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Pholeomyia comans (Diptera: Milichiidae) an Associate of *Atta texana:* Larval Anatomy and Notes on Biology

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With 12 Figures

Abstract

Adults of *Pholeomyia comans* enter the nests of *Atta texana* and lay eggs in the underground detritus cavities, where the maggots feed on exhausted fungus garden substrate and nest refuse recently deposited by workers. The thirdstage larva and the puparium are described. A diapriid wasp was obtained from *P. comans* puparia. One species of uropodid and two species of macrochelid mites phoretic on *P. comans* adults are discussed.

Introduction

The Milichiidae (o l i m Phyllomyzidae) are a small family of acalyptrate flies whose life histories are poorly known. Existing information indicates, however, that the larvae of the various species generally feed on decaying vegetable matter or excrement. Associations with ants have been reported for several members of the family. Species of *Phyllomyza* and *Milichia* have been found in the nests of *Formica* and *Lasius* (SÉGUY 1950). *Costalima myrmicola* Sabrosky is apparently an inquiline in *Azteca* nests in *Cecropia* trees (SABROSKY 1953). SABROSKY (1959) reported the field observations of W. L. BROWN, jr. and E. O. WILSON, who found adults of *Pholeomyia decorior* Steyskal tracking workers of the leaf-cutting ant, *Trachymyrmex septentionalis* McCook.

Near Austin, Texas, *Pholeomyia texensis* Sabrosky is found in nests of the town ant, *Atta texana* Buckley. In studies since terminated, the present authors observed *Pholeomyia comans* and *P.* n. sp. nr. *leucogastra* (Loew) [determined by C. W. SABROSKY] in town ant nests in central Louisiana, near Alexandria. The information recorded here comprises what is known about *P. comans;* descriptions of the third larval stage and the puparium are included. Though much remains to be learned, it seems clear that the species follows the scavenger habits of other known species in the family.

Biology

Adult flies of *P. comans* seemed to be directly attracted to ant nests and were never seen following ants. On 5 occasions during February, March, and

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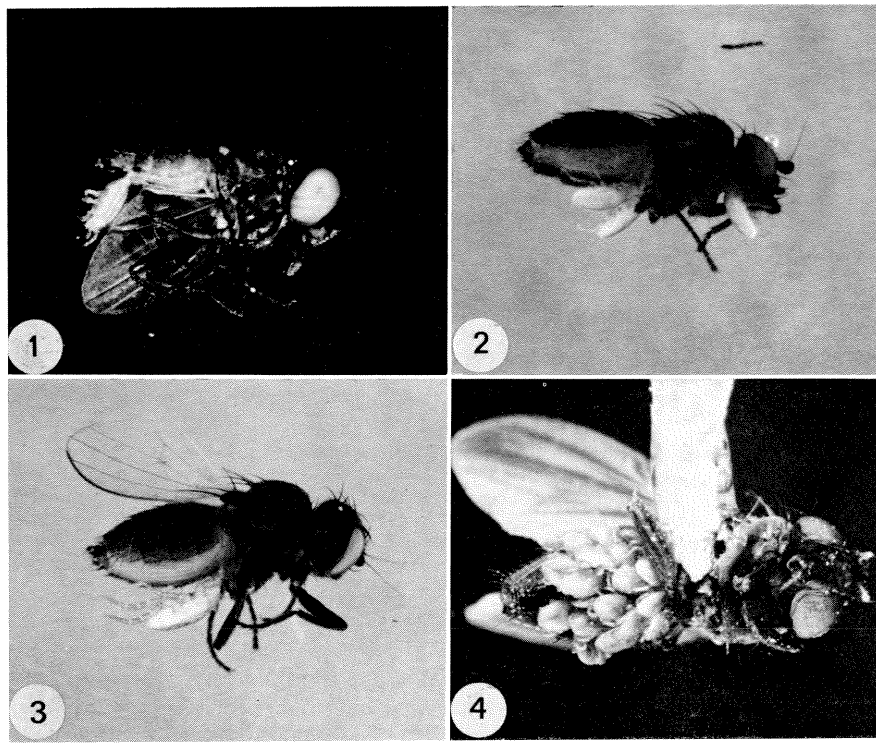


