

Emerald Ash Borer

Agrilus planipennis Fairmaire

(Coleoptera: Buprestidae)

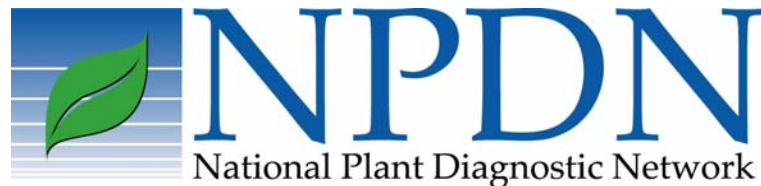


A guide to identification and comparison to similar species

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Introduction



The adult stage of the Emerald Ash Borer (EAB) is fairly distinctive and usually easy to tell apart from most similarly colored and shaped buprestids and other insects by a trained taxonomist. However, many researchers and field workers currently sampling for EAB are not trained taxonomists, and might confuse some other similarly shaped or colored insects with EAB. The species included in this guide were chosen because of their relative commonness, similarity in size, shape and/or coloration to the EAB, and because specimens were available for photography in the A.J. Cook Arthropod Research Collection, at Michigan State University. Additional species, not included here, may be present in other parts of North America that could also potentially be confused with the EAB.

The main purpose of this guide is to assist with sight identification of adult specimens that have been field collected or reared. It will be somewhat easier to verify the identity of beetles reared from known hosts, however host data is not necessary to use this simple guide.

Many trapping methods for EAB utilize Tanglefoot®, Pest-Stick® or some other kind of sticky material. To be able to properly identify specimens, all residues of this sticky material must be removed with a suitable cleaning agent. Soaking beetles in 95% ethanol will dissolve Tanglefoot, and HistoClear® will dissolve Pest-Stick. It may take several days of soaking and frequent transfers to clean solvent to remove all traces of the sticky material. In addition, specimens in alcohol usually do not appear their true color or show setae and setal patterns while wet. Ideally, specimens should be cleaned and allowed to air dry. Specimens mounted on pins or points will usually be much easier to manipulate under a dissecting microscope, which is usually needed for best examination of these small beetles. The bright lighting typically used with microscopy will best reflect the coloration of these beetles for comparison to the pictures used in the guide.

Note the similarity in color among the beetles in the photos to the left that were removed from sticky traps and pinned without any cleaning. The photos to the right are the same beetles after cleaning for only a few seconds with hexane used as a solvent. While still not perfectly clean, sufficient color and patterns now are evident to allow these to be identified to species.



*Agrilus
anxius*



*Agrilus
bilineatus*



*Agrilus
cyanescens*

The initial pages of this guide describe the general characteristics for identification of the emerald ash borer. These are followed by pages showing some additional species of *Agrilus*, other Buprestidae, and a few other beetles that have similar color and/or shape to the EAB, and which could potentially be confused with it.

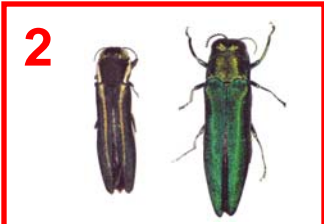
These pages can be used for basic sight comparison and possible identification of some of the more common species in question. This guide uses coloration differences and a few distinctive, morphological characters for comparisons. Those using this guide should not expect to be able to identify any given specimen with absolute certainty to the species level. There are 171 species of *Agrilus* in North America, and only a few representatives are shown here. Many of the smaller species are very similar to each other, and most can only be reliably identified with keys. There are a few keys for North American *Agrilus* (Fisher 1928, Bright 1987, Downie & Arnett 1996 for eastern species) and other Buprestidae that can be used for identification of difficult specimens. However, it may still be necessary to send difficult specimens to an expert with familiarity in this group of insects. There are currently no revised keys available to North American *Agrilus* or other Buprestidae that include the EAB.


An example of a species comparison to EAB as used in this guide


1. Scientific and common name (if available) of the species being compared to EAB.
2. Side-by-side comparison of the species to EAB at the same size scale.
3. Text box listing size range, description of color and shape, similarities and differences to EAB, and known host plants.
4. Side, top and oblique views of the species showing color and shape characteristics.
5. Photos of the most diagnostic characteristics that will aid in separation of the species from EAB.
6. Range map of the species.


