

KEY TO SCREEN SELECTED LEPIDOPTERA LARVAE OF QUARANTINE
SIGNIFICANCE TO THE SOUTHERN UNITED STATES

This key is designed to help extension entomologists quickly screen samples for quarantine significant Lepidoptera likely to be encountered as larvae in the southern USA. The couplets usually combine family characteristics with biological and morphological notes specific for each species. It is not made to replace existing family keys which are more accurate and comprehensive (Weisman 1986, Stehr 1987, Kristensen 1999 and Holloway et al. 1987). The advantage of this work is that it treats many major exotic pests of concern to APHIS in a relatively simplified format, mostly at the species level.

To keep the key simple, Cossidae and Sesiidae, gelechiids associated with cotton or potato, and noctuids in the genera *Sesamia* and *Busseola*, were all listed in the key as a unit. If a specimen fits the family characteristics, but not the second part of the couplet, it is probably a species not covered by the key. False positives (a specimen that keys to an exotic pest but is not) are possible. Knowing the origin (USA or exotic) is critical in some cases to prevent false positives. Thus, the key sometimes warns that an exotic origin needs to be confirmed. Many of the characters used in the key were taken from the literature and are cited in the attached Power Point presentation. This key does not order the characters so that the most important ones are first. Preserved larvae of all species treated below were examined except for *P. demoleus*, *D. pallivitta* and *B. graminea*. Abbreviations and setal terminology follow Stehr (1987).

Host ranges given in the key are simplified. In some cases a distribution is given. This refers to the most likely origin of a future USA infestation. Consult the taxonomic literature (eg. Zhang 1994) and USDA/APHIS/PPQ Pest ID database for a more complete summary of the known hosts, interception records, and distribution of these pests.

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|---|---|
| 1. Secondary setae covers the head and body | 2 |
| 1'. Secondary setae absent or restricted only to only a few pinacula | 4 |
| 2. Osmeterium present (Papilionidae); early instars with spiny scoli and a white mid-abdominal saddle; mature larva smooth with a black or white intersegmental markings between T2 and T3, another between A1 and A2, and a slanted lateral line on A4 and A5; anterior margin of prothorax and A9 with paired small tubercles; on citrus and relatives from the Caribbean | |
| | <i>Papilio demoleus</i> (except subspecies <i>sthenelus</i>) |
| 2'. Osmeterium absent; body with hair pencils or verrucae, not scoli; larva not colored as above; on forest trees | 3 |

3. A6 and usually A7 with dorsal glands (Lymantriidae); anal point absent; dorsal verrucae spiny, without hairbrushes, tufts, flattened white setae or transverse steel blue setal bands; head with two thick longitudinal stripes; sixth stemma closer to stemma 5 than the antennal base; prothorax with a pair of lateral projecting verrucae; trees or shrubs, usually not conifers; northeastern US *Lymantria dispar* (European)
- 3'. Large round anal point present (Lasiocampidae); no spiny verrucae; A6 and A7 without dorsal glands; ground color from brown to silver white, often with red laterally; meso and metathorax with dorsal transverse steel blue setal bands; head with two thin broken longitudinal stripes; sixth stemma closer to the antennal base than stemma 5; prothorax lacks a pair of lateral projecting verrucae; abdomen with flattened white dorsal setae; on conifers *Dendrolimus* spp.
4. Crochets absent in all stages; terminal abdominal segment of last instars with two thin threadlike tails (absent in the prepupa); larva forms a serpentine mine with a central frass tract; on citrus leaves (rarely the stem or fruit) *Phyllocnistis citrella*
- 4'. Crochets present, or if absent, then larva not a serpentine miner on citrus 5
5. Head hidden (sometimes partially) in dorsal view or D setae in a vertical line on at least A3-6 (Zygaenoidea) 6
- 5'. Head clearly visible in dorsal view; D setae of A3-6 arranged horizontally 7
6. Spiracular glands on A2 and A7 (Zygaenidae); crochets present; leaf notcher on Euonymus; from Maryland or Virginia *Pryeria sinica*
- 6'. Crochets absent (Limacodidae); spiracular glands absent on A2 and A7; larva white to gray, with a dark longitudinal stripe, and often some orange markings on A3-6; stinging scoli cover the body; wide host range; Hawaii *Darna pallivitta*
7. Prespiracular group of prothorax trisetose (most microlepidoptera) 8
- 7'. Prespiracular group of prothorax bisetose (few microlepidoptera, pyraloids, macrolepidoptera) or apparently unisetose (few Noctuidae) 16
8. Trunk borers in trees; prothoracic shield usually with a faint oblique line; crochets of A3-6 in transverse bands or ovals Cossidae, Sesiidae
- 8'. Leaf feeders and fruit, bud or stem borers on various plants (except linden bark borer and cherry bark tortrix); prothoracic shield usually without a faint oblique line; crochets usually in circles 9
9. D2 setae of A9 on the same pinaculum (Tortricidae) 10
- 9'. D2 setae of A9 on separate pinacula 12
10. D1 and SD1 of A9 on separate pinacula (Tortricinae); pale green larva; first mandibular ridge with two small teeth at the apex; SD2 of A1-7 on the margin of SD1 pinaculum; distance between the V1 setae of A9 equal to, or smaller than, the distance between the V1 setae on A8; D2 pinaculum of A9 triangular; anal comb with seven teeth; fruits or legumes from California *Epiphyas postvittana*

