Screening Aid

Ambrosia Beetles

Platypus quercivorus (Murayama), *Megaplatypus mutatus* (Chapuis)

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Version 5
30 June 2015

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The ambrosia beetles (Platypodinae) (Fig. 1) are an enigmatic group of bark beetles native to the tropical regions of the world. Within this group two species are considered potentially invasive pests: *Platypus quercivorus* (Murayama) and *Megaplatypus mutatus* (Chapuis). *Platypus quercivorus* feeds primarily on oaks (*Quercus*) and other broad leaf trees and spreads the ambrosia fungus *Raffaelea quercivora* which may be the agent of Japanese oak disease. *Megaplatypus mutatus* primarily attacks walnut (*Juglans*), poplar (*Populus*), and apple (*Malus*) trees but will infest a variety of other broadleaf trees. It does little direct damage to the tree, but its boring can reduce the tree's structural integrity and discoloration caused by symbiotic fungi reduce wood quality (Figs. 2-3).

Fig. 1: *Platypus* sp. on tree (photo by, Andrea Battisti, Universita di Padova, Bugwood.org).

Platypodinae is currently considered a subfamily of Curculionidae 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. In general, members of Platypodinae are small (<10mm long) elongate beetles of a reddish brown or black color. Historically, Platypodinae has been difficult to place within the Coleoptera, at times being considered a distinct family or a tribe of the Scolytinae (bark beetles).

Fig. 2: *Tomicus minor* galleries (photo by James Solomon, USDA Forest Service, Bugwood.org).

The genus *Platypus* contains 121 species and is found across Eurasia, Africa, and Australia. It is recognized by a shallow, unarmed metasternal impression and a convex and entire elytral declivity in the male. *Megaplatypus* contains 8 species and is limited to South and Central America. Members are distinguished by their large size, deeply impressed metasternal impression armed with small spines, and stout processes on the male elytral declivity with a series of spines on the angle between them. Neither *P. quercivorus* nor *M. mutatus* have been detected in the United States.

This aid is designed to assist in the sorting and screening of *P. quercivorus* and *M. mutatus* suspect adults collected by Lindgren funnel traps 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 *P. quercivorus* and *M. mutatus* suspects.

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

1. Beetles are between 4 mm (0.25 inches) and 5 mm (0.3 inches) in length for *P. quercivorus* or between 7 mm (0.4 inches) and 8 mm (0.5 inches) for *M. mutator*.

2. Beetles are elongate and roughly cylindrical in shape.

3. Beetles are reddish-brown or tan colored.

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

Fig. 3: *Platypus* sp. galleries infected with ambrosia fungus. Unlike scolytids, platypodids form simple galleries in the xylem of the host tree. The simple straight galleries have given them the alternate common name of pinhole borers. The name ambrosia beetles comes from the ambrosia fungus which platypodids actively carry from tree to tree and which is their exclusive food source. Some types of ambrosia fungus can kill entire trees (photo by Ladd Livingston, Idaho Department of Lands, Bugwood.org).

Fig. 4-5: Lateral views of *Platypus* sp. (top) and the scolytid *Ips* sp. (bottom). While platypodids and scolytids are superficially similar shape and habits the two groups are easily distinguished by several traits. In comparison with scolytids, platypodids are more elongate and cylindrical. The thorax especially is much longer than in the scolytids. Of the two groups, the platypodids are the less successful and more specialized, being mostly relegated to the tropics and feeding exclusively on symbiotic fungi in the xylem.

Suspect adults should be pointed and properly labeled. Level 1 Screening is based on characteristics of the antennae, prothorax, and tarsi. It is designed to separated platypodids from other similarly sized beetles (Figs. 4-5).

Fig. 6: Antennae of *Oxoplatypus* sp. Note the long scape and large solid club.

Antennae

Platypodids have relatively stout, geniculate, clubbed antennae. The clubs are made up of three antennomers but are always solid with no sutures (Fig. 6).

Prothorax

The prothorax of platypodids is usually relatively elongate when compared with that of the scolytids. It is at most as wide as the head and in many species the head is substantially wider than the pronotum (Fig. 7). In scolytids the pronotum is wider than the head. In addition the lateral magin of the platypodid pronotum is insized.

