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BIOLOGY AND METAMORPHOSIS OF SOME SOLOMON
ISLANDS DIPTERA. PART I: MICROPEZIDAE
AND NERIIDAE*

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DURING the recent war I served in the Solomon Islands with a United States Navy Malaria and Epidemic Control unit which was responsible for the control of arthropods of medical importance. Since it is possible that some of the poorly known flies of that region are actual or potential vectors of epidemic disease, knowledge of their general biology might be of prophylactic value, and I therefore observed the habits and reared the larvae of many of the Diptera encountered.

Regardless of possible epidemiological significance, the information gained concerning the life cycles and biology of the sixty-one species reared seems to be of sufficient interest to warrant publication. Restricted to a relatively unstudied region, many of the species collected were new, and nearly all of the larvae are undescribed. In several instances, the larvae and puparia collected are the only immature forms known in

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the genus, the subfamily, or even the family which they represent.

In the present paper, the first of a planned series, the occurrence and general biology of Micropezidae and Neriidae found on Guadalcanal and New Georgia Islands are discussed, and immature stages of *Mimegralla albimana striatofasciata* Enderlein, Micropezidae, and *Telostylinus lineolatus* (Wiedemann), Neriidae, are described and figured. To ensure accuracy of proportions, tracings of micro-projector images were utilized as the basis of all drawings.

I am indebted to Mr. George C. Steyskal, of Detroit, Michigan, for identification of the Diptera, and to Dr. C. F. W. Muesebeck, of the Bureau of Entomology and Plant Quarantine, United States Department of Agriculture, for identification of the hymenopterous parasites. Miss Grace Eager, artist at the University of Michigan Museum of Zoology, and Mr. Joseph C. Bender, formerly an assistant in the Department of Zoology, University of Michigan, gave valuable assistance in the preparation of illustrations.

Several recent papers on the Micropezidae and Neriidae (Enderlein, 1922; Frey, 1927; Czerny, 1930, 1932; Cresson, 1930, 1938; and Hennig, 1934-35, 1935-36, 1937) present considerable information on the taxonomy and systematic relationships especially of the Palearctic, Nearctic, and Neotropical species. As already stated by Curran (1934: 306) and Cresson (1938: 296), very little is known about their early stages and habits.

MICROPEZIDAE

Wheeler (1924) and Dorn (1928) reported on the habits of Micropezidae, and Hennig (1935-36: 214-17) reviewed the fragmentary knowledge concerning the biology of the family. The only published descriptions of immature stages seem to be those of Fischer (1932), concerning "*Grallomyia annulata* (Fab.)," and Sabrosky (1942), dealing with the puparium of *Rainieria brunneipes* (Cresson). Published records of Micropezidae from the Solomon Islands apparently are confined to those of *Mimegralla contingens salomonis* Hennig,

described from two specimens collected on Shortland Island (Hennig, 1935-36: 192-93), and a "poorly preserved specimen belonging to the genus *Mimegralla*" from Malaita Island (Curran, 1936: 30).

The five species of Micropezidae to be discussed here include four which were recently described from specimens collected on Guadalcanal (Steyskal, 1947) and one, *Mimegralla albimana striatofasciata* Enderlein, which was collected on both Guadalcanal and New Georgia Islands, although previously reported only from the Bismarck Archipelago. The four species described by Steyskal are *Eurybata tetras*, *Gongylocephala atra*, *Gongylocephala pallida*, and *Grammicomyia bergi*. Adult specimens of these five species and larvae and puparia of *Mimegralla a. striatofasciata* are deposited in the University of Michigan Museum of Zoology. Imagoes of *Mimegralla a. striatofasciata* are also deposited in the American Museum of Natural History and in the United States National Museum.

Mimegralla a. striatofasciata is abundant in the jungle areas of Guadalcanal and New Georgia. Adults are often observed resting or running about on leaves of jungle underbrush with their wings folded compactly over their abdomens and with their long, narrow front legs waving before them like antennae. Hennig (1935-36: 216-17) emphasized that this habit, characteristic of several species of Micropezidae, often contributes toward a remarkable mimicry of certain Ichneumonidae. It is striking in this species because of the sharply contrasting white of the fore tarsi. They feed on excrement, carrion, and putrescent fruits.