- 10'. D1 and SD1 of A9 on the same pinaculum (Olethreutinae); first mandibular ridge without two small teeth at the apex; SD2 of A1-7, and distance between the V1 setae of A8 and A9, both variable; D2 pinaculum of A9 not triangular; anal comb with 6-7 teeth; on citrus from California or soybeans 11
11. Head with at most a black genal spot; prespiracular group of prothorax extends below and beyond spiracle; pinacula large; crochets of A3-6 reduced laterally; spiracle of A8 near the posterior margin; anal comb with six short teeth; in California citrus fruit imported from S. Africa *Thaumatotibia leucotreta* or near
 11'. Head with a black genal band; prespiracular group of prothorax not extending below and beyond spiracle; pinacula small; crochets of A3-6 not reduced laterally; spiracle of A8 near the center of the segment; in soybean buds or pods *Epinotia aporema*
12. L setae of A1-8 joined on the same pinaculum (Gelechioidea) 13
 12'. L setae of A1-8 widely spaced, not on the same pinaculum; (Tineoidea, some Yponomeutoidea) 14
13. Submental pit present; D1 of A9 anteroventrad of D2 and anterodorsad of SD1 ("Blastobasidae"); SV of A1 group trisetose; D setae of A9 on the same pinaculum; sugarcane from Latin America *Blastobasis graminea*
 13'. At least D1 dorsad of SD1, usually D2, D1, and SD1 form a vertical line; SV group of A1 bisetose (Gelechiidae); submental pit absent; D setae of A9 on separate pinacula; on cotton and potato worldwide *Pectinophora, Mometa, Platyedra* (cotton) and various Gnorimoschemini (potato)
14. SD1 pinacula of A1-8 joined to spiracle (Acrolepiidae); on onions from Canada *Acrolepiopsis assectella*
 14'. SD1 pinacula of A1-8 separated from spiracle; not on onions 15
15. Crochets of A3-6 biserial to multiserial and uniordinal (Yponomeutidae); six stemmata present; prespiracular group of prothorax separate from spiracle; D and SD setae of A9 on a continuous pinacula; L3 of A9 absent; in the buds of citrus *Prays citri*
 15'. Crochets of A3-6 uniserial and uniordinal, surrounded by spinules on the planta; L3 present except in *Tineola* (Tineidae); two stemmata present; prespiracular group of prothorax surrounds spiracle; D and SD setae on A9 on separate pinacula; ornamentals from Hawaii or S. Florida *Opogona sacchari*
16. L setae of A1-8 joined on the same pinacula (Pyraloidea) 17
 16'. L setae of A1-8 widely spaced on separate pinacula (Noctuidae) 23

17. A sclerotized ring surrounds the SD1 seta of mesothorax (Pyalidae: Phycitinae) 18
 17'. SD1 seta of mesothorax without a sclerotized ring 19
18. Prespiracular group fused to prothoracic shield in late instars; mesothoracic SD1 pinaculum ring large and pointed posteriorly; body lacks black transverse bands; dried and damaged fruit from the Caribbean *Cryptoblabes gnidiella*
 18'. Prespiracular group separated from prothoracic shield in all instars; mesothoracic SD1 pinaculum ring thin and rounded posteriorly; body with black transverse bands; Opuntia *Cactoblastis cactorum*
19. Mesothorax with a transverse pinaculum lacking setae posterior to the D pinacula, may be pale in diapausing forms (Crambinae); V1 pinacula of A3-6 rounded 20
 19'. V1 pinacula of A3-6 bandlike (Pyraustinae); mesothorax without a pinaculum lacking setae posterior to the D pinacula or paired pinacula lacking setae are present 21
20. Prothoracic shield with tonofibrillary platelets that weakly encircle the margins and a small black spot posteroventrad to XD2; center of anal shield irregularly covered with tonofibrillary platelets of equal intensity compared to those on the prothorax; meso and metathorax with SV group bisetose; confirmed Old World origins only *Chilo suppressalis*
 20'. Prothoracic shield without tonofibrillary platelets that weakly encircle the margins; no small black spot posteroventrad to XD2; center of anal shield not irregularly covered with tonofibrillary platelets; meso and metathorax with SV group unisetose; confirmed New World origins only *Eoreuma loftini*
21. Meso and metathorax with a pair of pinacula lacking setae posterior to the D pinacula; legumes *Maruca vitrata*
 21'. Meso and metathorax without pinacula lacking setae posterior to the D pinacula; wide host range 22
22. Mandible lacks an outer tooth, one inner tooth is present on the first mandibular ridge; SV pinacula of meso and metathorax with a broad anterior notch; SV group of A1 trisetose; SD1 pinacula of A2 and A7 reduced; greenhouses from Canada or peppers from the Netherlands *Duponchelia fovealis*
 22'. Mandible with an outer tooth and three inner tooth on the first mandibular ridge; SV pinacula of meso and metathorax rounded without a broad anterior notch; SV group of A1 bisetose; SD1 pinacula of A2 and A7 not reduced; S. Florida and Jamaica from Mormidica only *Diaphania indica*
23. Prespiracular group of prothorax apparently with a single seta, the second one minute and hard to see *Sesamia/Busseola* spp.
 23'. Prespiracular group of prothorax with two obvious macrosetae setae (may be unequal in length) 24