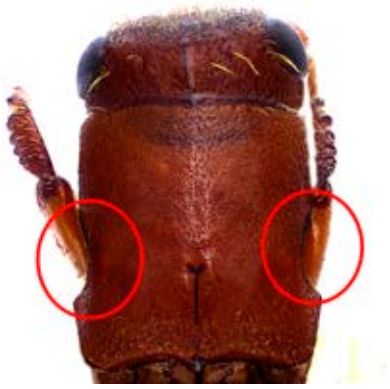

Fig. 7: Head and prothorax of *Oxoplatypus* sp. Note the length and width in comparison to the head.

Tarsi

The first tarsal segment of all target and native platypodids is as long as next for segments combined (Fig. 8). In addition the third tarsal segment is not bilobed and concealing a small fourth segment as it is most curculionids.

Fig. 8: Tarsus of *Platypus* sp. Note the length of the first tarsal segment in comparison to the others and the lack of lobes on the third segment.

Specimens meeting these requirements should be forwarded to level two screening. As platypodids only occur in the Southeast and Pacific Northwest, Level 2 screening may be unnecessary outside of these areas.

Fig. 9-10: male (top) and female (bottom) *Treptoplatypus wilsoni.* All platypodids are sexually dimorphic with males bearing an elytral declivity armed with a series of spines or processes. Platypodids are monogamous with the males making the bore hole and using pheromones to attract the female. In some species these pheromones also attract other males to the tree, precipitating a mass attack.

Level 2 screening is designed to separate *Platypus* (Fig. 15)and *Megaplatypus* (Fig. 16) suspects from native platypodids (Figs, 17-20). As neither *Platypus* nor *Megaplatypus* occur in the United States, separating out to genera will be sufficient to identify invasive platypodid suspects. Screening is based on the metasternum and abdomen, elytral declivity, and pronotum. It should be noted that platypodids are sexually dimorphic and that screening is somewhat different for males and females (Figs: 9-10)

Metasternum and Abdomen

In *Myoplatypus, Oxoplatypus, Euplatypus,* and *Megaplatypus* the metasternum and metepisternum bears a glabrous impression armed by spines or a carinate ridge in which the femur is inserted (Fig. 12). In contrast *Platypus* and *Treptoplatypus* bear a smaller unarmed impression (Fig. 11). In some cases this feature is the only one needed to separate invasive platypodids from natives as *Treptoplatypus* is only found in the Pacific Northwest. In *Myoplatypus* and *Oxoplatypus* sternites a single ventrite is armed with pair of lateral spines (the first ventrite in *Myoplatypus* and the second in *Oxoplatypus*) (Fig. 14). This feature does not occur in the other genera (Fig. 13).

Fig. 11-12: Metasterna of *P. quercivorus* (top) and *M. mutatus* (bottom). Note how the impression in *M. mutatus* is deeper and armed with a large spine (circled).

Elytral Declivity

The elytral declivity is only useful in separating male platypodids. In *P. quercivorus,* the male declivity is convex in form with a broad square end and is armed with a series of spines at the top (Fig. 21). In contrast the declivity of *Treptoplatypus* is concave with two large prominences bearing three small spines each. There are no spines on the declivity top (Fig. 22).

The declivity of *M. mutatus* is entire with only short broad prominences (Fig. 23). The top is armed by a crown of blunt ridged spines and a series of small spines covers the ventrolateral angle. In contrast the prominences and spines on the native platypodids are far more elongate and less numerous (Figs. 24-26).

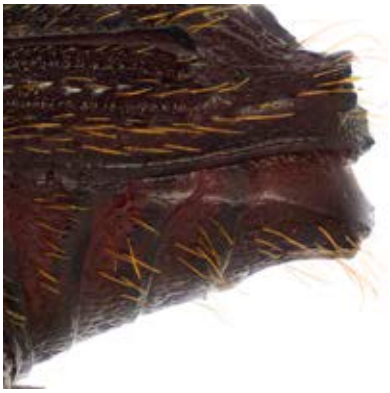

Fig. 13: *Megaplatypus mutatus*

Pronotum

The mycetangia, pores in which ambrosia beetles carry symbiotic fungus spores, are found on the pronotum of female platypodids and occasionally on the male pronotum. The pores, while diagnostic, are highly variable within species. In both *Platypus* and *Treptoplatypus* the pores are numerous (Fig. 27). The pronotum of *Megaplatypus* usually lacks mycetangia completely (Fig. 28) but may bear a single pair. Pairs of mycetangia are common in *Myoplatypus, Oxoplatypus,* and *Euplatypus* (Fig. 29).