Fig. 1. Deutonymph of Uropodidae sp. hanging by fecal tube from male *P. comans* – *Fig. 2.* Three females of small *Macrocheles* sp. attached by chelicerae to female *P. comans* – *Fig. 3.* Female of large *Macrocheles* sp. – *Fig. 4.* Twenty females of small *Macrocheles* sp. attached by chelicerae to female of *Pholeomyia* sp. nr. *leucogastra*

October, adults were observed entering nests during the day through holes used by ants. On one occasion (March 8), an adult entered an ant town that had been extirpated by methyl bromide, perhaps an indication that the fly is attracted to the nest and not to the ants. In summer, no flies were observed in or near the nests, presumably because the ants are nocturnal and plug entrance holes during the day. One female of *P.* n. sp. nr. *leucogastra* (Fig. 4) was collected at 1 p. m. on 24 July just under a plugged nest entrance hole. Presumably it would have exited that night after workers unplugged the hole. Another dipterous associate of *A. texana* exhibits a similar behavior. Gravid females of *Fannia moseri* Chillicott were noted entering and emerging from ant tunnels being used by workers (CHILLCOTT 1965).

In excavated nests, larvae and puparia of *P. comans* were found exclusively in detritus cavities, which contain exhausted fungus garden substrate and other nest refuse. Immature stages were never found in fungus gardens or in dormancy cavities; they were most numerous in freshly deposited detritus, but on occasion some were seen in detritus partially or completely decomposed. The presence of longitudinal ridges (PhS Figs. 6, 9) on the ventral part of the cephalopharyngeal skeleton suggests that the maggots may utilize bacteria and fungi in the detritus as well as small

detrital particles (see DOWDING 1967, 1968). Numerous empty puparia of *P. comans* were found in detritus cavities containing decomposed substrate. Larvae of *P. comans* were found at depths of 1 to 10 feet; in summer, they were usually in cavities at a depth of 4 feet or less, whereas in winter they were below 7 feet.

In the laboratory, a generation of *P. comans* requires about 6 weeks. When 2 females and 1 male were placed in a jar containing moist detritus from a laboratory ant colony, the parent adults lived 3 days; and 6 weeks later 31 adults emerged.

Two other common town ant associates, *F. moseri* and *Lobopoda opacicollis* Champion (= *L. subcuneata* Casey) (Coleoptera: Alleculidae), fed on fresh detritus and often coexisted with *P. comans*. Their biologies are discussed by CHILLCOTT (1965), CAMPBELL (1966), and MOSER (1963).

Psilis n. sp. (Hymenoptera: Diapriidae) was reared from pupae of *P. comans* from detritus cavities of at least 3 nests. In all cases, adults emerged from puparia within 2 weeks after collection.

Various species of mites are often abundant in detritus being actively worked by insect inquilines, and *Pholeomyia* spp. seem to aid the dispersal of mites between ant nests. At least 3 species, a uropodid (? *Uroseius* sp. det. B. D. Ainscough) and 2 macrochelids (*Macrocheles* spp.), are phoretic on both male and female *P. comans* and *P.* n. sp. nr. *leucogastra* (Fig. 4). Deutonymphs of the uropodid were attached to the abdomen (Fig. 1) and leg by a fecal tube characteristic of many members of the family. Both macrochelids attached themselves with chelicerae, preferably near the juncture of the fly's abdomen and thorax (Figs. 2, 3).