Copulation, which usually takes place on a large leaf, is similar to that reported for another species of this family by Wheeler (1924). Male and female remain together for ten to fifteen minutes, alternately standing still and walking about. The male fore tarsi are held parallel on the sides of the female prescutum while his other tarsi remain on the leaf.

The habits of the four other micropezid species are not well known. All specimens were taken in moist, shaded situations ranging from open woodland to deep jungle. The copulatory

behavior of *Gongylocephala atra* is similar to that described above for *Mimegralla a. striatofasciata*.

On three occasions immature stages of *Mimegralla a. striatofasciata* were discovered and reared. Larvae occur in moist, decaying vegetable matter and probably eat this substance or the fungus which grows on it. In the laboratory they thrived in this material, which was kept moist and exposed to the air, and made no attempt to leave it before pupation. They move slowly and crawl about relatively little. The average duration of the pupal stadium is thirteen days.

On October 13, 1944, a single puparium was found beneath the moist bark of a fallen tree near the Tenaru River, about one and one-half miles from its mouth on the north coast of Guadalcanal. The adult emerged six days later.

On January 6, 1945, at least forty larvae were collected from beneath the wet bark of a large dead hardwood tree trunk lying on the bank of the Little Tenaru River, two and one-half miles from the north coast and one and one-half miles from the site of the October collection. Twelve larvae were immediately killed and preserved. By January 10, more than half of those remaining had pupated. The first five emergences occurred between 7:30 and 8:30 on the morning of January 19. Six more adults emerged between 6:30 and 7:00 on the following morning, and nine between 7:00 A.M. and 8:00 A.M. on January 21. After six flies had emerged on the next two mornings, the few remaining pupae were preserved. Although emergence had continued for five days, it was limited in any given day to a duration of one hour sometime between 6:30 A.M. and 8:30 A.M. This seems to indicate marked diurnal periodicity in the activity of the pupa.

On February 22, 1945, larvae of *Mimegralla a. striatofasciata* were found living in the pulp surrounding the seeds of sago palm, *Metroxylon* sp., which were lying on moist ground near Yankee River, one-half mile from the north coast and four miles from the two earlier collections. Several larvae had pupated four days later. The only adult flies obtained from this collection were two which emerged on the morning of March 10.

On March 24 and again on March 28 some small parasitic Hymenoptera were found in the rearing jar. One of these was identified by Muesebeck as belonging to the Pteromalidae, probably an undescribed form in the genus *Spalangia*. The others he identified as *Trichopria* n. sp. (Diapriidae). Each of the puparia parasitized by the latter species yielded several parasites. One puparium with two emergence holes (Pl. II, Fig. 3) still contained fourteen *Trichopria* pupae in a series of stages of development. Fischer (1932: 22) found a micropezid puparium parasitized by a species of Diapriidae, later described by Ogloblin (1934) as *Trichopria lamellifera*.

LARVA OF *Mimegralla a. striatofasciata*

Ten preserved mature larvae of *Mimegralla a. striatofasciata* (Pl. I, Fig. 1) range 8.2–11.1 mm. in length, average, 10.0 mm.; maximum width, 1.3–1.8 mm., average, 1.6 mm. The larva is white or very light gray, nearly cylindrical, tapering anteriorly, and somewhat truncate posteriorly. There are twelve visible segments: one small pseudocephalic, three thoracic, and eight abdominal. The larva is amphipneustic, bearing anterior spiracles on the first thoracic segment and posterior spiracles on the eighth abdominal segment.

Spinulose areas, used in locomotion, occupy the ventral anterior part of each abdominal segment. These areas on abdominal segments 1–7 (Pl. I, Fig. 2) are fairly uniform, each composed of a posterior row of minute, crowded spinules with combined bases, an intermediate row of larger, individual spinules, an irregular front row, and several scattered spinules anterior to it. Most of these spinules are simple conical processes, quite blunt, and directed backward. The spinulose area on the eighth abdominal segment differs from the others in that the posterior row is represented by only two small trifid sclerites. A few larger spinules are scattered irregularly around the anal plate.

