NOCTUIDAE - *Helicoverpa*

Taxonomy

Noctuoidea: Noctuidae: Heliothinae: *Helicoverpa*

Common names: earworms, bollworms

Various species have been previously placed in *Heliothis*.

Larval diagnosis

Helicoverpa is a worldwide genus consisting of 20 described species (Matthews 1999). Hardwick (1965: 28) suggested a few larval characters that will diagnose *Helicoverpa* from other members of the Heliothinae (including *Heliothis*, *Chloridea*, etc.). Identification to species relies on other morphological characters in addition to body markings, origin, and host. Usually only middle to late instar larvae can be identified below the subfamily level.

The two most frequently intercepted *Helicoverpa* include: *H. armigera* and *H. zea*. Diagnoses for these two species are provided on the respective fact sheets along with keys to separate them from other *Helicoverpa*. No morphological characters have been identified that will consistently separate the larvae of *H. armigera* from those of *H. zea*.

Morphological characters to distinguish larvae of the Heliothinae including *Helicoverpa* (modified from Hardwick 1965) include:

- Prothoracic L setae arranged in horizontal or slanted horizontal line (or vertically arranged in early instars)
- Cuticular spines arising from "cobblestone thickenings" (minute rounded granules in between the spines)
- Crochets weakly biordinal (said to be uniordinal in *H. assulta* by Li et al. 2013)
- Prolegs of A3-6 equal in size
- Height of the D pinacula tends to be smaller than its diameter (this can vary, see *H. zea* Fact Sheet)
- Microspines absent on D setal bases of A1, A2 and A8 (*H. fletcheri* is an exception) (Matthews 1991: fig. 740)
- Mandible never with a large retinaculum

Host/origin information

Because *Helicoverpa* is a worldwide genus with many polyphagous species, larvae can be intercepted from nearly any origin on most any host. A complete list of the host and origin data for "*Helicoverpa* spp." is listed on the Interception Records tab. Common host/origin combinations for the two most frequently intercepted species of *Helicoverpa* (*H. armigera* and *H. zea*) are provided on the respective fact sheets.

Recorded distribution

Helicoverpa is a worldwide genus (Hardwick 1965).

Links to species fact sheets

Helicoverpa armigera

Helicoverpa zea

Larval diagnosis (Detailed)

Species identification of late instar larval Heliothinae can be found in the Heliothinae and *H. armigera* keys (below) and on the fact sheets for *H. zea* and *H. armigera*. Examples are given when identification to species, genus, or only subfamily is appropriate. This discussion focuses on identification of the early instars to genus.

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Fig. 1: Late instar *Helicoverpa armigera*


Fig. 2: Late instar *Helicoverpa armigera*


Fig. 3: Early instar *Helicoverpa armigera*


Fig. 4: Late instar *Helicoverpa zea*


Fig. 5: Mid-instar *Helicoverpa zea*

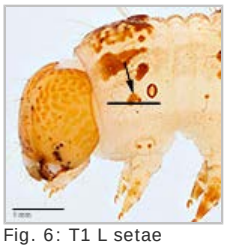


Fig. 6: T1 L setae

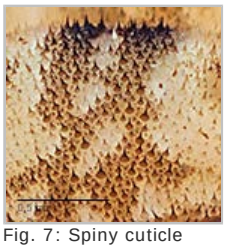


Fig. 7: Spiny cuticle


Fig. 8: No microspines

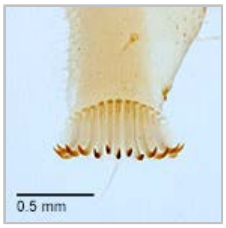


Fig. 9: Crochets

Helicoverpa larvae change color and form during development (Hardwick 1965). Early instars, as shown on the fact sheet for *H. armigera*, have dark pinacula and a faint or absent pattern of stripes or lines. Later instars develop the color pattern typical of the genus. Besides *H. armigera*, another good example of this developmental change is in *H. assulta*; the early instar is pictured here in PaDIL (click for link). Li et al. (2013) illustrated the mature larva.