Description of Larva and Puparium of *P. comans*

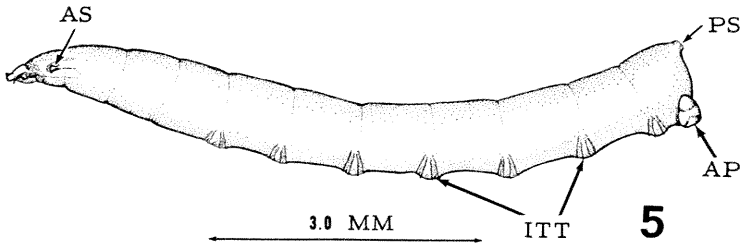
Third-stage larva (Fig. 5): Length 4.8–7.2 mm; width 0.45–0.75 mm. Anterior end conical, tapering with terete body to a rather truncate caudal segment. Integument transparent, subshining, devoid of prominent spines and spinules. Twelve apparent segments (pseudocephalic, 3 thoracic, 8 abdominal). Segment 1 (Figs. 6, 7) bilobed anteriorly; each lobe bearing a 2segmented tubercle (DaP) dorsoapically and a circular sensory area (CSP 1) apically, each circular area with 5–7 oval structures on its surface; ventral and lateral surfaces of lobes with 20–22 ridges (LR) adjacent to grooves, these converging on dorsolateral surface of each lobe; posterior third of segment with encircling spinous band. Segment 2 bearing ventral spinous area on anterior margin, this area extending laterally about one-half the diameter of segment. Paired anterior spiracles, one on either side of posterior third of segment, each spiracle (Fig. 8) with 5 or 6 spherical papillae (Pa) on distal border; each papilla slightly protruding and elevating adjacent integument, with a minute pore (Po) apically. Cephalopharyngeal skeleton (Fig. 9) with paired mouthhooks and bearing 9 longitudinal ridges in ventral portion of pharyngeal sclerite (PhS); each mouthhook arcuate with straplike dentate sclerite (DS) ventrally, an intercalary sclerite (ICS) associated with posterior margin of mouthhook articulating with anterior portion of hypostomal sclerite (HS), thin parastomal rods (PaR) from pharyngeal sclerite lying

above hypostomal piece. Segments 3 and 4 lacking spinule patches and tubercles. Segments 5–12 lacking adornment dorsally and laterally, bearing intersegmental transverse tubercles ventrally, each tubercle with 4–6 rows of appressed spatulate spines, these parallel ventrally, converging ventrolaterally. Segment 12 with paired posterior spiracles posterodorsally, no papillae or lobes evident on surface surrounding spiracles; each spiracle (Fig. 10) separated from other by 1–1/2 times its diameter and slightly elevated above surface. No sclerotized border or peritreme enclosing the arcuate spiracular slits; dorsal slit with convex margin directed dorsomesially and bearing 2 radiating palmate hairlike interspiracular processes (RPP), middle and ventral slits with concave margin directed dorsally and bearing 1 radiating palmate process. Anal plate on posteroventral border of 12th segment, appearing as a well-developed proleg, 2–1/2 times broader than long; anal opening a median, longitudinal slit. (Twenty specimens. From recent detritus cavities, *A. texana* nest, Lucky, La., 15 June 1959.)

Puparium (Figs. 11, 12): Length 3.0–3.6 mm; width 1.0–1.4 mm. Dark reddish brown; fusiform. Anterior end tapering into widest portion at middle with posterior end more truncate. Anterior spiracles minute, barely visible on either side near apex of dorsal cephalic cap. No pupal respiratory organs or "horns" penetrating puparium wall. Segments 5–12 with contracted creeping tubercles ventrally, appearing as elliptical spinulose patches. Posterior spiracles near center of segment 12, slightly elevated above integument surface, separated from one another by the diameter of a spiracular plate. Anal plate (Fig. 11 a) black, ellipsoid, 1–1/2 times as broad as long. (Ten specimens. From recent detritus cavities, *A. texana* nest, Flatwoods, La., 30 December 1958.)

Further studies of this interesting family must be carried out before the larvae and puparia can be adequately characterized. *P. comans* larvae lack the wartlike tubercles on the dorsal surface of the 12th segment that have been observed in *Leptometopa* and *Desmometopa* (HENNIG 1956; SHTAKELBERG 1956). The sclerite (termed here intercalary sclerite, Figs. 6, 9, ICS) that is closely associated with the posterior margin of the mouthhooks may be useful in subsequent generic differentiation. Also, the shape and curvature of the posterior spiracular slits and arrangement of the interspiracular processes or "radiating palmate processes" may serve to distinguish the immature stages of the Milichiidae.