The anal plate (Pl. I, Fig. 2) surrounding the median, longitudinal slit is a chitinized region of blunt, irregular elevations immediately behind the spinulose area of the eighth abdominal

segment. A triangular flap with denticulate margins usually covers the posterior part of the anal slit. Since this flap is directed posteriorly in some preparations, its attachment must be a hingelike one along the smooth rear edge. Fischer (1932: 20) described what seems to be a homologous structure in the larva of another micropezid species thus: "O orificio anal é representado por uma fenda longitudinal, atraz da qual se encontra um órgão circular . . . de difícil interpretação."

Gross morphology of the pharyngeal skeleton and mouth hooks is illustrated on Plate I, Figure 4. For clarity, a dorsal bridge between the lateral rods of the hypostomal sclerite is omitted. The mouth hooks are dark, rather heavy, and without denticles along their lower margins.

The bilobed first segment (Pl. I, Fig. 6) bears two pairs of small tubercles. The minute inferior ones barely protrude beyond the adjacent body surface, but the three-segmented dorsal tubercles are larger and more distinct. When protruded, the mouth hooks are visible on either side of the median longitudinal oral groove just anterior to the mouth orifice. Corrugation of the integument laterad to the oral groove forms a series of ridges and furrows, the former overlapping like shingles and hiding the furrows from view. The serrate exposed edges of these ridges are generally directed posteriorly, ventrally, or posteroventrally. Two semicircular flaps in the oral groove just behind the mouth orifice apparently are the structures which Phillips (1946) called "oral lobes." Paired digitate structures are anterior to the mouth between the mouth hooks.

The posterior spiracular plates of the larva (Pl. I, Fig. 5) are terminal, heavily chitinized, projecting structures slightly above the horizontal axis, and separated by a distance equal to approximately one-tenth the diameter of a single plate. Each bears three oval spiracular slits and two conspicuous tapering processes: one short, blunt, and median; the other longer and in a dorsolateral position. Near the median process, the conical depression or scar called a "button" by recent authors (Greene, 1921; Sabrosky, 1942) marks the position of

the spiracle of the first instar larva (De Meijere, 1895: 77-78). A tuft of fine, branched, radiating hairs arises from each of four relatively clear, subcircular spots near the margin.

These posterior spiracles are similar in several respects to those observed on other species of Micropezidae by Fischer (1932) and Sabrosky (1942). All three have prominent dorso-lateral processes, spiracular scars in mesial or dorsomesial positions, and marginal spots. Neither Fischer nor Sabrosky mentioned radiating hairs, however, and Sabrosky figured four spiracular slits on each plate.

The paired, fan-shaped anterior spiracles (Pl. I, Fig. 3), which open into the lateral tracheal trunks, protrude from the body wall near the posterolateral margin of the first thoracic segment. They terminate in seventeen to nineteen small papillae, each of which bears several minute pores on its truncate extremity. Behind these papillae there is a conical depression termed the "*aussere Stigmennarbe*" by De Meijere (1895: 75), who observed a similar structure on the larva of *Hydromyza livens* Fallen (Scatophagidae) and stated that it is the scar or vestige of the anterior spiracle of the first instar larva.

PUPARIUM OF *Mimegralla a. striatofasciata*

Twelve preserved puparia of *Mimegralla a. striatofasciata* (Pl. II, Fig. 3) range 5.6-6.8 mm. in length, average, 6.2 mm.; maximum width, 1.4-1.7 mm., average, 1.6 mm. The puparium is dark brown, somewhat depressed throughout, but more strongly so toward the truncate anterior end, and bluntly rounded posteriorly. The integument bears no tubercles nor other processes, but has vestiges of the larval spinulose areas, spiracles, and anal plate, and weak transverse striations which become more prominent around the anal plate and near the anterior end.

The posterior spiracles (Pl. II, Fig. 1) are similar to those of the larva, but more heavily sclerotized and farther apart. They are situated above the longitudinal axis in an oval, slightly concave area enclosed by a very dark, thick ridge of the integument. Although the anal plate is below and anterior to this area, it is visible in a direct posterior view.