According to Neunzig (1969), based on *H. zea*, the pinacula and microspine character for recognizing *Helicoverpa* works only on the third to last instar. It cannot be used on early instars. Like the later instars, early instars of *Helicoverpa* never have a large retinaculum.

It is easy to confuse early instar larvae of *Helicoverpa* with those noctuids that have a spiny or finely granular cuticle. Heliothinae do not have stout setae with a blunt tip or faint club as is common in many Herminiinae (see illustrations in Wagner et al. 2011).

Identification authority (Detailed)

Identification of *Helicoverpa* in the early instars is sometimes justified. Below are a few of some of these situations (not a complete list):

1. The host or origin suggests that only one species present in the pathway and the larva is consistent with the *Helicoverpa* early instar description. An example would be *H. zea* in corn ears from Mexico and Central America.

2. The origin can rule out sibling species. For example, Hawaii has several *Helicoverpa* species but only *C. virescens*. The keys to first, second and third, and third to last instars in Neunzig (1969) could be used to separate *H. zea* (and the native *Helicoverpa* species more than likely) from *C. virescens*.

3. The larva is clearly a middle instar *Helicoverpa*, but poorly known rare species prevent recognition of the common pests forcing only a generic identification. *Helicoverpa sugii* has a restricted distribution in Japan and an unknown host range (Yoshimatsu and Takeuchi 2004). Species identification of *Helicoverpa* in Australia by morphology is difficult to impossible.

Do not identify a larva as *Helicoverpa* if a large retinaculum is present, the dorsal pinacula have microspines near the top of the setal base, or the body setae are stout with a faint club or blunt tip. *Helicoverpa fletcheri* from Africa is an exception.

The vast majority of early instar Heliothinae are best left at subfamily with the notation that the larvae are too young to name with morphology.

Identification guide to larval Heliothinae (Lepidoptera: Noctuidae) of quarantine significance

Key to the identification of *Helicoverpa armigera* suspects intercepted at U.S. ports of entry

Origin records

Helicoverpa have been intercepted from the following locations:

Afghanistan, Angola, Australia, Austria, Azores, Bangladesh, Benin, Brazil, Bulgaria, Cambodia, Cameroon, Canada (?), Cape Verde, China, Colombia, Congo, Costa Rica, Cote D'Ivoire, Czech Republic, Dominican Republic, Ecuador, Egypt, El Salvador, Fiji, France, Gambia, Germany, Ghana, Greece, Guatemala, Guinea, Guyana, Haiti, Hong Kong, India, Indonesia, Iran, Israel, Italy, Jamaica, Japan, Jordan, Kenya, Laos, Lebanon, Lithuania, Macao, Macedonia, Malaysia, Mali, Mexico, Morocco, Nepal, Netherlands, New Zealand, Nigeria, Norway (?), Pakistan, Palestinian Territory, Peru, Philippines, Portugal, Puerto Rico, Romania, Saudi Arabia, Senegal, Serbia, Serbia and Montenegro, Singapore, South Africa, South Korea, Spain, Syrian Arab Republic, Tanzania, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, United Kingdom of Great Britain and N. Ireland, Uzbekistan, Venezuela, Viet Nam, Zambia, Zimbabwe

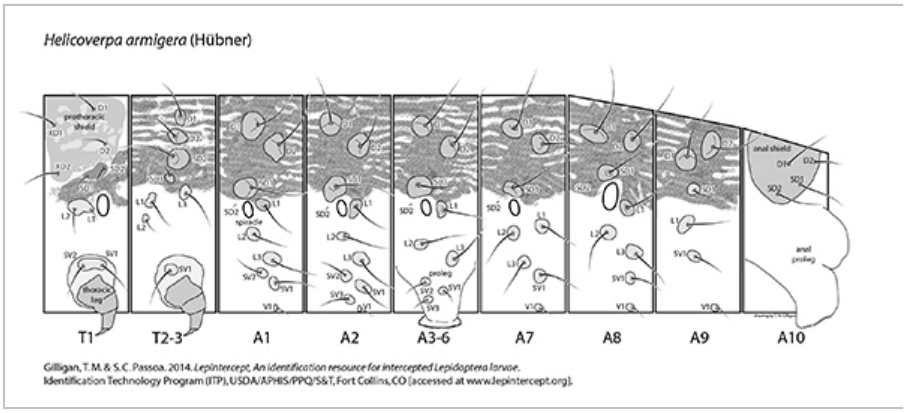
Host records

Helicoverpa have been intercepted on the following hosts:

Abelmoschus esculentus, *Abelmoschus* sp., *Achillea* sp., *Aconitum* sp., *Agapanthus* sp., *Ageratum* sp., *Alcea rosea*, *Alchemilla mollis*, *Alchemilla* sp., *Allium porrum*, *Allium schoenoprasum*, *Allium* sp., *Alstroemeria* sp., *Amaranthus* sp., *Ammi majus*, *Ammi* sp., *Ananas comosus*, *Anemone coronaria*, *Anemone nemorosa*, *Anemone* sp., *Anethum graveolens*, *Anigozanthus* sp., *Annona* sp., *Anthemis* sp., *Anthriscus cerefolium*, *Antirrhinum* sp., *Apium graveolens*, *Artemisia dracunculus*, *Artemisia* sp., *Asclepias* sp., *Asclepias tuberosa*, *Asparagus officinalis*, *Aster* sp., *Astilbe* sp., *Astrantia* sp., *Berzelia* sp., *Bouvardia* sp., *Brassica* sp., *Brunia albiflora*, *Bupleurum griffithii*, *Bupleurum* sp., *Cajanus cajan*, *Calendula* sp., *Calla* sp., *Campanula glomerata*, *Campanula* sp., *Capsicum annuum*, *Capsicum pubescens*, *Capsicum* sp., *Carthamus* sp., *Celosia argentea*, *Celosia* sp., *Cestrum* sp., *Chamelaucium* sp., Chenopodiaceae, *Chenopodium* sp., *Chichorium* sp., *Chrysanthemum* sp., *Cicer arietinum*, *Cicer* sp., *Cichorium intybus*, *Cichorium* sp., *Citrus hystrix*, *Clematis* sp., *Colocasia esculenta*, *Corchorus* sp., *Coriandrum sativum*, *Coridothymus capitatus*, *Crossandra* sp., *Crotalaria* sp., *Cucurbita pepo*, *Cucurbita* sp., Cucurbitaceae, *Cymbidium* sp., *Cynara* sp., *Dahlia* sp., *Delphinium* sp., *Dendranthema* sp., *Dendrobium* sp., *Dianthus caryophyllus*, *Dianthus* sp., *Diascia* sp., *Dimocarpus* sp., *Dolichos* sp., *Echinacea* sp., *Eremurus* sp., *Ergngium* sp., *Erica* sp., *Eruca sativa*, *Eruca vesicaria*, *Eryngium* sp., *Euphorbia* sp., *Eustoma grandiflorum*, *Eustoma* sp., Fabaceae, *Fragaria* sp., *Gardenia jasminoides*, *Gardenia* sp., *Genista* sp., *Gentiana* sp., *Gerbera* sp., *Gladiolus* sp., *Glycine max*, *Gomphrena globosa*, *Gomphrena* sp., *Gravilea* sp., *Grevillea* sp., *Gypsophila* sp., *Helianthus annuus*, *Helianthus* sp., *Helleborus* sp., *Hibiscus* sp., *Hydrangea* sp., *Hypericum* sp., *Ixora* sp., *Jasminum*

