

Identification Aid for Box Tree Moths (*Cydalima perspectalis*)

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At the time of writing, box tree moths were being trapped in the U.S. using male pheromone-baited, dry-type bucket traps (Fig. 1) and collected by hand. Trapping for this species in Europe has also involved the use of light traps which will produce specimens of similar quality. Unlike sticky traps, dry traps (if closely monitored and allowed to drain) can produce specimens in very good condition (Fig. 2) that can often be screened and in some cases identified without dissection. The downside to these traps is that specimens readily grows mold in moist conditions (Fig. 3) which can make dissections particularly challenging since the hyphae and spores will persist through the chemical processing (Fig. 4) and must be mechanically removed.

* note trap color may differ



Fig. 1 dry bucket trap; Fig 2. Specimens from a dry style trap; Fig. 3 moldy specimens from a dry-type trap exposed to moisture; Fig. 4 terminal segments of the abdomen after chemical processing with persistent mold spores in red circle.

External Identification

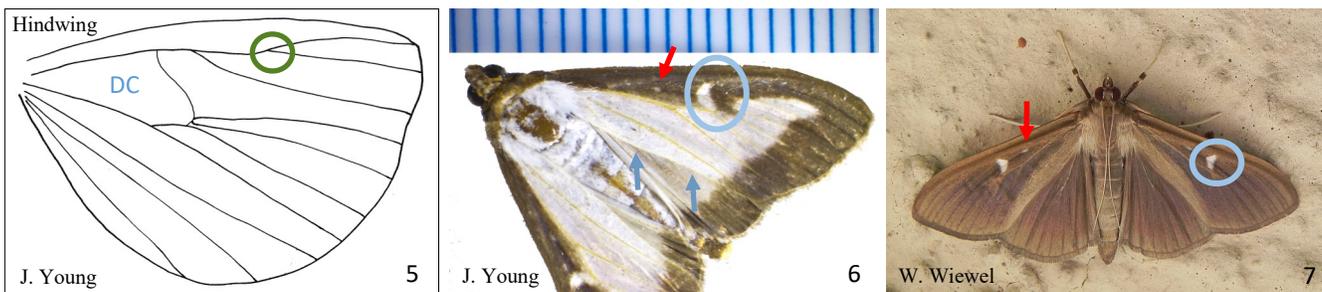
Pyraloid characters:

- Proboscis scaled (*caution*: make sure the scales are attached and not just debris; look for scale sockets)
- Visible dorsally or ventrally, the hindwing with SC & R diverging (green circle) past the discal cell (DC), (note: crossvein is weak and hard to see, a small drop of EtOH on the wing can help) (Fig 5).

Cydalima perspectalis specific characters:

- 1) Forewing with a small white spot (red arrow) and single large white “comma-shaped” mark (blue circle)
- 2) Males with a black scale tuft (which may be internalized and not visible)
- 3) *Typical Morph* (Fig. 6): Anterior and distal border of the forewing with a broad dark band. In spread specimens, the pattern continues to the hindwing but does not extend along the posterior margin to the base. Posterior margin of the forewing, except for the tornus (distal posterior angle) is white (blue arrows).

Dark Morph (Fig. 7): Except for the small white spot and large white “comma” the wing is iridescent gray with a purple hue when viewed at some angles.



