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The European oak bark beetle, *Scolytus intricatus* (Ratzeberg) (Fig. 1), is a widely distributed pest in Europe. This species primary host is oak (*Quercus*) but they will also infest other hardwood tree species including chestnut (*Castanea*) and hazelnut (*Corylus*). The adults and larvae feed in the cambium of tree branches and in the trunk, damaging the tree by girdling it and spreading pathogenic fungi (Figs. 2-3).



Fig. 1: *Scolytus intricatus* in tree (photo by, Milos Knizek, Forestry and Game Management Research Institute, Bugwood.org).

Scolytus intricatus 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 subfamily Scolytinae, to which *Scolytus* belongs, consists of the bark beetles. In general, members of Scolytinae are small (<10mm long) pill shaped beetles of a reddish brown, black, or tan color. Some authors consider Scolytinae to be a distinct family (Scolytidae).

The genus *Scolytus* contains over 100 species, 25 of which are native to North America. It is the only genus in Scolytini to occur in temperate climates. The genus has a wide distribution, inhabiting all of Eurasia and the Americas. It can be distinguished by a steeply ascending second abdominal ventrite which, in some species, is embellished by one or more large tubercles, and by protibia unarmed except for a single large lateral spur which extends from the outer apical angle.

Scolytus intricatus has not yet been detected in the United States. However two other species within the genus, *S. multistriatus* and *S. schevyrewi* (Figs. 4-5) have established themselves here and are known vectors for dutch elm disease. 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 *S. intricatus* suspect adults collected through visual survey in the continental United States. It covers basic Sorting of traps, First Level, and Second Level screening, all based on morphological characters. Basic knowledge of Coleoptera morphology is necessary to screen for *S. intricatus* suspects.



Fig. 2: *Scolytus intricatus* galleries (photo by Gyorgy Csoka, Hungary Forest Research Institute, Bugwood.org).

Sorting

European Oak Bark Beetle *Scolytus intricatus* (Ratzeburg)

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

1. Beetles are between 2 mm (0.1 inches) and 3 mm (0.15 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 *Scolytus intricatus*. 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 Jan Liska, Forestry and Game Management Research Institute, Bugwood.org).



Figs. 4 and 5: The smaller European elm bark beetle: *Scolytus multistriatus* (top), and the banded elm bark beetle: *Scolytus schevyrewi* (bottom). These two European species feed on elm trees and are well established in the United States. Both species have impacted native and exotic elm trees in the U.S. (photos by Joseph O'Brien, USDA Forest Service (top) and Whitney Cranshaw, Colorado State University (bottom), Bugwood.org).

Suspect adults should be pointed and properly labeled. Level 1 Screening is based on characteristics of the, antennae, general dorsal surface, protibia and abdomen. Specimens with these traits should be forwarded to Level 2 Screening.

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. 6).



Fig. 6: Antennae of *Scolytus* spp. Note the scape and large three part club.

General Dorsal Surface

Beetles in the tribe Scolytini have the basal margins of their elytra unarmed and forming a straight line across the body (Fig. 7). The scutellum of tribe members is usually large and flat and the head is usually concealed at least partially by an enlarged pronotum.



Fig. 7: Base of elytra and scutellum of *Scolytus* spp. Members of the Scolytini tribe should have a broad scutellum and the base of the elytra should be unarmed.

Protibia

The protibia of the Scolytini tribe are distinguishable by being armed only with a large lateral spur extending from the outer apical angle (Fig. 8). Most other Scolytinae have protibia armed by several small spines along the lateral margin.



Fig. 8: Protibia of *Scolytus* spp. Members of the Scolytini tribe have only a single apical spine on the protibia (circled).

Abdomen

In most members of the Scolytinae, including *S. intricatus*, the second ventrite of the abdomen steeply ascends producing an oblique plain between the first and third ventrites (Figs. 9 and 10).



Figs. 9 and 10: Postrolateral (left) and lateral (right) views of *Scolytus* spp. abdomen. In this genus the second ventrite is raised at an oblique angle so that the abdomen meets the only slightly declivous elytra. The ventrites may be armed with one or more spines or tubercles of varying size depending on the species.



Fig. 11: *Scolytus intricatus* (target)



Fig. 12: *Scolytus schevyrewi*



Fig. 13: *Scolytus multistriatus*

Fig. 11-13: Dorsal view of non-native *Scolytus* species. No native *Scolytus* feed on hardwoods as do Palearctic species. However, both *S. schevyrewi* (middle) and *S. multistriatus* (right) have become established in the U.S. These two species infest elms so their presence in oaks would be atypical.

Level 2 screening is designed to screen out potential *S. intricatus* (Fig. 11) from other members of Scolytini. In general, surveys for *S. intricatus* should detect only a few other members of the tribe. In the Scolytini, only the genus *Scolytus* occurs in the Temperate regions and most native species feed exclusively on conifers. In addition to *S. intricatus*, other nonnative species which have become well-established in North America, such as *S. schevyrewi* and *S. multistriatus* (Figs. 12-13), may be found during surveys. Screening is based on general dorsal surface, the abdomen, and the frons.