When the adult escapes, it ruptures the puparium along a circular suture, detaching an anterior part which includes, approximately, the three thoracic segments. This anterior part is divided by a semicircular horizontal suture into two pieces, the dorsal and ventral anterior plates. The ventral anterior plate, to which the pharyngeal skeleton and mouth hooks adhere, usually remains loosely attached to the puparium.

The dorsal anterior plate (Pl. II, Fig. 2) has a roughly triangular, more heavily sclerotized area, centrally situated, and bears some wrinkles of the integument which are very heavy and coarse at the anterior end, but progressively lighter and finer toward the posterior. The larval anterior spiracles, connected internally with cast linings of the larval tracheae, are at the anterolateral corners of the dorsal anterior plate.

NERIIDAE

The Neriidae (formerly Neriinae, Micropezidae) were elevated to family rank by Hendel (1922: 157). As indicated above, the literature concerning this family is almost entirely of a taxonomic and distributional nature. Biological notes of Jacobson (recorded by De Meijere, 1911: 354-56) on the Javaneſe *Gymnonerius fuscus* (Wiedemann) concern adult flies only. Neriidae have been reared from cereus, papaya, calabash, and banana (Cresson, 1938: 296), and from cotton bolls (Bezzi, 1928: 88), but no immature stages have been described.

Curran (1936: 30) doubtfully identified Neriidae collected on San Cristoval, Solomon Islands, by the Templeton Crocker Expedition as *Telostylinus lineolatus* (Wiedemann). Steyskal has tentatively referred the reared specimens herein discussed to the same species. Adult specimens are deposited in the University of Michigan Museum of Zoology, in the American Museum of Natural History, and in the United States National Museum. Larvae and pupae are deposited in the University of Michigan Museum of Zoology.

Adults of *T. lineolatus* were often observed feeding on the sap exuding from wounds in trunks of papaya trees (*Carica*

papaya), near the Tenaru River, about one and one-half miles from the north coast of Guadalcanal. With their slender bodies elevated on long, thin legs and wings folded compactly over their narrow abdomens, they have a stiltlike posture as characteristic as their jerky, sporadic movements. Reluctant to fly into open spaces, they elude the collector's net by remaining near the protection of the plant, running suddenly along and around the trunk and darting quickly from one papaya tree to another.

Immature stages of *T. lineolatus* were found twice in or beneath the bark of fallen timber. The larvae probably eat decaying wood or the fungus growing on it. They lived and pupated in this material in the laboratory. The pupal stadium averaged ten days in duration.

On January 25, 1945, two puparia were collected from beneath the moist bark of a fallen hardwood tree near the Nalimbu River three and one-half miles from the north coast of Guadalcanal. Adults emerged two and three days later.

On April 11, 1945, more than forty larvae were secured from the bark of a dead tree lying on the bank of the Tenaru River two miles from the north coast. This bark had a soft, cheesy consistency and a sour smell. As it decomposed in the laboratory, it became more liquid and more malodorous. Eight larvae were killed and preserved immediately. On April 28 most of the remaining specimens had pupated. The first adult emerged on May 6, and twenty-three more were obtained between then and May 21.

LARVA OF *Telostylinus lineolatus*

Eight preserved mature larvae of *Telostylinus lineolatus* (Pl. III, Fig. 1) range 5.9–8.1 mm. in length, average, 7.0 mm.; maximum width, 0.6–0.9 mm., average, 0.8 mm. The larva is white, slender, nearly cylindrical, tapering anteriorly, and bluntly rounded posteriorly. The twelve visible segments include one small pseudocephalic, three thoracic, and eight abdominal. It is amphipneustic, bearing anterior spiracles on the first thoracic segment and posterior spiracles on the eighth abdominal segment.

