

*Male*.—In color and general appearance similar to the female. Antennae slender, filiform, longer than the entire body; scape four times as long as thick; pedicel globular; joint 3 as long as scape, four times as long as thick, excised, but not deeply, on basal one-fourth; joint 4 shorter than joint 3; joints 3–13 gradually shorter; joint 13 two-thirds as long as joint 4; apical joint about one and one-fourth times as long as preceding joint. Petiole one and one-third times as long as wide. Abdomen, including petiole, about as long as head and thorax combined; exclusive of petiole, twice as long as wide; second tergite one and one-half times as long as wide; fourth and fifth tergites each about one-half as long as the preceding tergite.

*Length*, 2.2–2.8 mm.

Taken at Hollyburn, 11 June–20 September, 1928–30.

## SEASONAL HISTORY AND MORPHOLOGICAL NOTES ON *POLYSCELIS MODESTUS* GAHAN.

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### INTRODUCTION.

The general life history of this species was published by P. R. Myers<sup>1</sup> in 1924. At that time, it was thought to be a rare parasite of the Hessian fly, but in 1928 it was found by the authors to be parasitizing, in considerable numbers, the fall generation of the Hessian fly during the very early spring days. It is the purpose of this paper to call attention to this latter occurrence and also to present some additional morphological details which were lacking in the earlier account by Myers.

### EXTENT OF PARASITISM.

In the spring of 1928 adults of *Polyscelis modestus* were found in two wheat fields that were heavily infested with the Hessian fly. One was located near Carlisle, Pa., and the other about 8 miles south of Carlisle near Mt. Holly Springs, Pa. On May 7, by which time the period of oviposition of *P. modestus* was past, a sample of 100 Hessian fly puparia was secured from the field at Mt. Holly Springs, and dissection showed 33 per cent of them to be parasitized by *P. modestus*.

### OVIPOSITION.

Hessian fly puparia containing both larval and pupal stages were found to be parasitized indiscriminately. As the season advanced, pupae in all stages of development were found which

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had been oviposited upon by this parasite. The parasitic egg was always found loosely placed on the surface of the Hessian fly larva or pupa within the puparium. The egg (fig. 1), which is normally ovate, was sometimes found bent near its smaller end as though it had been lodged in a restricted position between the host and the wall of its puparium. The appearance of the egg shell after hatching is shown in Figure 2.

The female apparently stings her host before ovipositing. Hosts taken in the field bearing eggs of *P. modestus* were always found in a paralyzed condition, and there were always present one or more black spots in the epidermis where the ovipositor of the parasite had punctured the tissue. Captive females were observed to insert their ovipositors through the wall of a puparium of the host several times before finally ovipositing. It usually took about 24 hours for the point through which the ovipositor was thrust to appear as a black spot. The dark area was found to penetrate a slight distance into the host's body. In only one instance was the female observed to place her mouth to the point pierced by the ovipositor as though to feed on host material.

#### MORPHOLOGY.

In the publication by Myers previously mentioned, descriptions were given of the egg, primary larva, mature larva, prepupa, pupa, and adult, together with figures of the egg, mature larva, front view of head, and mandibles of the same stage, and the pupa. Since further studies on this parasite have afforded the opportunity to make additional morphological observations, there are included in the present paper descriptions of the stages which were previously lacking, together with more detailed morphological descriptions of some of the other stages than were given by Myers. The figures of the egg and pupal stages are reproduced from Myers for the sake of continuity and in order to illustrate more clearly the morphological changes undergone during the growing period.

The larva was found to pass through five instars. These may be distinguished by the size and appearance of the mandibles (figs. 3-7). Measurements of the mandibles from apex to exterior margin of the condyle showed the following differences: instar I, 0.015 mm.; instar II, 0.027 mm.; instar III, 0.033 mm.; instar IV, 0.047 mm.; instar V, 0.053 mm. The first-instar larva (fig. 8), besides being smaller, differs conspicuously from the other instars by the large size of its head and thorax as compared with the rest of the body, and by the sharpness with which the abdomen tapers to the caudal extremity. It has well defined antennae and its mouth parts (fig. 9) are capable of considerable protrusion. Spiracles are present on the mesothorax and first three abdominal segments.

The second, third, and fourth instars appear essentially the same as the last instar except in size and minor details. In these instars spiracles are found on the mesothorax, metathorax, and first seven abdominal segments. The lateral seta located near each side of the mouth is conspicuous in the second instar but in subsequent instars decreases in length relative to the increase in size of the body. The ventral view of the head of the full grown larva is depicted in Figure 10, showing the position of the mouth parts, setal arrangement, and antennae. The shaded area shows the position of the mandibles, duct of the silk gland, and supporting chitinous structure, all of which are hidden more or less beneath the surface. The antenna of the full-grown larva is 0.01998 mm. long and is shown in Figure 11. The lateral aspect of the larva is shown in figure 12 and the setal arrangement on its caudal extremity in Figure 13. Ventral aspects of the prepupal and pupal stages are shown in figures 14 and 15.

#### EXPLANATION OF PLATE.

*Figures drawn by C. C. Hill.*

1. Egg (length 0.38 mm.) (After Myers.)
2. Eggshell after hatching (length 0.35 mm.).
3. Mandible of first-instar larva (distance from apex to outer margin of condyle 0.015 mm.).
4. Mandible of second-instar larva (distance from apex to condyle 0.027 mm.).
5. Mandible of third-instar larva (distance from apex to condyle 0.033 mm.).
6. Mandible of fourth-instar larva (distance from apex to condyle 0.047 mm.).
7. Mandible of full-grown larva (distance from apex to condyle 0.053 mm.).
8. First-instar larva, lateral aspect (length 0.2736 mm.).
9. Ventral aspect of head of first-instar larva showing position of mouth parts, setae, and antennae (head width 0.1225 mm.).
10. Ventral aspect of head of full-grown larva showing position of mouth parts, setae, and antennae. The shaded area is chitinized tissue beneath the surface and reveals the mandibles, silk-gland duct, and supporting chitinous structure (head width 0.60 mm.).
11. Antenna of full-grown larva (length of inside area shown by dotted line 0.01998 mm.).
12. Full-grown larva, lateral aspect (length 1.65 mm.).
13. Caudal extremity of full grown larva, ventral aspect, showing position of setae (greatly enlarged).
14. Prepupal stage, ventral aspect (length 1.8 mm.).
15. Pupal stage, ventral aspect (length 1.8 mm.) (After Myers.)

#### *Abbreviations.*

<i>a</i> , antenna	<i>m</i> , mandible
<i>bc</i> , buccal cavity	<i>sgld</i> , common duct of silk gland
<i>lbi</i> , labium	<i>s</i> , sensorial spine
<i>lbr</i> , labrum	