24. Crochets biordinal; prolegs absent or vestigial on A3 and A4 (Plusiinae) 25
 24'. Crochets uniordinal; prolegs present on A3 and A4 27
25. Prolegs vestigial on A3 and A4; SD1 on A9 hairlike (Argyrogrammatini); mesothoracic D setae almost touch; two ridges of mandible do not reach cutting margin; pinacula not surrounded by ring of minute black spicules; North American greenhouses with confirmed Old World or Hawaii imports *Chrysodeixis* spp. 26
 25'. Prolegs absent on A3 and A4; SD1 on A9 setalike (Plusiini); mesothoracic D setae do not almost touch; ridges of mandible do not reach cutting margin; pinacula usually surrounded by ring of minute black spicules, most obvious in the SV or V groups confirmed Old World localities only 26
26. Genal dash present; head with a thin dash in adfrontal area; inner surface of the mandibles, especially the molar ridges, sometimes colored black *Autographa gamma* 27
 26'. Genal dash absent; head without a thin dash in adfrontal area; inner surface of the mandibles never colored black *Cornutiplusia circumflexa* 27
27. Late instars with the prothoracic L setae arranged horizontally or in a slanted line; cuticle rough and spiny (Heliiothinae); see attached key *Helicoverpa armigera* 28
 27'. All instars with the L setae arranged vertically; skin not spiny 28
28. Mesothorax and metathorax lack a minute tonofibrillary platelet connected to the SD setae by a sclerotized bar 29
 28'. Mesothorax and metathorax with at least SD1 (and sometimes SD2 as well) connected to a minute tonofibrillary platelet by a sclerotized bar 30
29. Larva not a cutworm and colored with dark segmental spots on at least A1-4 surrounding the SD1 pinacula and often the spiracles; posterior of abdomen concolorous with the anterior portion; cuticle with small dark pinacula; mandible lacks an inner tooth; last segment of labial palpi less than ½ length of basal segment; Honduras on corn or sorghum *Metaponpneumata rogenhoferi* 30
 29'. Larva a cutworm without dark lateral segmental spots; posterior of abdomen pale; cuticle smooth without dark pinacula; mandible with an inner tooth; last segment of labial palpi more than ½ length of basal segment; winter cutworm at least in the north *Noctua pronuba* 30
30. Mesothorax and metathorax with SD1 connected to a minute tonofibrillary platelet by a sclerotized bar; adfrontal area of head often white; young larva (“Prodenia group”) with a swollen thorax, mature larva often with a lateral dark spot on mesothorax (exigua) or A1 *Spodoptera* spp. (see attached key) 31
 30'. Mesothorax and metathorax with both SD1 and SD2 connected to a minute tonofibrillary platelet by a sclerotized bar 31

31. Mandible with a large retinaculum; spinneret never with a medial depression; labial palpi with the last segment as long as the basal segment; normal (dark) form with black patch surrounding spiracles of A1-8; green form with thick subspiracular stripe from the head to the anal prolegs; confirmed Old World localities only *Mamestra brassicae*
31'. Mandible without a retinaculum; spinneret usually with a medial depression; labial palpi with last segment much shorter than basal segment; young larvae with a mottled head and green dorsum faintly striped with white, mature larvae with white body setae, paired dorsal dashes or triangles, or lateral red spots, or no markings; often from Mexico, northern South America and Chile (rarer in Central America) *Copitarsia* sp.

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