The anteroventral part of each abdominal segment is supplied with hooklets or spinules used in locomotion. The fusiform spinulose areas on abdominal segments 2-8 (Pl. III, Fig. 2) are similar, all having the anterior two rows of spinules somewhat separated from the other four. On abdominal segments 2-6, these anterior two rows are shorter than the other four rows of the segment; on abdominal segment 7 they are subequal; on abdominal segment 8, longer. On each of these segments, the posterior three rows of spinules point backward; the anterior three, forward. Spinules of the anterior and posterior rows are minute. The greatly reduced spinulose area of the first abdominal segment includes only two rows of minute spinules directed backward.

The anal plate (Pl. III, Fig. 2), just behind the spinulose area of the eighth abdominal segment, supports spinules of considerable range in size, including the largest on the body. It bears the median longitudinal anal slit in a glabrous central region. A small denticulate projection behind the anal slit may be homologous to the denticulate flap described above for *Mimegralla a. striatofasciata*.

Gross morphology of the pharyngeal skeleton and mouth hooks is illustrated in Plate III, Figure 3. For purposes of clarity, certain complexities of the hypostomal sclerite are omitted. The mouth hooks are dark, fairly heavy, and smooth along their lower margins.

The strongly bilobed first segment (Pl. III, Fig. 4) bears two pairs of small tubercles. Although the lower ones are set out prominently on papillae, they are minute and often indistinct. The three-segmented dorsal tubercles are larger and more evident. Mouth hooks protrude on either side of the deep, longitudinal oral groove just anterior to the mouth, and oral lobes, at the base of the mouth and laterad to it, are large and conspicuous in this species. As in *Mimegralla a. striatofasciata*, the integument in the oral region is corrugated to form alternate ridges and furrows, but the position and number of serrate ridges differ in the two species, and the serrations are much finer on *T. lineolatus*.

The posterior spiracles are terminal, chitinized plates borne on paired protuberances above the horizontal axis, and separated by a distance equal to approximately half the length of a single plate. Each plate is a vertically elongate sclerite (Pl. III, Fig. 5) bearing four slightly curved spiracular slits. These slits nearly enclose the spiracular scar or "button," which is near the center of the plate. Four tufts of branched, radiating hairs arise from clearer areas near the spiracular slits.

The fan-shaped anterior spiracle (Pl. III, Fig. 6), which opens into the lateral, longitudinal tracheal trunk, terminates in eight (sometimes nine) small papillae, each bearing several minute pores on its truncate extremity. A conical depression (the "*aussere Stigmennarbe*" of De Meijere, 1895) is faintly visible behind these papillae.

PUPARIUM OF *Telostylinus lineolatus*

Twelve preserved puparia of *T. lineolatus* (Pl. II, Fig. 6) range 4.8–6.3 mm. in length, average, 5.3 mm.; maximum width, 0.9–1.3 mm., average, 1.1 mm. The puparium is brown, slender, and elongate. Widest at the second and third abdominal segments, it tapers abruptly toward the truncate anterior end and more gradually toward the bilobed posterior extremity. It bears weak transverse striations and vestiges of the larval spiracles, anal plate, and spinulose areas. A dorsal flexure of the last three segments (Fig. 1) is more strongly marked in some specimens than in others. Its cross-sectional outline is nearly circular at the sixth abdominal segment, but becomes depressed both anteriorly and posteriorly.

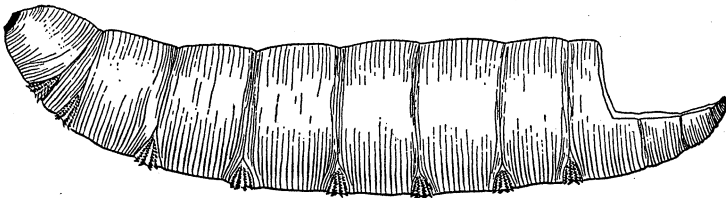


FIG. 1. Lateral view of puparium of *Telostylinus lineolatus* after emergence of imago.

The posterior spiracles (Pl. II, Fig. 4) are similar to those of the larva, but are separated by a distance greater than the length of a single spiracular plate. The anal plate and one to three of the posterior spinulose areas are also visible in an end view.

