

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

NATURAL HISTORY OF PLUMMERS ISLAND,
MARYLAND¹

XV. DESCRIPTIONS OF THE STAGES OF *CHAETODACTYLUS KROMBEINI*, NEW SPECIES, A MITE ASSOCIATED WITH THE BEE, *OSMIA LIGNARIA* SAY
(ACARINA: CHAETODACTYLIDAE)

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Although the mites belonging to the family Chaetodactylidae are commonly found on bees of the genus *Osmia*, and related genera, little is known about them. Trouessart (1904), working with *Chaetodactylus ludwigi* (Trouessart), and Popovici-Bazosanu (1913), working with *C. osmiae* (Dufour), discovered the encysted hypopial stage. They believed that this was an overwintering form that transformed into an adult in the spring. Michael (1903) reared *C. osmiae* from the migratory hypopus through the third nymph into the adult. However, he did not find the encysted hypopial stage. Zakhvatkin (1941) has presented the most complete bibliography of the family Chaetodactylidae.

The rearing of a new species of *Chaetodactylus* in association with the bee *Osmia lignaria* Say, from Plummers Island, Maryland, by K. V. Krombein, has presented us with the opportunity to give more details on the morphology and biology of this genus and its relationship to the host bee. The biology will be discussed in the article immediately following by K. V. Krombein.

Banks (1902) records, with doubt, the presence of *Chaetodactylus osmiae* (Duf.) from *Osmia* sp., Sea Cliff, New York. This may be the species we are dealing with in this paper.

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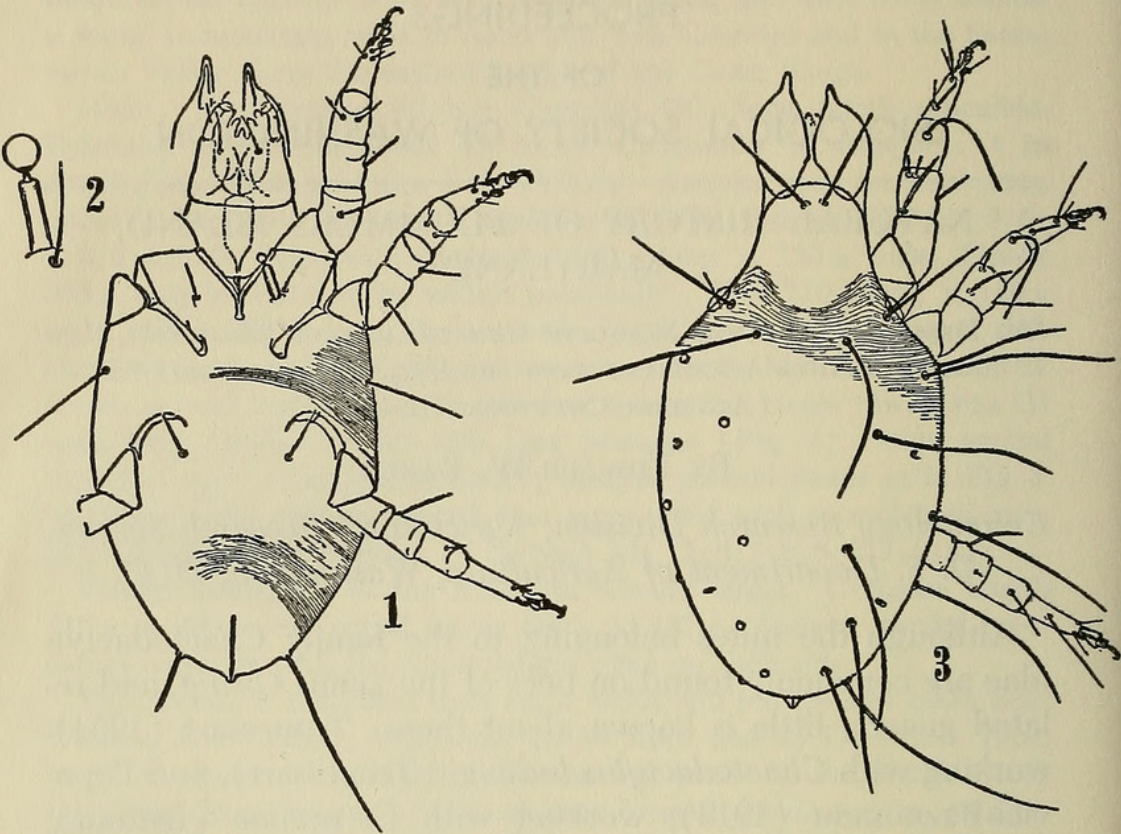


FIG. 1. Venter of larva. FIG. 2. Coxal rod of larva. FIG. 3. Dorsum of larva.

