crenulations along the elytral margins .



Fig. 7: *Dendroctonus pseudotsugae*



Fig. 8: *Dendroctonus ponderosae*

Figs. 7-8: Dorsal views of the common native *Dendroctonus* species *D. pseudotsugae* and *D. ponderosae*. These two species rank among the most destructive scolytid species currently present in the United States.



Fig. 9: *Dendroctonus micans* (target)



Fig. 10: *Dendroctonus punctatus*

Figs. 9-10: *Dendroctonus micans* (far left) and *D. punctatus* (left) dorsal surfaces. These two bark beetles are almost identical in appearance and separation is only through careful comparison or genetic testing. *Dendroctonus punctatus* is widespread but uncommon across the Nearctic.

Level 2 screening is designed to screen out potential *D. micans* (Fig. 9) from other members of the genus (Figs. 7, 8, and 11). Screening is based on features of the frons and stria patterning of the elytral declivity. It should be noted that the widespread native species *D. punctatus* is almost identical in form to *D. micans* (Figs. 9-10). The two can only be differentiated through careful examination by a scolytid expert, or through genetic testing. *Dendroctonus micans* is 6-8 mm in length.

### Frons

The frons of *D. micans* lacks a median groove and any form of lateral expansion. The epistomal process is rather narrow and flattened. The frons is smooth and polished interrupted only by deep close punctures. Distance between the eyes is at least three times an eye width (Fig. 12). Other *Dendroctonus* species have variable frons and epistoma (Fig. 13-17).

### Elytral Declivity

The interstriae on the *D. micans* declivity are smooth and shining. The stria punctures are rather large, at least three times the size of the interstriae (Fig. 18). Other *Dendroctonus* species have dull declivities or smaller punctures (Figs. 19-21).



Fig. 11: Dorsal view of the common Nearctic species *Dendroctonus rufipennis*. This species is one of the most destructive beetles currently in the US. At times it can be difficult to distinguish from *D. micans* but the red colored elytra of the former allow for easy identification.





Fig. 12: *Dendroctonus micans* (target).



Fig. 13: *Dendroctonus punctatus*.



Fig. 14: *Dendroctonus rufipennis*



Fig. 15: *Dendroctonus ponderosae*



Fig. 16: *Dendroctonus pseudotsugae*



Fig. 17 *Dendroctonus brevicomis*

Figs. 12-17 (above): *Dendroctonus* frons. Note the smooth shining frons of *D. micans* (top left), adorned only with a series of deep close punctures.

Fig. 18-21 (right): Declivities of assorted *Dendroctonus* species. Note the smooth shining declivity of *D. micans* with large strial punctures



Fig. 18: *Dendroctonus micans* (target)



Fig. 19: *Dendroctonus rufipennis*

Suspect *D. micans* specimens (hylurgini with five segmented funicles, a shining polished frons with dense punctures but no median groove, and large shining strial punctures on the declivity) should be sent forward for identification. Specimens must be labeled and carefully packed to avoid damage during shipping.



Fig. 20: *Dendroctonus ponderosae*



Fig. 21: *Dendroctonus brevicomis*

## Key to Sort and Screen *Dendroctonus micans* Suspects in the United States

1. Beetles approximately 6-8 mm long; pill shaped and with black, brown, or tan coloration..... 2
- 1'. Beetles larger or smaller than 6-8 mm long; not pill shaped; or color not a shade of black, brown, or tan.....Not *D. micans*
  
2. Antennae geniculate with a large club made up of three segments on the end (Fig. 5); anterior margins of elytra armed with a crenulate ridge and procurved (Fig. 6); scutellum small; head not covered by pronotum; antennal funicle five segmented ..... 3
- 2'. Antennae not geniculate or without a large club made up of three segments on the end; basal margins of elytra unarmed and forming straight transverse line across the body; scutellum large; head may or may not be covered by pronotum; funicle not five segmented, club not flattened.....Not *D. micans*
  
3. Frons smooth and shiny with close deep punctures but no medial groove (Fig.12); distance between eyes at least three times eye width; declivity smooth and shining with large punctures (Fig. 18).....***D. micans* suspect**
- 3'. Frons dull or armed with granules or medial groove (Figs. 14-17). Declivity with interstria dull or stria punctures not wider than those of interstria .....Not *D. micans*

## Citation

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## References for more information on *Dendroctonus micans* and non-targets

**Anderson, R. S.** 2002. Family 131 Curculionidae. Pp. 722-815. In Arnett R. H. *American Beetles: Volume II*. CRC Press. Boca Raton, Florida. 861 pp.

**Armendariz-Toledano, F. Nino, A. Sullivan, B. T. Kirkendall, L. R. Zuniga, G.** 2015. A new species of bark beetle *Dendroctonus mesoamericanus* sp. nov. (Curculionidae: Scolytinae), in southern Mexico and Central America. *Annals of the Entomological Society of America*. 108 (3). 403-414.

**CERIS.** 2011. Exotic Wood Borer/ Bark Beetle Survey Reference: *Dendroctonus micans*. <https://caps.ceris.purdue.edu/dmm/1979>.

**Six, D. L., & Bracewell, R.** 2015. *Dendroctonus*, Pp. 305-350. In Vega, F. E., & Hofstetter, R. W. *Bark Beetles: Biology and Ecology of Native and Invasive species*. Academic Press, Elsevier. Amsterdam, Netherlands. 620 pp.

**Wood, S. L. 1982.** The Bark and Ambrosia Beetles of North and Central America (Coleoptera: Scolytidae) a taxonomic monograph. *Great Basin Naturalist Memoirs No 6*. pp. 151-203.

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