1 *Agrilus bilineatus* (Weber)
“two-lined chestnut borer”

- Length: 4.2-9.5 mm, slightly smaller than EAB.
- 3** Distinctively colored bronze-black with white-yellow pubescent stripes extending from edges of pronotum backwards along length of elytra (only visible on dry specimens).
- Abdominal dorsum black in color (red in EAB), pygidium with carina and projecting spine (similar to EAB).
- Hosts: oaks, chestnut, American hornbeam, beech, and eastern hop hornbeam.

**2**

**4**

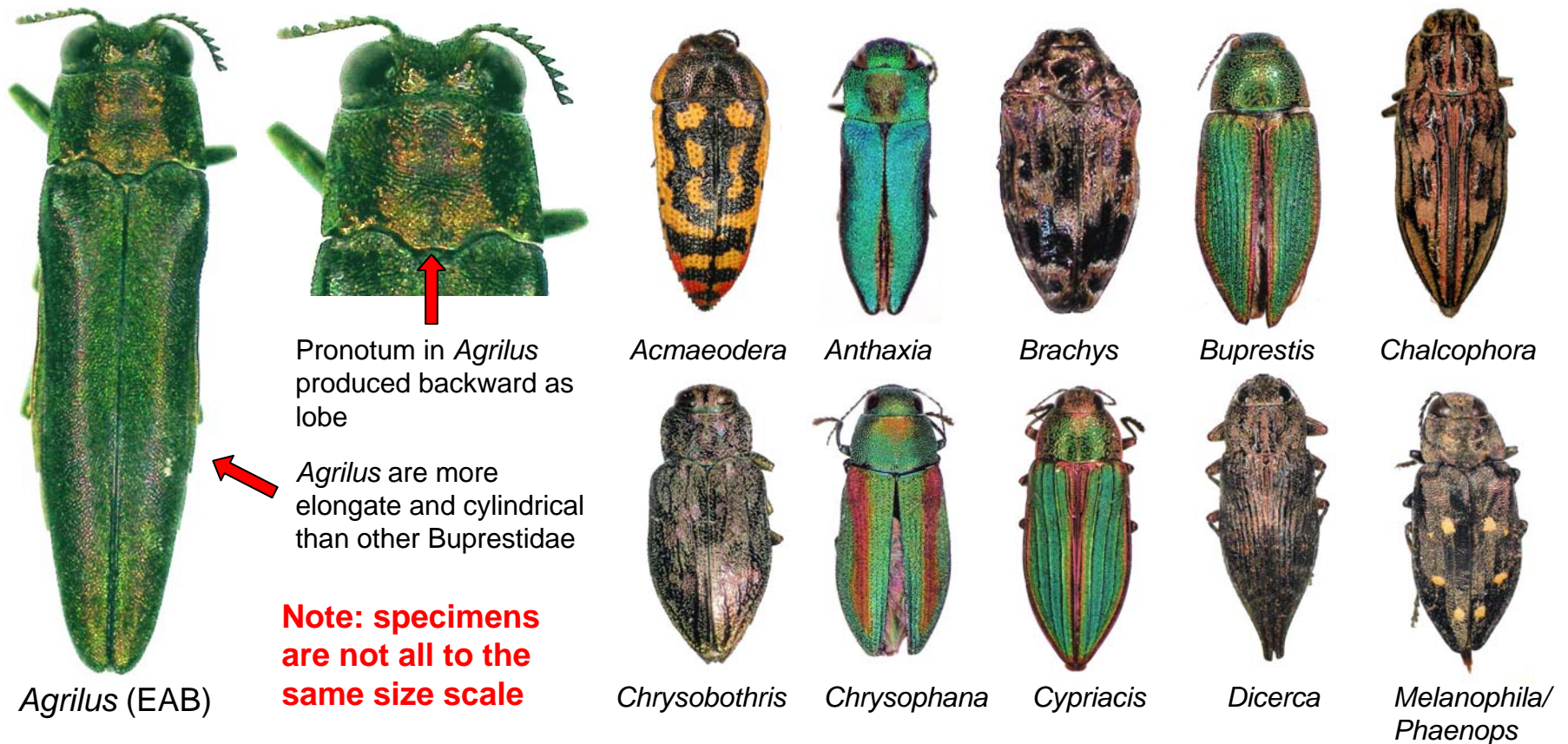
**5**
bilineatus with carina/spine dorsum of abdomen black
EAB with carina/spine dorsum of abdomen red

**6**

Source of morphological characteristics, host records and distributional data primarily from Bright 1987, Downie & Arnett 1996, and Fisher 1928.