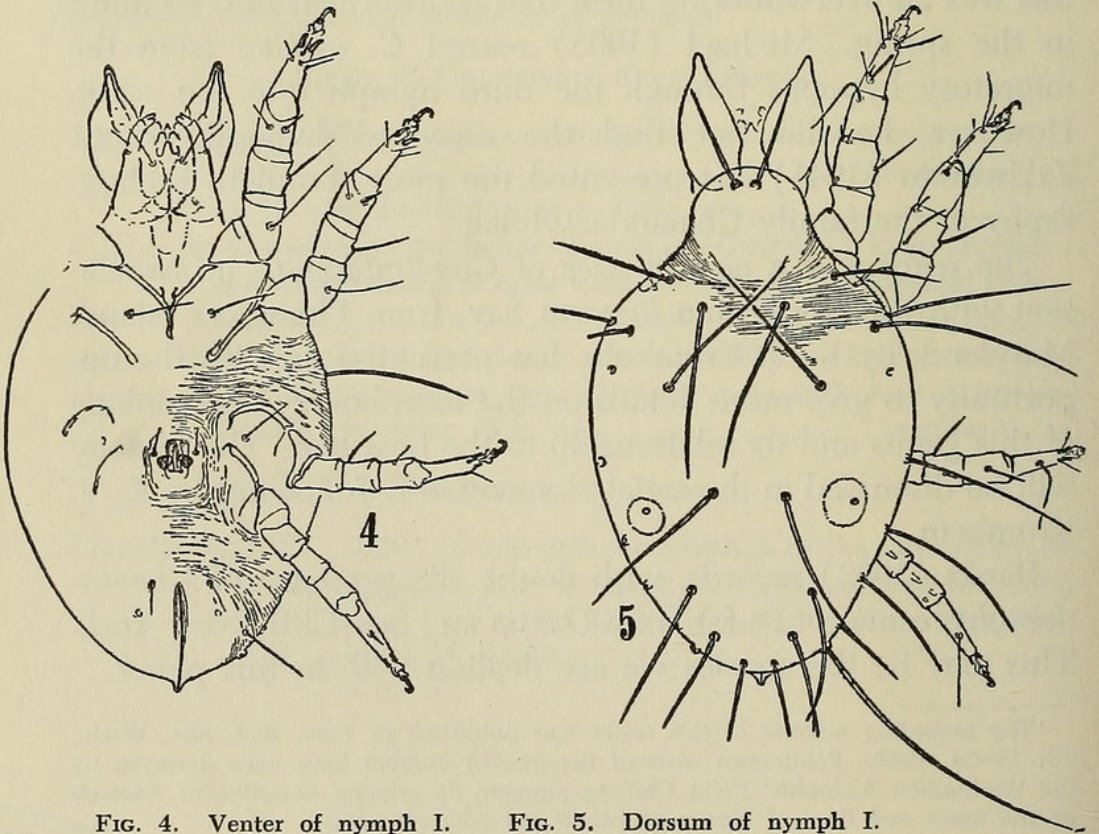


FIG. 4. Venter of nymph I. FIG. 5. Dorsum of nymph I.

As considered here, the family Chaetodactylidae consists of only four genera, *Chaetodactylus*, *Sennertia*, *Sennertionyx*, and *Cerophagopsis*. Baker (1962) placed *Tortonia* and *Horstia* in the Acaridae, and it is possible that *Neohorstia* and *Cerophagus* also belong there.

***Chaetodactylus krombeini*, new species**

(Figs. 1-24)

This species is separated from the others in the genus in having the distinctive, swollen ventral setae in the migratory hypopial stage. The adults of *Chaetodactylus osmiae* (Duf.) and *C. ludwigi* (Trt.) are inadequately described and figured, and comparisons with these cannot be made.

Egg: Smooth, oval, measuring 170-185 μ long by 110-120 μ wide. Only one mounted female was gravid, and only a single egg was present. (Fig. 14.)