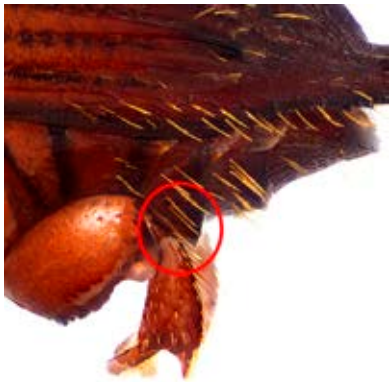

Fig. 14: *Myoplatypus flavicornis*

Figs. 13-14: Abdomens of Platypodids. Note the lateral spines on the ventrites of *Myoplatypus* (circled).

Fig. 15: *Platypus quercivorus* (target).

Fig. 16: *Treptoplatypus wilsoni*.

Fig. 17: *Megaplatypus mutatus* (target)

Fig. 18: *Oxoplatypus quadridentatus.*

Fig. 19: *Myoplatypus flavicornis*.

Fig. 20: *Euplatypus compositus*.

Fig. 21 *Platypus quercivorus* (target).

Fig. 22: *Treptoplatypus wilsoni*.

Fig. 23: *Megaplatypus mutatus* (target)

Fig. 24: *Oxoplatypus quadridentatus.*

Fig. 25: *Myoplatypus flavicornis*.

Fig. 26: *Euplatypus compositus*.

Figs. 21-26 (above): Elytral declivities of male platypodids. Note the pair of spines on the top of the *P. quercivorus* declivity and the series of small spines on the ventrolateral angle of the *M. mutatus* declivity.

Suspect *P. quercivorus* and *M. mutatus* specimens (platypodids without spines on metasternal impression or large multispined prominences on declivity if male, or with a crenulate ridge on metasternal impression and with short broad prominences and a series of small spines along the ventrolateral angle of the declivity if male and lacking mycetagia if female) should be sent forward for identification. Specimens must be labeled and carefully packed to avoid damage during shipping.

Figs. 27-29 (below): Pronotums of select female platypodids. Note the large clusters of mycetagia on *Platypus* sp. and the single pair of mycetagia on *E. compositus* (circled).

Fig. 27: *Platypus* sp. (target).

Fig. 28: *Megaplatypus mutatus* (target)

Fig. 29: *Euplatypus compositus*.

Key to Sort and Screen *P. quercivorus* and *M. mutatus* Suspects in the United States

1. Beetles approximately 4-5 mm long or 7-8 mm long; body elongate and cylindrical, brown; antennae stout, geniculate with solid club (Fig. 6); pronotum elongate, narrower than prominent head (Fig. 7); first tarsal segment as long as others combined (Fig. 8)..... 2

1'. Beetles larger or smaller than 2-3 mm long or 7-8mm long; body not elongate and cylindrical; color not brown; antennae not geniculate or without solid club; pronotum wider than and possibly covering head; or first tarsal segment not as long as others combined..... Not suspect

2. Metasternum and metepisternum with only a shallow unarmed impression (Fig. 11) 3

2'. Metasternum and metepisternum with deep impression armed a the edges by spines or carinate ridge (Fig. 12).. 4

3. Declivity entire, square at end, armed with a series of spines at the top (Fig. 22); or, declivity rounded; pronotum with region densely packed with mycetagia pores (Fig. 27) .. .. ***P. quercivorus* suspect**

3'. Declivity attenuate, with two large processes bearing multiple spines declivity top without spines (Fig. 22)..... Not suspect

4. Length 7-8 mm; declivity with short broad processes and spines along ventrolateral angle and abdomen without spines on ventrite (Fig. 23); or, declivity rounded; pronotum without mycetagia (Fig. 28)..... ***M. mutatus* suspect**

4. Length not 7-8 mm; declivity with longer processes and without series of spines on ventrolateral angle (Figs. 24-26); abdomen with or without lateral spines on ventrite; or, declivity rounded; pronotum bearing single pair of mycetagia (Fig. 29) ..... Not *suspect*

Citation

Benzel, J. S. 2015. Screening aid: Ambrosia beetles, *Platypus quercivorus* (Murayama), *Megaplatypus mutatus* (Chapuis). Identification Technology Program (ITP), USDA-APHIS-PPQ-S&T, Fort Collins, CO. 7 pp.

References for more information on *P. quercivorus, M. mutatus* and non-targets

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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.