Family: Buprestidae “metallic wood-boring beetles”

The genus *Agrilus* is one of 53 genera of Buprestidae found in North America. Fortunately, species in the genus *Agrilus* have a very distinctive shape that will easily separate them from most of the other common genera of Buprestidae. *Agrilus* in general are more linear and cylindrical than other genera of Buprestidae and the base of the prothorax is produced backward as a lobe, which is lacking or less obvious in most other genera (except *Brachys* and *Chrysobothris*).



Identification of the Emerald Ash Borer



Agrilus planipennis Fairmaire

“emerald ash borer” (EAB)

- Typical specimens are a **bright, metallic, emerald green color overall**, with the **elytra usually appearing somewhat duller and slightly darker green**. The overall greenish coloration may also have variable amounts of **brassy, coppery or reddish reflections**, especially on the pronotum and ventral surfaces.
- A few rare specimens of EAB are entirely coppery-red, entirely bluish-green, or green with bluish elytra.
- Length: <10.0–13.0 mm
- EAB in general is somewhat larger in size and more brightly metallic green than most other U.S. *Agrilus* species.



dorsal view

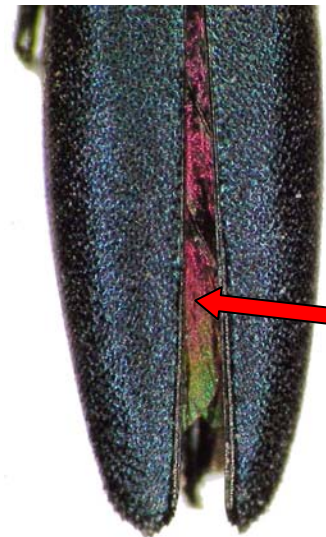
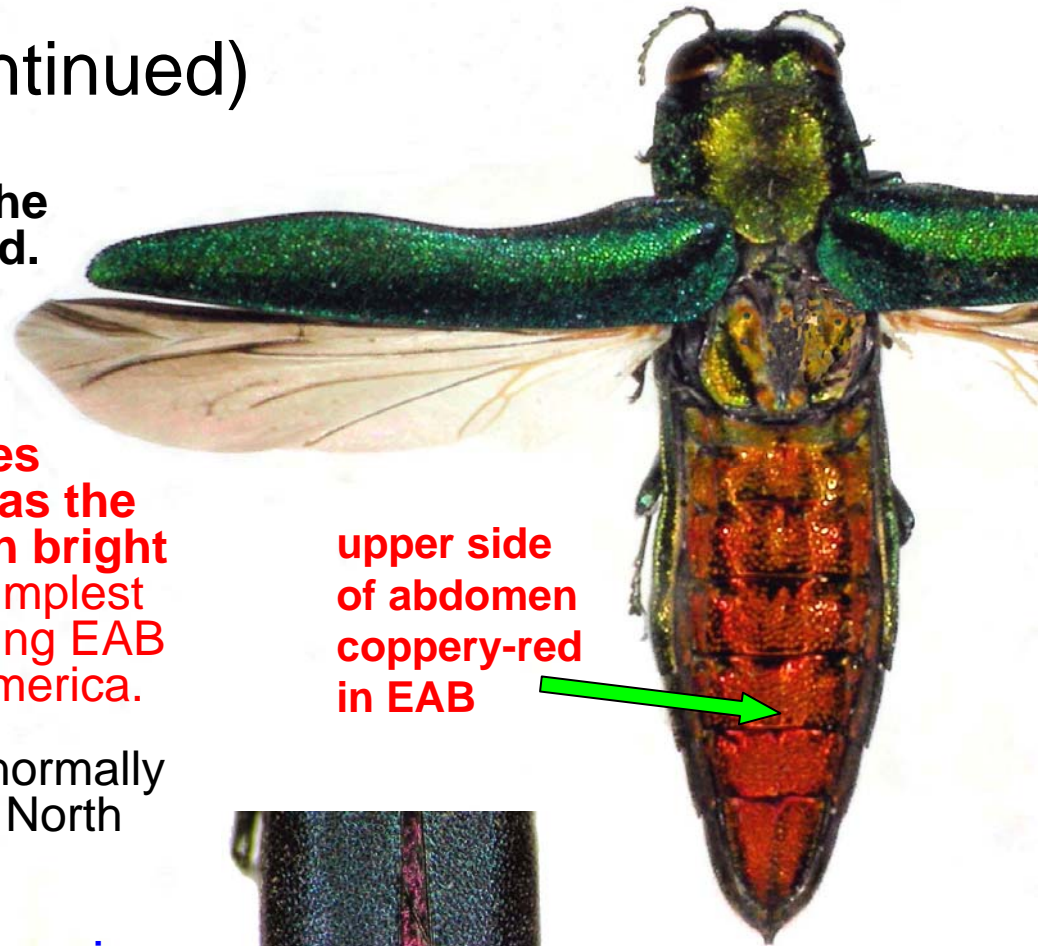