Larva: Small, six-legged, with transverse striae dorsally and ventrally as figured. Chelicerae relatively large in proportion to body, chelate, dentate. Venter of rostrum with a single pair of simple setae. Dorsum of body transversely striate except for propodosomal shield; with 12 pairs of long, whip-like setae; vertical external setae missing; supracoxal setae small, hair-like. Humeral and hysterosomal gland pores present. Venter of larva without external genitalic development; with posterior anal opening, but without anal setae. Apodemes of leg I forming a Y; those of legs II and III free, widely separated. Apodemes of leg I each contain a hair-like seta, and none, one, or both sides may possess the coxal rod which is of medium length, tube-like, supporting distally a balloon-like process. A pair of short ventral humeral setae present. Apodemes of coxae III each contain a simple, hair-like seta; rest of venter of body bare. All legs short, stout, but leg III more slender than I and II; setal pattern as figured; empodial claws borne on prominent caruncles, with a pair of rods connecting claw to tarsus; all tarsi with a pair of distal-ventral claw-like setae; tarsus I with solenidion, without famulus, and with whip-like seta adjacent to solenidion; tarsus II with solenidion only. Length of body 223-236 μ . (Figs. 1-3.)

Nymph I: With four pairs of legs; body striate transversely dorsally and ventrally, except for genital area where striae are circular. Chelicerae large, stout, chelate; venter of rostrum similar to that of larva. Dorsum of body with propodosomal shield; with 15 pairs of strong, whip-like setae; vertical external setae missing; supracoxal setae small, hair-like. Dorsum with two pairs of pores, one humeral and the other opening into hysterosomal glands. Coxal I apodemes forming Y, enclosing a pair of whip-like setae; apodemes of coxae II, III, and IV free, and those of coxae III enclosing a pair of whip-like setae. With a single pair of genital setae, and a single pair of genital discs. Anal area not striate, with a single pair of anterior setae, a single pair of pores posterior to

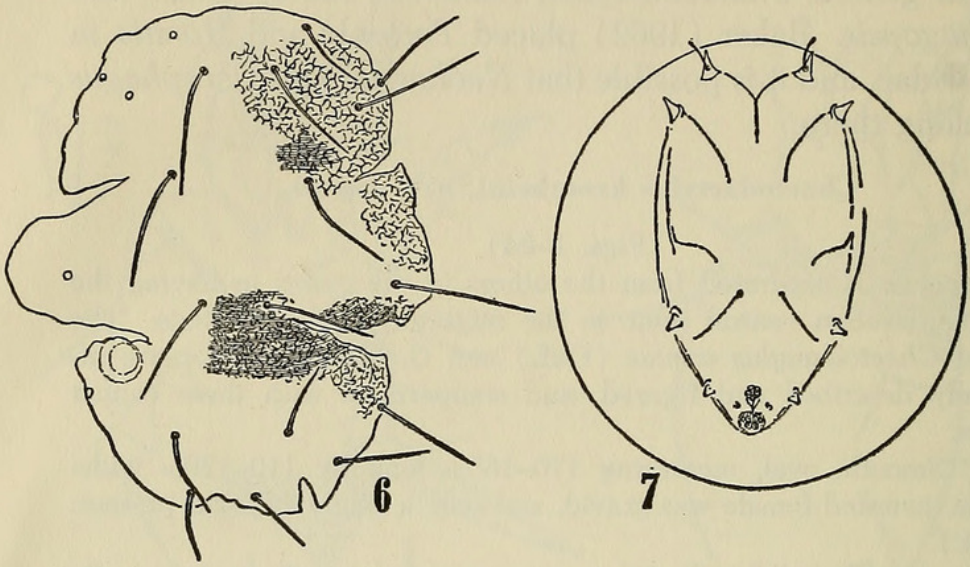


FIG. 6. Section of nymph I skin which contains encysted hypopus.
FIG. 7. Venter of encysted hypopus.

