Dendroctonus micans (Kugelann)

### Joseph Benzel

1) Identification Technology Program (ITP) / Colorado State University, USDA-APHIS-PPQ-Science & Technology (S&T), 2301 Research Boulevard, Suite 108, Fort Collins, Colorado 80526 U.S.A. (Email: itp@USDA.gov)

Version 5 18 June 2015 This CAPS (Cooperative Agricultural Pest Survey) screening aid produced for and distributed by:

USDA-APHIS-PPQ National Identification Services (NIS)

This and other identification resources are available at: http://caps.ceris.purdue.edu/taxonomic\_services



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).

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.

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.



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



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

# **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).

# **Level 1 Screening**

## **Great Spruce Bark Beetle**

Dendroctonus micans (Kugelann)

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 antennomers 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.

#### **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. 7: Dendroctonus pseudotsugae



Fig. 8: Dendroctonus ponderosae



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



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

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.

## **Great Spruce Bark Beetle**

Dendroctonus micans (Kugelann)



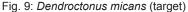




Fig. 10: Dendroctonus punctatus

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.

Figs. 9-10: Dendroctonus micans (far

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 strial punctures are rather large, at least three times the size of the interstriae (Fig. 18). Other *Dendroctonus* species have dull decliveties 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.

# **Level 2 Non-targets**

## **Great Spruce Bark Beetle**

Dendroctonus micans (Kugelann)

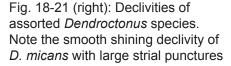


Fig. 12: Dendroctonus micans (target).



Fig. 15: Dendroctonus ponderosae

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.



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. 13: Dendroctonus punctatus.



Fig. 16: Dendroctonus pseudotsugae



Fig. 18: Dendroctonus micans (target)



Fig. 20: Dendroctonus ponderosae



Fig. 14: Dendroctonus rufipennis



Fig. 17 Dendroctonus brevicomis



Fig. 19: Dendroctonus rufipennis



Fig. 21: Dendroctonus brevicomis

# **Key and References**

### **Great Spruce Bark Beetle**

Dendroctonus micans (Kugelann)

	Key to Sort and Screen Dendroctonus micans Suspects in the United States
1. 1'.	Beetles approximately 6-8 mm long; pill shaped and with black, brown, or tan coloration
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
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
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)
3'.	Frons dull or armed with granules or medial groove (Figs. 14-17). Declivity with interstria

#### Citation

Benzel, J. S. 2015. Screening aid: Great Spruce Bark Beetle, *Dendroctonus micans* (Kugelann). Identification Technology Program (ITP), USDA-APHIS-PPQ-S&T, Fort Collins, CO. 6 pp.

### 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.

### **Acknowledgments**

Funding for this project was provided to J. S. Benzel through section 10201 of the FY2014 Farm Bill. I would like thank Terrence Walters (USDA-APHIS-PPQ-S&T ITP) and USDA-APHIS-PPQ National Identification Services for support of this work and access to imaging equipment. Boris Kondratieff, Donald Bright, and Todd Gilligan (Colorado State University) provided advice on species identification, image editing, and screening aid formatting.