ventral view



emerald ash borer (continued)

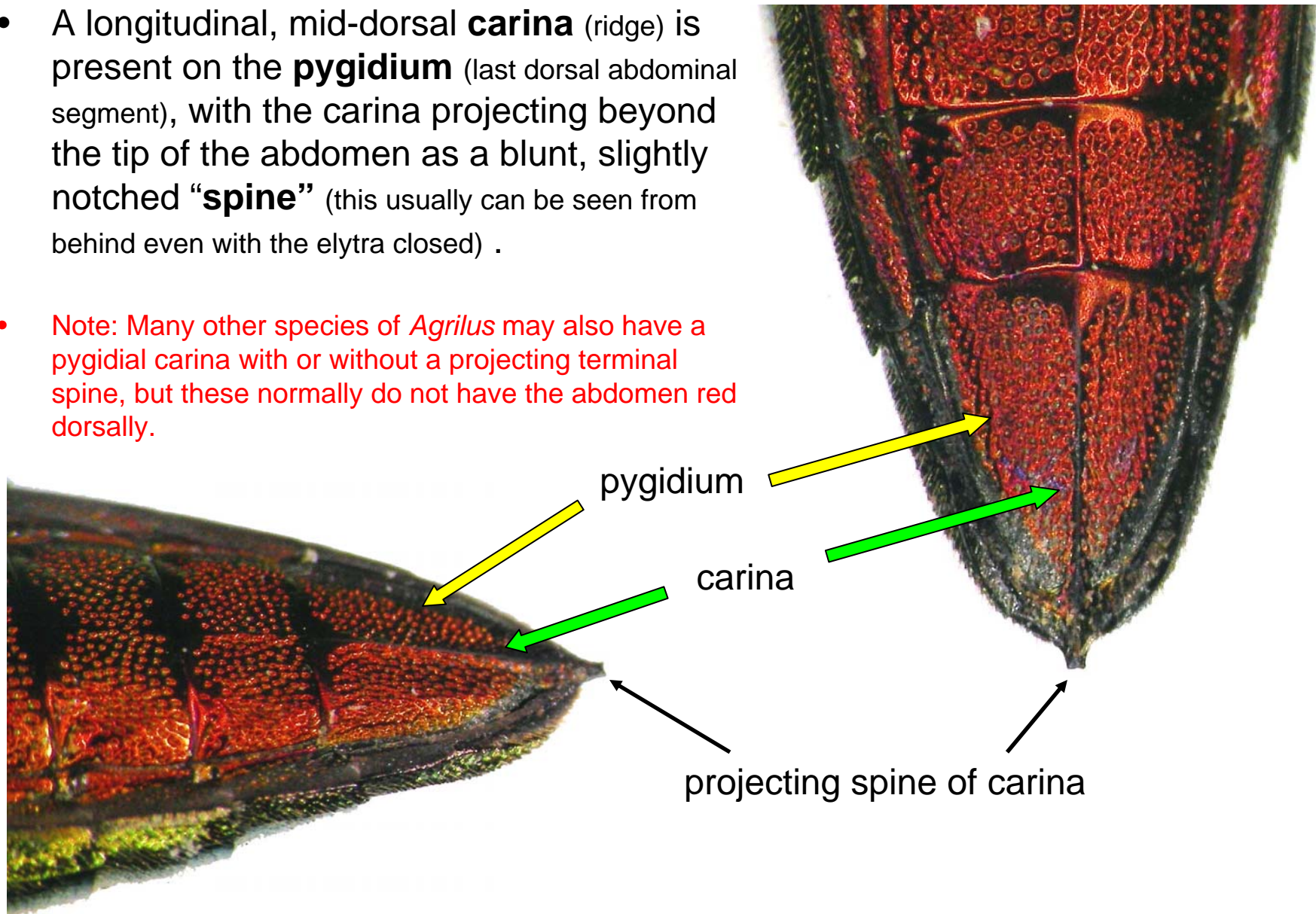
- In EAB the dorsal surface of the abdomen is bright coppery-red. This may only be visible if the elytra and wings are raised.
- **EAB is the only *Agrilus* species found in North America that has the dorsal surface of the abdomen bright metallic red.** This may be the simplest diagnostic character for separating EAB from all other *Agrilus* in North America.
- The dorsum of the abdomen is normally black, green or blue on all other North American species of *Agrilus*.
- **Note: The hind wings on many *Agrilus* species often have a reddish or pinkish iridescence that may be visible on the folded wings if the elytra are not completely closed. This may give the impression of a reddish abdomen when in fact it is only the hind wings that reflect this color. The only reliable way to determine the dorsal abdominal color is by spreading apart the elytra and hind wings to view the dorsum of the abdomen from above.**