General Dorsal Surface

Scolytus intricatus is a relatively small bark beetle ranging in length from 2-3 mm (0.1-0.15 inches). The body color is black with reddish brown elytra and light brown antennae and legs (Fig. 11). This coloration is readily distinguishable from that of *S. schevyrewi* which is lighter in color and often possesses a distinct black or dark brown band across its elytra (Fig. 12).

Abdomen

The abdominal ventrites of *S. intricatus* members are not armed with any form of spine or tubercle (Fig. 14) as would be seen in many *Scolytus* species such as *S. quadrispinosus* and *S. unispinosus* (Figs. 15-18). Some other native *Scolytus* lack tubercles as well (Figs: 19-21).

Frons

The frons is distinctive only in male *Scolytus* which can be distinguished by having this area of the body flattened and with a series of impressions. *Scolytus intricatus* males have a flattened frons armed with two brushlike patches of dense pubescence (Fig. 22). In most native scolytus the frons usually bears a shallow or marked impression and the patches of pubescence are not present (Fig. 23).



Fig. 14: *Scolytus intricatus* (target).



Fig. 15: *Scolytus schevyrewi*.



Fig. 16: *Scolytus multistriatus*



Fig. 17: *Scolytus quadrispinosus*



Fig. 18: *Scolytus unispinosus*



Fig. 19: *Scolytus ventralis*



Fig. 20: *Scolytus rugulosus*



Fig. 21: *Scolytus reflexus*

Figs. 14-21: *Scolytus* abdomens in postrolateral view. note the lack of spines on the progressively rising ventrites of the *S. intricatus* abdomen (top left).

Fig. 22-23: Frons of male *S. intricatus* (left) and *S. ventralis* (right). In *S. intricatus*, the frons is flattened and the bottom margin has two patches of closely clumped setae (circled). Native *Scolytus* bear at least a shallow depression and no setae patches.

Suspect *S. intricatus* specimens, (those with unbanded elytra, a raised second ventrite but otherwise unarmed abdomen, and if male, a flattened frons bearing two dense patches of setae) should be sent forward for identification. Specimens must be labeled and carefully packed to avoid damage during shipping.



Fig. 22: *Scolytus intricatus* (target).

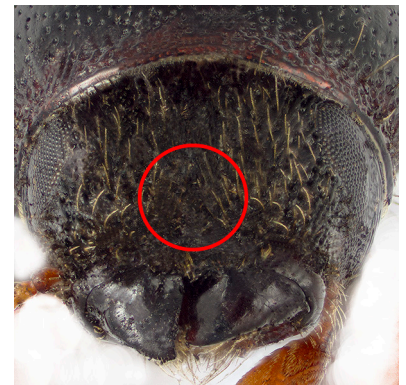


Fig. 23: *Scolytus ventralis*

Key to Sort and Screen *Scolytus intricatus* Suspects in the United States

1. Beetles approximately 2-3 mm long; pill shaped and with black; brown, or tan coloration..... 2
- 1'. Beetles larger or smaller than 2-3 mm long; not pill shaped; or color not a shade of black, brown, or tan..... Not *S. intricatus*

2. Antennae geniculate with a large club made up of three segments on the end (Fig. 6); basal margins of elytra unarmed and forming a straight transverse line across the body (Fig. 7); scutellum large and flat; head usually covered by pronotum; protibia armed by only a single apical spur (Fig. 8); second abdominal ventrite steeply ascending to meet the elytra (Figs. 9-10) 3
- 2'. Antennae not geniculate or without a large club made up of three segments on the end; basal margins of elytra armed with ridge and strongly procurved; scutellum small or absent; head may or may not be covered by pronotum; protibia with several teeth along lateral margin; second abdominal ventrite not steeply ascending..... Not *S. intricatus*

3. Beetle with black body and reddish brown elytra (Fig. 11); Abdomen with no processes or lateral spines (Fig. 14); If male, then frons flattened and bearing a pair of brush like setae patches (Fig. 22)..... ***S. intricatus suspect***
- 3'. Beetle with dark band on elytra (Fig. 12); Abdomen armed with at least one process or spine (Figs. 15-21); If male, then frons with depression and lacking pair of brushlike setae patches on margin (Fig. 23) Not *S. intricatus*

Citation

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References for more information on *Scolytus intricatus* 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.

Grune, S. 1979. *Brief Illustrated key to European Bark Beetles*. Verlag M. & H. Schalper. Hannover. 38-39.

Michalski, J. 1973. *Revision of the Palearctic species of the genus Scolytus Geoffroy (Coleoptera, Scolytidae)*. Panstwowe Wydawnictwo Naukowe. Krakow. pp. 111-113

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. 669-705.

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