sambac, *Jasminum* sp., *Lablab purpureus*, *Lablab* sp., *Lactuca sativa*, *Lavandula* sp., *Leucadendron platyspermum*, *Leucadendron* sp., *Leucospermum cordifolium*, *Leucospermum* sp., *Liatris* sp., *Lilium* sp., *Limonium perezii*, *Limonium* sp., *Lippia* sp., *Lisianthus* sp., *Lycopersicon esculentum*, *Lycopersicon* sp., *Lysimachia* sp., *Marjorana hortensis*, *Matricaria* sp., *Mentha arvensis*, *Mentha longifolia*, *Mentha* sp., *Mentha spicata*, *Moluccella* sp., *Momordica balsamina*, *Monstera* sp., *Musa* sp., *Nasturtium* sp., *Nelumbium* sp., *Nelumbo nucifera*, *Nerine* sp., *Nigella* sp., *Ocimum basilicum*, *Ocimum* sp., *Oncidium* sp., Orchidaceae, *Origanum majorana*, *Origanum* sp., *Origanum vulgare*, *Ornithogalum arabicum*, *Ornithogalum orabiaum*, *Ornithogalum* sp., *Oryza sativa*, *Paeonia* sp., *Papaver* sp., *Paullinia* sp., *Persea americana*, *Petroselinum crispum*, *Petunia* sp., *Phaseolus* sp., *Phaseolus vulgaris*, *Phlox* sp., *Photinia* sp., *Physalis ixocarpa*, *Physalis philadelphica*, *Physalis* sp., *Pieris* sp., *Pisum sativum*, *Pisum sativum* var. *macrocarpon*, *Pisum* sp., *Pittosporum* sp., *Plectranthus* sp., Poaceae, *Polianthes tuberosa*, *Polyanthus* sp., *Protea* sp., *Prunus* sp., *Psidium guajava*, Ranunculaceae, *Ranunculus asiaticus*, *Ranunculus* sp., *Raphanus sativus*, *Rosa* sp., *Rosmarinus officinalis*, *Rosmarinus* sp., *Rudbeckia* sp., *Rumex acetosa*, *Salvia officinalis*, *Salvia* sp., *Sarcocaulon* sp., *Satureja hortensis*, *Scabiosa* sp., *Sedum* sp., *Serruria* sp., *Setaria italica*, Solanaceae, *Solanum aethiopicum*, *Solanum lycopersicum* var *lycopersicum*, *Solanum melongena*, *Solanum* sp., *Solidago* sp., *Symphoricarpos* sp., *Syringa* sp., *Tagetes erecta*, *Tagetes* sp., *Thymus citriodorus*, *Thymus* sp., *Thymus vulgaris*, *Trachelium* sp., *Tulipa* sp., *Veronica longifolia*, *Veronica* sp., *Veronica spicata*, *Verticordia* sp., *Viburnum* sp., *Vicia faba*, *Zantedeschia* sp., *Zea mays*, *Zea* sp.

Setal maps



Helicoverpa armigera setal map

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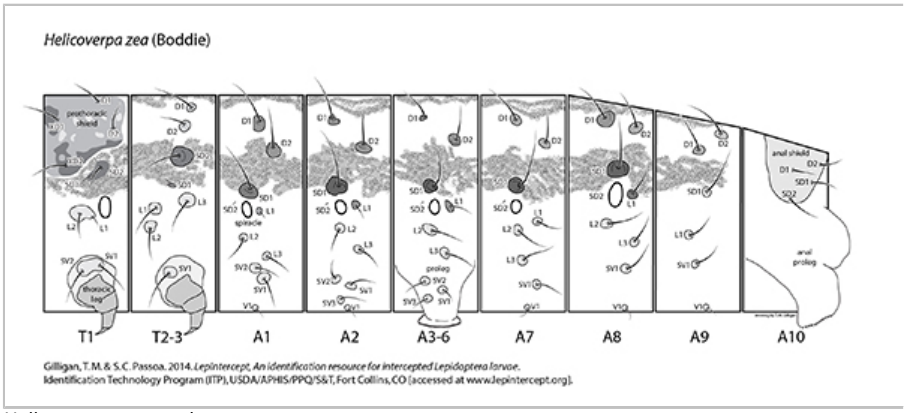

Helicoverpa zea setal map

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