When the imago escapes, the puparium is ruptured in a manner similar to that described above for *Mimegralla a. striatofasciata*, except that the anterior plates include about one-half the first abdominal segment, and the ventral anterior plate usually is not detached from the puparium (Fig. 1). Both anterior plates have four or five longitudinal rugose folds on the second thoracic segment, and some heavy, irregular wrinkles on the prothoracic segment.

The dorsal anterior plate (Pl. II, Fig. 5) bears the anterior spiracles at its anterolateral corners.

SUMMARY

The five species of Micropezidae herein discussed occur in moist, shaded situations. The subspecies *Mimegralla albimana striatofasciata* Enderlein feeds on excrement, carrion, and putrescent fruits, and copulates on large leaves of jungle underbrush.

Larvae of *Mimegralla a. striatofasciata* live in decaying wood and other vegetable matter. They pupate in this substance, and the average duration of the pupal stadium is thirteen days.

Although the emergence of twenty-six specimens of *Mimegralla a. striatofasciata* occurred over an interval of five days, it was restricted in any given day to a duration of one hour, sometime between 6:30 A.M. and 8:30 A.M.

Two species of parasitic Hymenoptera were reared from puparia of *Mimegralla a. striatofasciata*.

The larva and puparium of *Mimegralla a. striatofasciata*, discussed with the aid of nine figures, are similar in certain respects to the one larva and two puparia of Micropezidae previously described.

Telostylinus lineolatus (Weidemann), the only species of

Neriidae discussed here, feeds on the sap of papaya (*Carica papaya*).

Larvae of *T. lineolatus* live in and under decaying bark. They pupate in this material, and the pupal stadium averages ten days in duration.

The larva and puparium of *T. lineolatus* are described with the aid of ten figures. Apparently, these are the first descriptions of immature stages in the family Neriidae.

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PLATE I

Larva of *Mimegralla a. striatofasciata*.

- FIG. 1. Lateral view of whole larva.
- a. pl. Anal plate.
 - a. sp. Anterior spiracle.
 - m. h. Mouth hooks.
 - p. sp. Posterior spiracles.
 - s. a. Locomotor spinulose areas.
- FIG. 2. Ventral view of anal plate and last two spinulose areas.
- a. pl. Anal plate.
 - a. s. Anal slit.
 - d. f. Denticulate flap.
 - s. a. 7 Spinulose area of seventh abdominal segment.
 - s. a. 8 Spinulose area of eighth abdominal segment.
- FIG. 3. Anterior spiracle.
- b. w. Cut edge of body wall.
 - sp. s. Spiracular scar.
 - tr. Lateral tracheal trunk.
- FIG. 4. Pharyngeal skeleton and mouth hooks.
- h. s. Hypostomal sclerite.
 - m. h. Mouth hooks.
 - ph. s. Pharyngeal sclerite.
- FIG. 5. Right posterior spiracular plate.
- d. l. pr. Dorsolateral process.
 - m. pr. Mesial process.
 - m. s. Marginal spot.
 - r. h. Radiating hairs.
 - sp. Spiracular slits.
 - sp. s. Spiracular scar.
- FIG. 6. Ventrolateral view of first segment.
- d. s. Digitate structures.
 - h. s. Hypostomal sclerite of pharyngeal skeleton.
 - m. h. Mouth hooks.
 - o. l. Oral lobes.
 - s. r. Serrate ridges.