Agrilus bilineatus – the dorsum of the abdomen is actually black in this species, but the folded hind wings show a reddish iridescence which makes it appear that the abdomen beneath the wings is reddish.

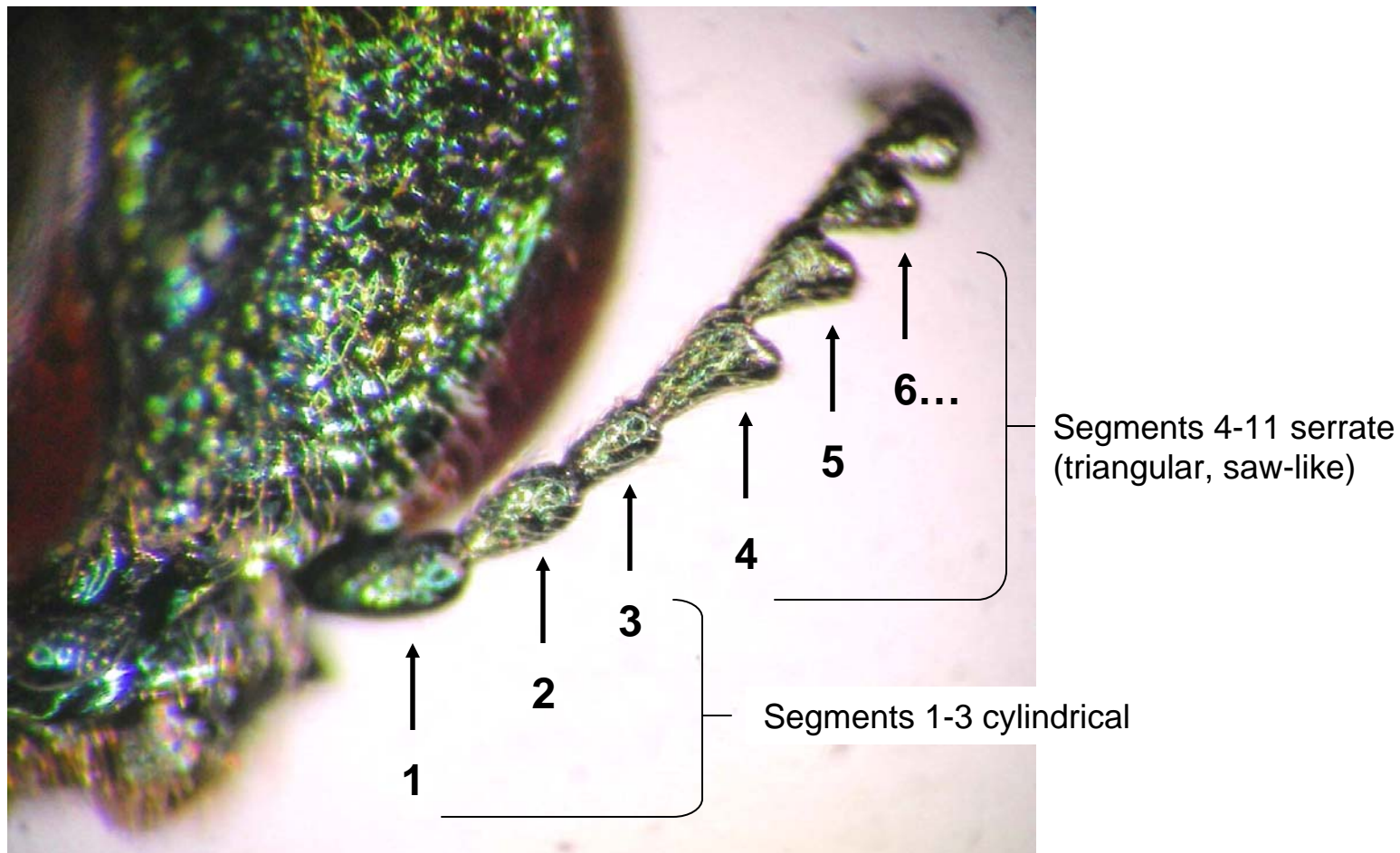
emerald ash borer (continued)