TARGET

Medium-sized moth with a FW length (blue bar) 14 to 18 mm in length



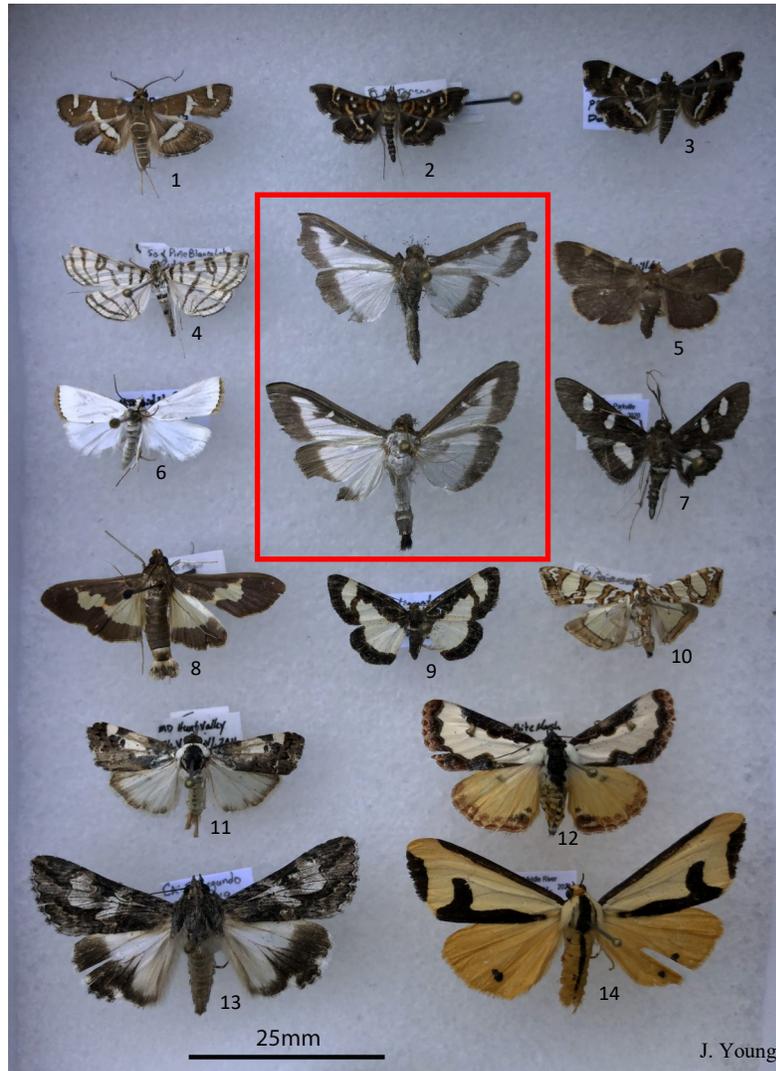
Native Genera with Similarities that Might be Encountered

Images below are from <http://mothphotographersgroup.msstate.edu/> and represent some genera that might be submitted as suspects. See page 3 for size comparison of the target to some common species.



Target with some common and uncommon native species for scale

The target, box tree moth, is in the red box. When printed on 8.5" x 11" paper the images below should be approximately life size. All specimens not in the red box are native/naturalized to CONUS and should not be submitted for further ID through this survey program.



1) *Spoladea* 2) *Diathrausta* 3) *Hymenia* 4) *Conchylodes* 5) *Hypsopygia* 6) *Udea* 7) *Desmia*
8) *Diaphania* 9) *Heliomata* 10) *Glyphodes* 11) *Tarache* 12) *Eudryas* 13) *Melipotis* 14) *Haploa*

Identification by Dissection

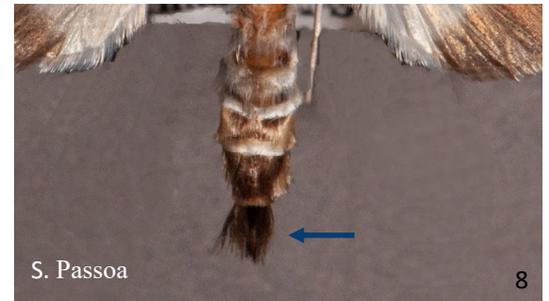
Specimen preparation follows the typical protocol for Lepidoptera encountered in traps. If you are unfamiliar with this process or are in need of detailed instructions, please review [Brambila 2009](#) for the fine details of this process. NOTE: that the time in hot KOH or NaOH is significantly reduced from the instructions in Brambila 2009 due to the smaller abdomen of this species.