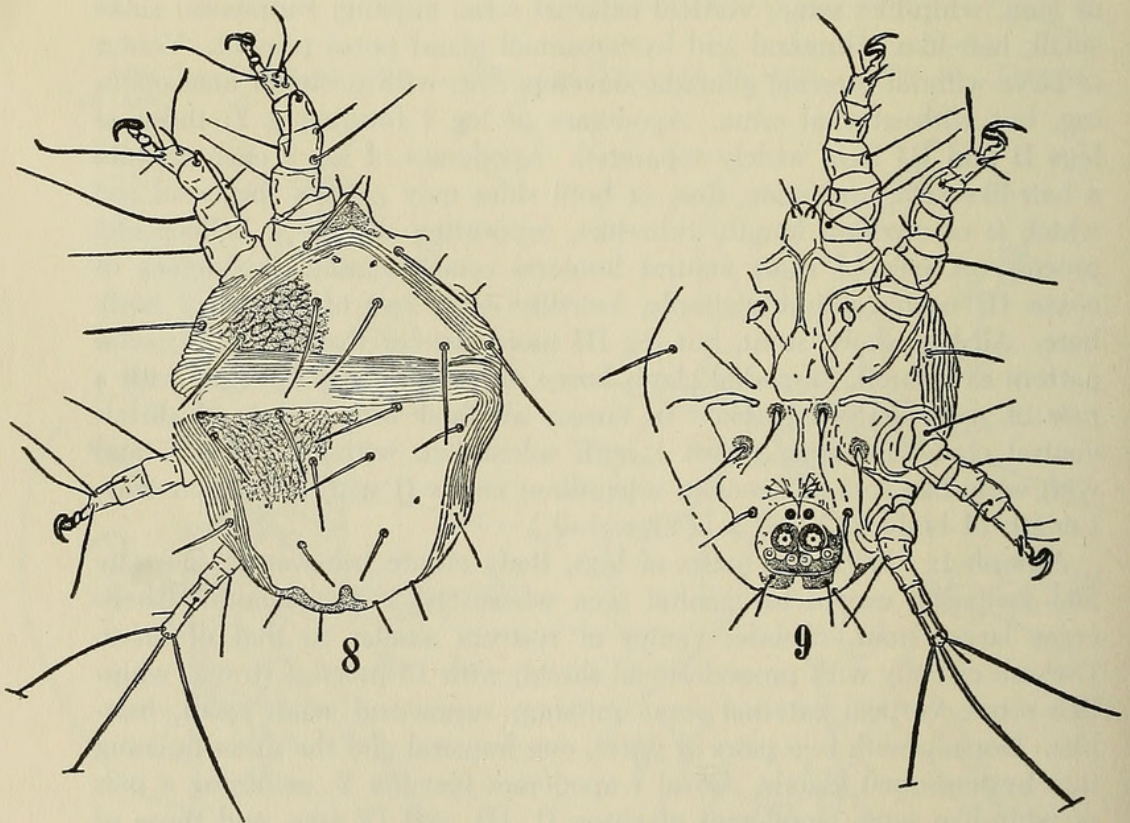


FIG. 8. Dorsum of hypopus. FIG. 9. Venter of hypopus.

these, and a pair of setae posterior to and laterad of anal pores. Legs I and II stout, legs III and IV more slender; tarsus I with solenidion, famulus, and hair-like seta arising from same base; tarsus II with solenidion and hair-like seta; all tarsi distal-ventrally with a pair of claw-like setae, those on tarsi III and IV weak; empodial claws as in larva. Length of body 319–414 μ . (Figs. 4, 5.)

Encysted nymph: Skin of nymph I wrinkled internally, forming protective case for encysted nymph. Encysted nymph round, smooth, with four pairs of conical projections which represent legs; anterior pair of projections each with sensory rod indicating these represent tarsi only. Coxal apodemes rudimentary, visible; suctorial plate rudimentary, visible. Length of body 306–325 μ ; width of body 287–300 μ . (Figs. 6, 7.)

Hypopus (Nymph II): Dorsal body setae long, saber-like; body with propodosomal and hysterosomal shields; reticulate pattern of propodosomal shield somewhat transverse, that of hysterosomal shield longitudinal, gnathosoma represented by two strong tubercles supporting a pair of setae of medium length. Apodemes of legs I coalesced anteriorly; apodemes of legs II and III free; apodeme of coxa II broadened and supporting a short, broad seta; between apodemes of coxae III a pair of long setae strongly widened at base; apodemes III each enclosing a similar seta; apodemes IV each containing a similar but not as strong seta. A saber-like humeral seta present ventrally. Suctorial plate as figured. Legs I–III stout, each with strongly recurved empodial claw; leg IV slender, tarsus without claw, ending bluntly, with three, long, whip-like setae and two short simple setae; setal patterns of legs as figured, tarsi I–III each with a pair of long setae spatulate distally; tarsus I with solenidion and famulus; tarsus II with solenidion only. Length of body 306–331 μ . (Figs. 8, 9.)