- A longitudinal, mid-dorsal **carina** (ridge) is present on the **pygidium** (last dorsal abdominal segment), with the carina projecting beyond the tip of the abdomen as a blunt, slightly notched “**spine**” (this usually can be seen from behind even with the elytra closed) .
- Note: Many other species of *Agrilus* may also have a pygidial carina with or without a projecting terminal spine, but these normally do not have the abdomen red dorsally.



emerald ash borer (continued)

- In EAB the antennal segments are serrate beginning with segment 4. (segments 1-3 cylindrical, segments 4-11 are triangular or “saw-like”).
- Note: Many species of *Agrilus* have the antennae serrate beginning with segment 4. However, in some species the antennae are serrate beginning with segment 5 (1-4 cylindrical).



emerald ash borer (continued)

Almost all *Agrilus* species exhibit some degree of natural variation in size and coloration. This is especially so with metallic colored species.

The specimens below show some of the size range and color variation seen in the more typical specimens of EAB.



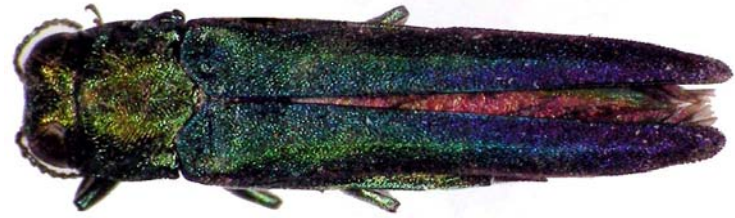
It should be noted that “metallic” coloration can be influenced by light intensity, light direction, and light quality. As you move metallic specimens around under a light, you can see them apparently change or shift color. Therefore, it is possible that individual specimens in hand may not exactly match the photos used in this guide. The individual species descriptions in this guide try to describe some of the color variations but odd variants often occur. As noted earlier, specimens in alcohol or covered in sticky trap material will seldom reflect their true colors and should be cleaned and dried before comparison to the photos in this guide.

emerald ash borer (continued)

Some examples of non-typically colored EAB adults.



green with bluish elytra



entirely bluish



(Note: dorsal surface of abdomen of some bluish specimens is brassy-green with only a slight reddish tinge)



entirely red, purplish-red or coppery-red



Although these color varieties are very rare, they might easily be confused for some of our native species which are similarly colored.

emerald ash borer (continued)

EAB was accidentally introduced into southeastern Michigan sometime in the 1990's in wood packing material imported from eastern Asia. It wasn't until 2002 that EAB was first recognized as being the source of ash tree deaths and its identity confirmed, by which time it had apparently become well established. Since then, EAB has been found in many parts of Michigan and most nearby states and Canada. The beetles are easily transported in dead ash logs and firewood, and despite quarantines on wood movement, this method of dispersal seems partly or mostly responsible for their rapid spread. It is possible EAB might eventually spread to anywhere in North America where suitable ash hosts are found. Research is being conducted to find effective chemical and biological control methods, but even then, it is unlikely that EAB can be completely eradicated, and it will likely continue invading some other parts of North America. Go to <http://www.emeraldashborer.info> for current distributions and other up-to-date information on the EAB.