- 1) Remove the abdomen of dry specimens by gently pressing up and then down with the goal of having the abdomen cleave at the attachment point to the thorax. With moist/supple specimens hold the thorax with a pair of forceps and using another pair of forceps grab the abdomen as close to the thorax as possible and carefully tear the abdomen off.
- 2) Place the abdomen briefly in EtOH and then transfer it to 8 -10% aqueous solution of KOH or NaOH.
- 3) 2 options:
 - A: for rapid processing heat the specimen for 5-10 minutes (this is quicker, but membranous structures may be deflated and more difficult to work with).
 - B: soak at room temperature for 5-8 hours* and then examine. If the specimen is still firm it can be gently warmed for 2 minute intervals until tissues are soft and can be easily removed.
- 4) Place the abdomen in vial with soapy water (dish soap works well) and gently shake. The soap will help remove fats and oils and the bubbles will perform gentle mechanical removal of unwanted tissues that were partially dissolved. Transfer to a dish of water to mechanically clean.
- 5) Using a small brush, gently clean the exterior surface of the abdomen working laterally (brushing anterior to posterior will likely rip the cuticle). Working from the genitalia to where the abdomen attached to the thorax gently press debris out of the abdominal cavity. *Extra care must be taken with female specimens.* The corpus bursae (Fig. 13 “cb”) will extend approximately half-way to the thorax and if you are too aggressive the structure can break off and be lost. With both males and females, if the abdomen is still firm and resists gentle pressure STOP! Place the abdomen back in KOH or NaOH and gently warm for 2-3 minutes and then repeat steps 4 and 5.
- 6) Once the abdomen is clear of unwanted fat and tissue move to a dish of 50% EtOH and go to instructions in the subsequent pages for male or female dissection.

* If a longer period is needed for overnight processing the concentration of the KOH or NaOH can be reduced by adding water.

Identification by Dissection– Males

In well-preserved specimens, the male can be readily separated from the female by the tuft of black setae present at the tip of the abdomen (Fig. 8). In most cases, these setae will persist through the chemical cleaning of the abdomen, but are easily brushed off (Fig. 9 blue arrow). This species also has plume setae (Fig. 9 & 10 yellow arrow) that may or may not be matted and will be more difficult to remove but, should come off with gentle pressure. The valvae (Fig. 9-11 black arrows) are bordered with short, black setae and are especially helpful for locating the tips of the valvae which are weakly sclerotized. Note: valvae are attached to tergite 10 at the purple arrow (Fig. 10) and will resist laying flat, as presented in figures 10 & 11.



Removal of the Genitalia

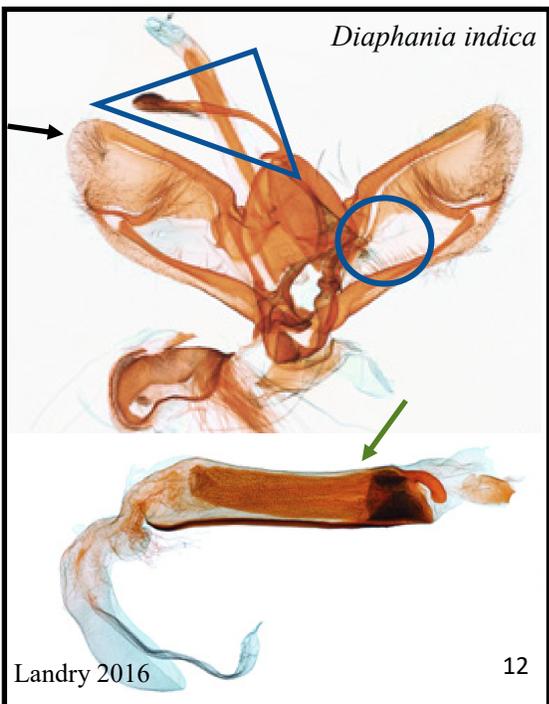
If the genital capsule is not expressed, gently apply pressure to the base of the genital capsule to position the structures as seen in figure 9. Using fine forceps tear the flexible, almost translucent cuticle between the yellow and blue arrows to separate the genital capsule from the rest of the abdomen. Be careful to not pull off and lose the phallus (green arrow in Fig. 11). Using a brush, gently but firmly, remove the setae indicated with the yellow arrow.

Morphological characters to distinguish from other taxa:

(refer to Fig 11):

- ❑ Uncus short and with a bifurcated tip (blue triangle)
- ❑ Editum with two points, one terminating with a spine, the other with a brush of setae (blue circle)
- ❑ Phallus with a long curved spine (cornutus) (green arrow)
- ❑ Tip of the valva coming to a point (black arrow)

Diaphania indica is provided for comparison (Fig. 12).