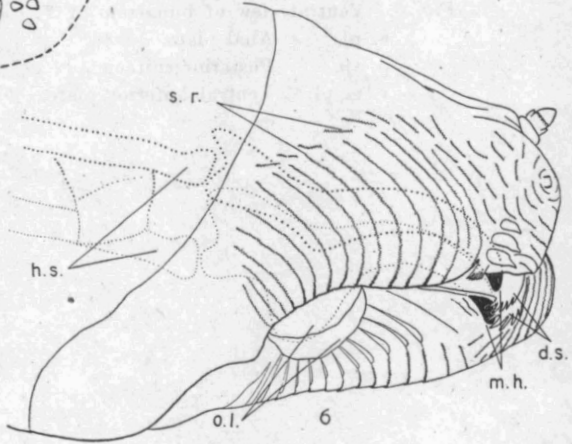
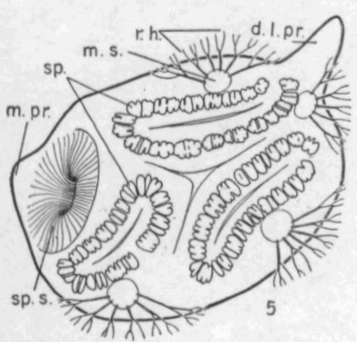
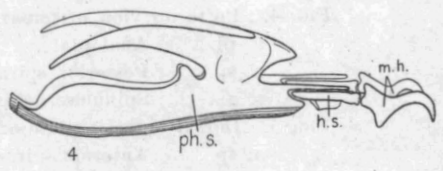
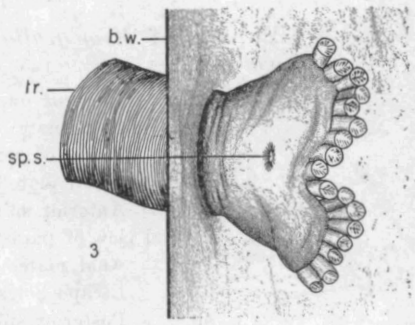
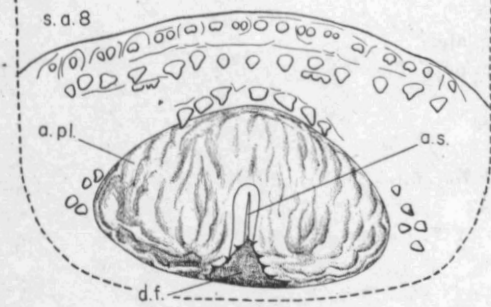
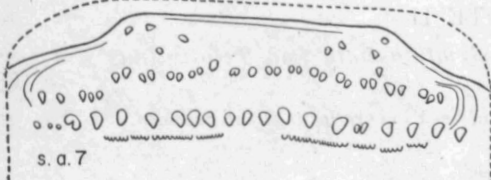
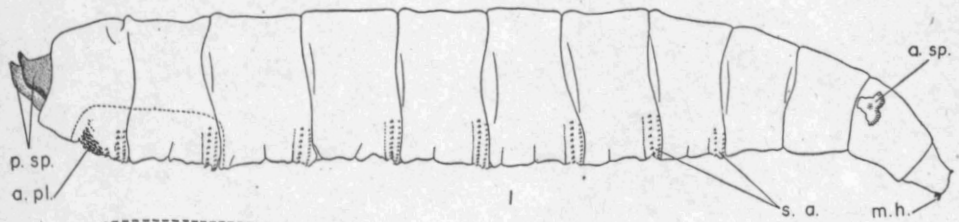


PLATE II

Puparia of *Mimegralla a. striatofasciata* and *Telostylinus lineolatus*.

- FIG. 1. Posterior view of puparium of *Mimegralla a. striatofasciata*.
a. pl. Anal plate.
p. sp. Posterior spiracles.
- FIG. 2. Dorsal anterior plate of *M. a. striatofasciata* puparium.
a. sp. Anterior spiracles.
- FIG. 3. Ventral view of parasitized puparium of *M. a. striatofasciata*.
a. pl. Anal plate.
e. h. Escape holes of parasites.
p. sp. Posterior spiracles.
v. a. pl. Ventral anterior plate.
- FIG. 4. Posterior view of puparium of *T. lineolatus*.
a. pl. Anal plate.
p. sp. Posterior spiracle.
s. a. Spinulose areas.
- FIG. 5. Dorsal anterior plate of *T. lineolatus* puparium.
a. sp. Anterior spiracles.
- FIG. 6. Ventral view of puparium of *T. lineolatus*.
a. pl. Anal plate.
p. sp. Posterior spiracle.
v. a. pl. Ventral anterior plate.

