

QUEENSLAND DEPARTMENT OF PRIMARY INDUSTRIES

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KEY TO THE LARVAE OF THE COMMON SPECIES OF ARMYWORMS, CUTWORMS AND BUDWORMS FOUND IN QUEENSLAND

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SUMMARY

A key is given for the separation of ultimate and penultimate instars of four genera of noctuid moths: *Agrotis*, *Heliothis*, *Pseudaletia* and *Spodoptera*, and for the separation of some species of the genera *Agrotis* and *Spodoptera*.

I. INTRODUCTION

The genera represented in the key: *Agrotis*, *Heliothis*, *Pseudaletia* and *Spodoptera*, family Noctuidae, include important pests in Queensland. In the field, larvae can often be recognized by their feeding habit, the position in which they occur on the host plant and their time of activity, i.e. whether they are diurnal or nocturnal feeders. For example, *Heliothis* spp. (budworms) are commonly confined to the flowers, fruit and seed-capsules of the host plant while *Agrotis* spp. (cutworms) which nip off the plant at ground level are nocturnal and hide in the soil at the base of the plant during the day. *Pseudaletia* spp. and *Spodoptera* spp. (armyworms) feed on the stems and leaves of the host plant, the former being nocturnal and the latter mainly diurnal.

Larvae of the species mentioned were successfully reared on an artificial medium (Shorey and Hale 1965) from eggs obtained from field collected moths.

The key was devised to facilitate the identification of some common economic larvae which attack cereals, grasses and pastures in Queensland. It can be used with accuracy only with the ultimate and penultimate instars.

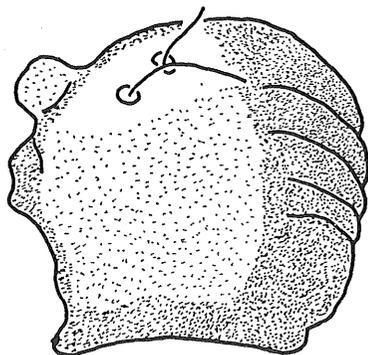
In the key the nomenclature applied to the setae follows Hinton (1946). An example is given in figures 7 and 8. The structure of a typical larvae is shown in figure 1.

II. KEY

- | | | | | |
|--|----|----|----|---------------------------|
| 1. Skin covered with spinules (fig. 2) | .. | .. | .. | <i>Heliothis</i> spp.* |
| Skin smooth | .. | .. | .. | 2 |
| Skin granulose (figs. 3, 4) | .. | .. | .. | 6 |
| 2. Pinnacula of setae of the first seven abdominal segments not distinct | .. | | | 3 |
| Pinnacula of setae of the first seven abdominal segments distinct | .. | .. | .. | <i>Pseudaletia</i> spp.** |

*Kirkpatrick (1961) has published keys to separate the larvae of the species of *Heliothis* occurring in Australia, although it is unreliable in the present authors' opinion. It is worth noting, however, that he considers the larvae of *armigera* (Hübner) and *punctigera* Wall., the two species of greatest economic significance, to be identical in all characters examined. This conclusion is supported by the present authors.

**No reliable characters could be found to separate the species of this genus. However, the predominant species of economic importance appears to be *P. convecta* (Walk.) with *P. separata* Walk. occurring occasionally in small numbers.



0.2mm

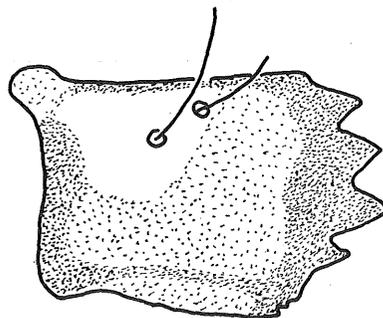


FIG. 6

FIG. 5

Figure 5. Mandible of *Spodoptera mauritia* (Boisd.)

Figure 6. Mandible of *Spodoptera litura* (F.)

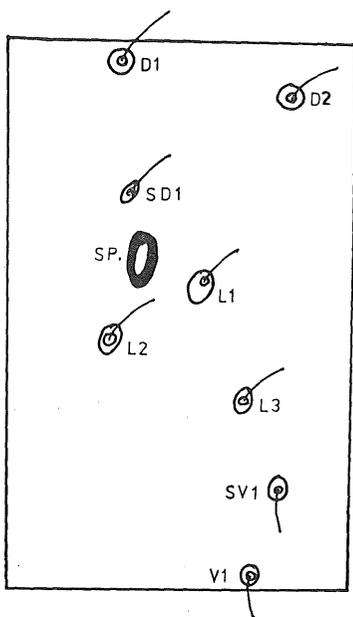


FIG. 7

Figure 7. Setal map of abdominal segment 8 of larva of *Agrotis porphyricollis* (Guen.)

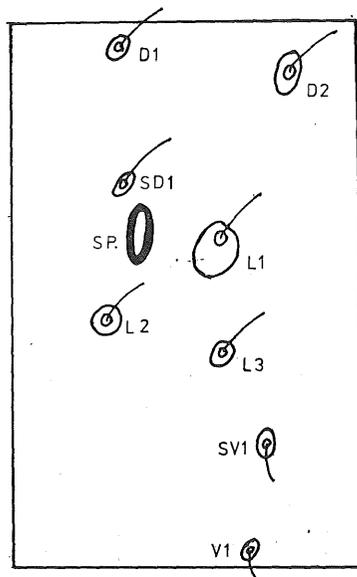


FIG. 8

Figure 8. Setal map of abdominal segment 8 of larva of *Agrotis ypsilon* (Hufn.)

3. Meso- and metathorax and the first eight abdominal segments each with a pair of conspicuous dark, semicircular spots, remainder of pattern indistinct 5
 Larvae not as above. Larvae in high-density populations velvety black with yellowish longitudinal lines. Low-density populations light brown to greenish. (But note that colouration is extremely variable) 4
4. Spiracles entirely brown to black *Spodoptera exempta* (Walk.)
 Spiracles pale, surrounded by a black rim *Spodoptera exigua* (Hüb.)
5. Mandibles with poorly developed teeth; ribs on outer surface distinct, extending from tooth-base to 2/3 depth of mandible (fig. 5) *Spodoptera mauritia* (Boisd.)
 Mandibles with well developed teeth; no ribs on outer surface of mandible (fig. 6) *Spodoptera litura* (F.)
6. Vertical diameter of pinnaculum of seta L1 on abdominal segment 8 less than the vertical diameter of the spiracle (fig. 7). Skin granules strongly convex to sub-conical 7
 Vertical diameter of pinnaculum of seta L1 on abdominal segment 8 equal to or greater than the vertical diameter of the spiracle (fig. 8). Skin granules flat to convex, never sub-conical *Agrotis infusa* (Boisd.)***
 and *Agrotis ypsilon* (Hufn.)
7. Skin granules coarse and strongly convex; primary granules close together, generally separated from each other by 1-2 times the diameter of the granules (fig. 3) *Agrotis porphyricollis* (Guen.)
 Skin granules finer, bluntly conical; primary granules isolated from each other, generally scattered over the surface of the skin and separated by 4-5 times the diameter of the granules (fig. 4) *Agrotis munda* Walk.

III. ACKNOWLEDGEMENTS

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***No constant characters could be found to separate these two species. However, *A. ypsilon* (Hufn.) is greasy-grey with darker longitudinal bands and has a mottled dark brown and cream pronotum while *A. infusa* (Boisd.) has a uniformly dark brown pronotum, and is brown to black with darker longitudinal bands.