Fig. 5. Third-stage larva, lateral view. AP – anal plate; AS – anterior spiracle; ITT – intersegmental transverse tubercle or creeping welt; PS – posterior spiracle. – *Fig. 6.* Same, ventral view of anterior end. AS – anterior spiracle; CSPl – circular sensory plate; DaP – dorsoapical papilla; DS – dentate sclerite; HS – hypostomal sclerite; ICS – intercalary sclerite; LaL – labial lobe; LR – labial ridge; MH – mouthhook; PhS – pharyngeal sclerite; SpB – spinous band (midventral portion of band omitted for clarity) – *Fig. 7.* Same, lateral view of anterior end. DaP – dorsoapical papilla – *Fig. 8.* Same, anterior spiracle. Pa – anterior (apical) papilla; Po – minute, apical pore; StS – stigmatic scar – *Fig. 9.* Same, cephalopharyngeal skeleton. DS – dentate sclerite; HS – hypostomal sclerite; ICS – intercalary sclerite; MH – mouthhook; PaR – parastomal rod; PhS – pharyngeal sclerite – *Fig. 10.* Same, posterior spiracle. RPP – interspiracular process or radiating palmate process; SpS – spiracular slit; StS – stigmatic scar – *Fig. 11.* Puparium, lateral view – *Fig. 11a.* Anal plate, enlarged – *Fig. 12.* Same, dorsal view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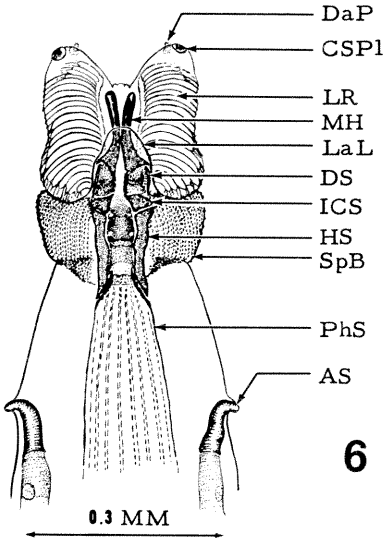
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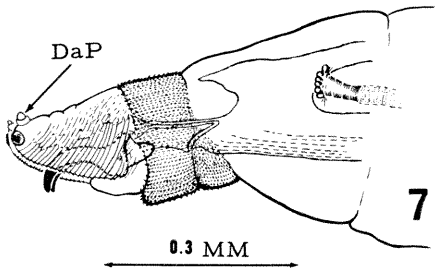
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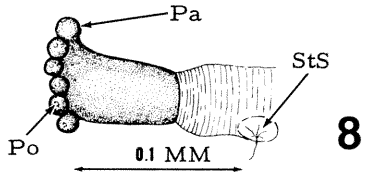
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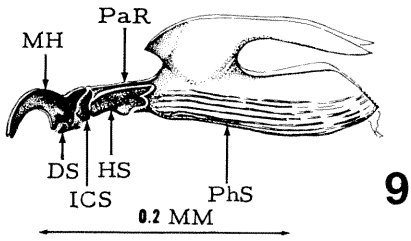
8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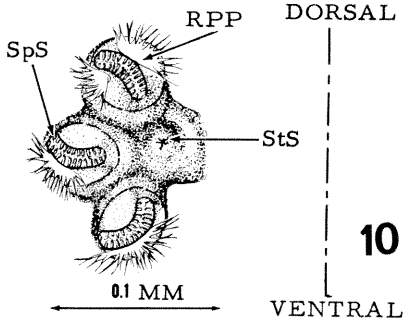
9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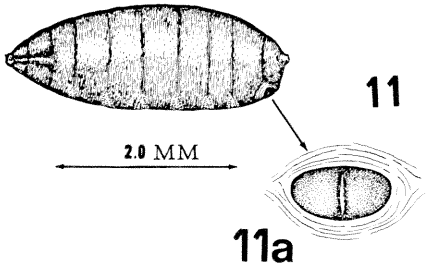
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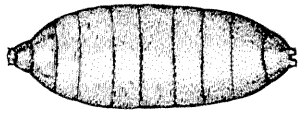
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Zusammenfassung

Zur Anatomie und Biologie von Pholeomyia comans, Einmieterin bei Atta texana

Imagines von *Pholeomyia comans* dringen in die Nester von *Atta texana* ein und legen Eier in den unterirdischen Abfallkammern ab, wo die Maden sich von verbrauchtem Pilzgartenmaterial und von frisch von Arbeitern dorthin verbrachtem Nestabfall ernähren. Die im 3. Stadium der Entwicklung befindliche Larve und das Puparium werden beschrieben. Eine Diapridenwespe wurde in den Puparien von *P. comans* gefunden. Eine Art von makrocheliden Milben, phoretisch auf *P. comans*, werden besprochen.

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