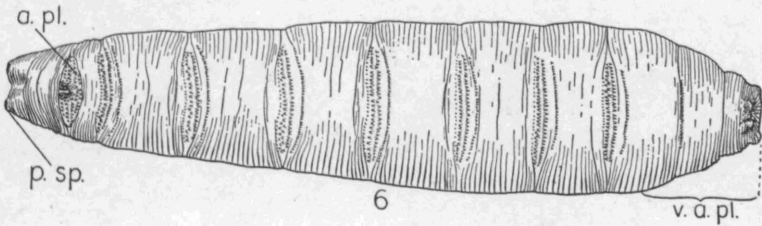
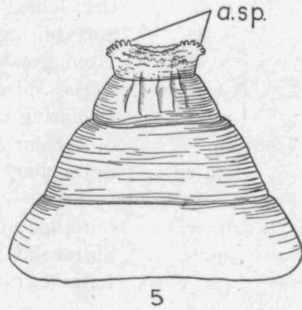
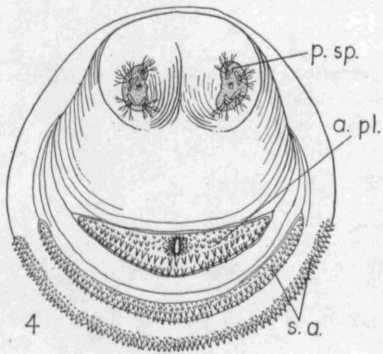
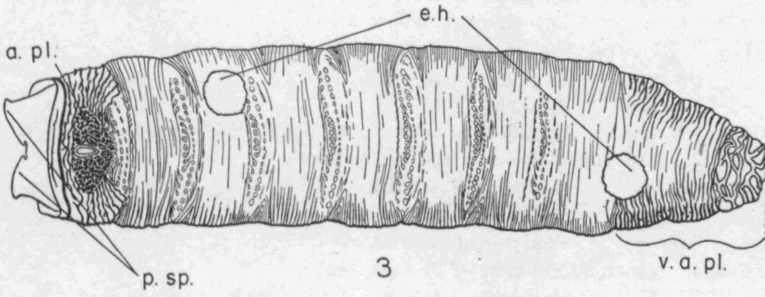
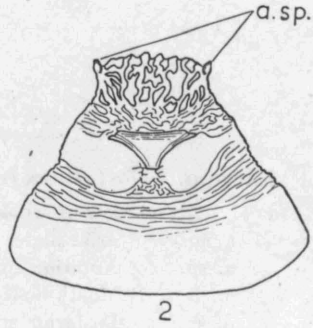
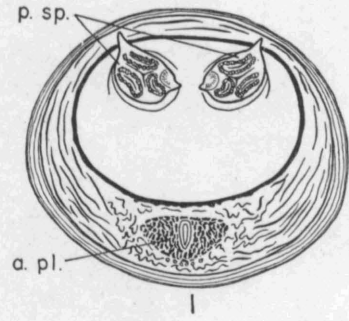


PLATE III

Larva of *Telostylinus lineolatus*.

FIG. 1. Lateral view of whole larva.

- a. pl. Anal plate.
- a. sp. Anterior spiracle.
- m. h. Mouth hooks.
- p. sp. Posterior spiracles.
- s. a. Locomotor spinulose areas.

FIG. 2. Ventral view of anal plate and last spinulose area.

- a. pl. Anal plate.
- a. s. Anal slit.
- s. a. 8 Spinulose area of eighth abdominal segment.

FIG. 3. Pharyngeal skeleton and mouth hooks.

- h. s. Hypostomal sclerite.
- m. h. Mouth hooks.
- ph. s. Pharyngeal sclerite.

FIG. 4. Ventrolateral view of first segment.

- h. s. Hypostomal sclerite of pharyngeal skeleton.
- m. h. Mouth hooks.
- o. l. Oral lobes.
- s. r. Serrate ridges (the serrations are too fine to show without greater magnification).

FIG. 5. Right posterior spiracular plate.

- r. h. Radiating hairs.
- sp. Spiracular slits.
- sp. s. Spiracular scar.

FIG. 6. Anterior spiracle.

- b. w. Cut edge of body wall.
- sp. s. Spiracular scar.
- tr. Lateral tracheal trunk.