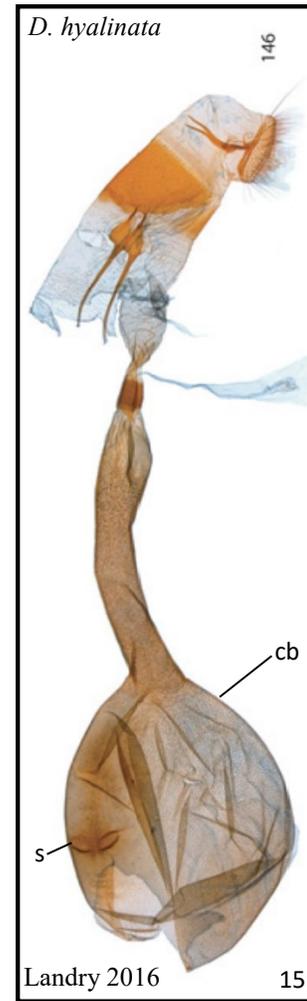
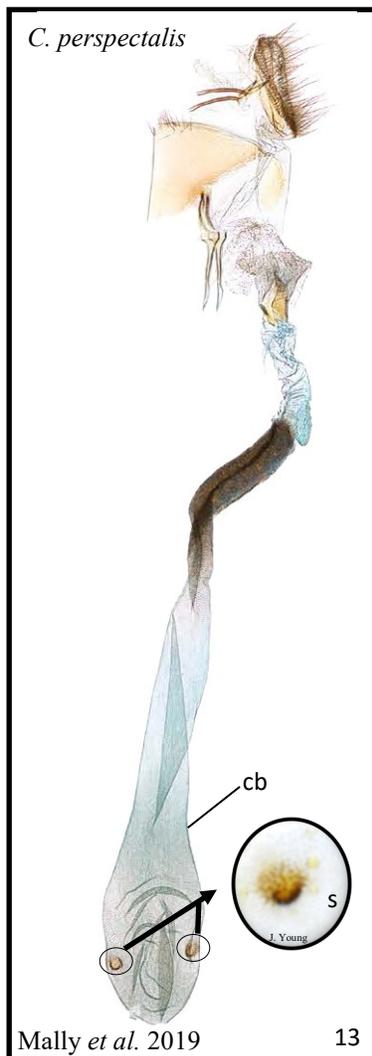
Landry, B. 2016. Taxonomic revision of the Spilomelinae (Lepidoptera, Pyralidae s. l.) of the Galápagos Islands, Ecuador. *Revue suisse de Zoologie*. 123(2): 315-399.

Identification by Dissection– Females

Females are unlikely to be encountered in pheromone traps, but may be submitted from light traps and hand collecting. These specimens are likely to be in good condition, and externally separating them from the target should be easy, with the possible exception of *Diaphania spp.* If dissection is required, it is good to keep in mind that females will often need additional processing time in KOH or NaOH due to persistent fat deposits that can be difficult to remove. Images of two *Diaphania* species are provided for comparison (Fig. 14-15). Note the differences in the shape of the corpus bursae (cb) and in *Cydalima* (Fig. 13) note the 2 small, round, spiny signa (s).

Removal of the Genitalia

Take extra care evacuating the contents of the abdomen! The corpus bursae (cb) will extend approximately half way to the thorax and if you are too aggressive it can break off and be lost. If you are uncomfortable with removing the genitalia entirely, it is possible to observe most of the structures below with the abdomen intact, if it has been thoroughly cleared and evacuated of fat, eggs and organs. If you need to remove the abdomen, it is strongly recommended that you leave the last conical abdominal segment attached. Leaving this part of the abdomen attached will reduce the chance of tearing or breaking the ductus bursae (db) or destroying the antrum (an).



Landry, B. 2016. Taxonomic revision of the Spilomelinae (Lepidoptera, Pyralidae s.l.) of the Galápagos Islands, Ecuador. *Revue suisse de Zoologie*. 123(2): 315-399.

Mally, R., B.H. Jordal, J.E. Hayden, C. Neinhuis C., & M.Nuss. 2019. "The phylogenetic systematics of Spilomelinae and Pyraustinae (Lepidoptera: Pyraloidea: Crambidae) inferred from DNA and morphology". *Arthropod Systematics and Phylogeny*. 77 (1): 141-204.