Nymph III: With four pairs of legs, I and II stronger than others. Dorsum of body striate except for propodosomal shield; venter transversely striate except for anal region which is bare and for circular striae in genital region. Chelicerae large, stout, chelate. Venter of rostrum with a single pair of setae. Dorsum of body with 15 pairs of strong, whip-like setae, and a marginal pair of humeral setae; vertical external setae missing; supracoxal setae small, hair-like. Humeral and hysterosomal gland pores present. Coxal I apodemes forming a Y, enclosing a single pair of whip-like setae; coxal II apodemes straight, free; coxal III apodemes short, enclosing a single pair of short, hair-like setae; coxal IV apodemes longer. A pair of short setae anterior and laterad of genital area, and a similar pair posterior and laterad of genital area; a single pair of genital setae; two pairs of genital discs; striae circle genital area. Anal opening longitudinal, posterior, surrounded by non-striated area, with a pair of setae anterior to anal opening; a pair of short setae lie in striated area laterad of anal opening. Legs I and II stronger than III and IV; tarsi I and II each with distal pair of strong ventral claw-like setae; tarsi III and IV with similar but weak setae; tarsus I with solenidion, famulus, and hair-like seta on same base; tarsus II with solenidion

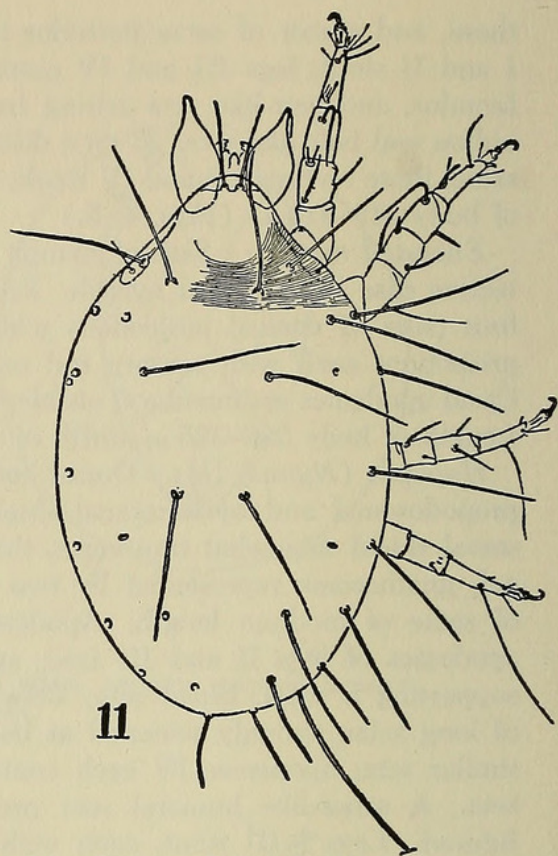
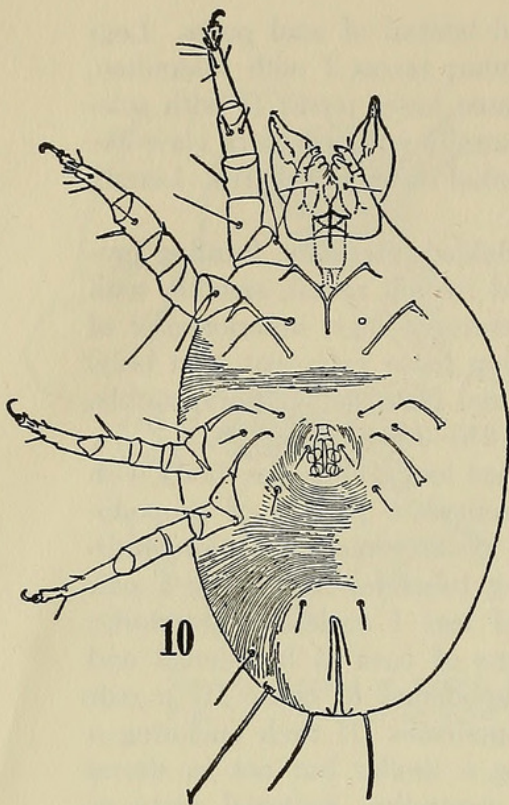


FIG. 10. Venter of nymph III.

FIG. 11. Dorsum of nymph III.

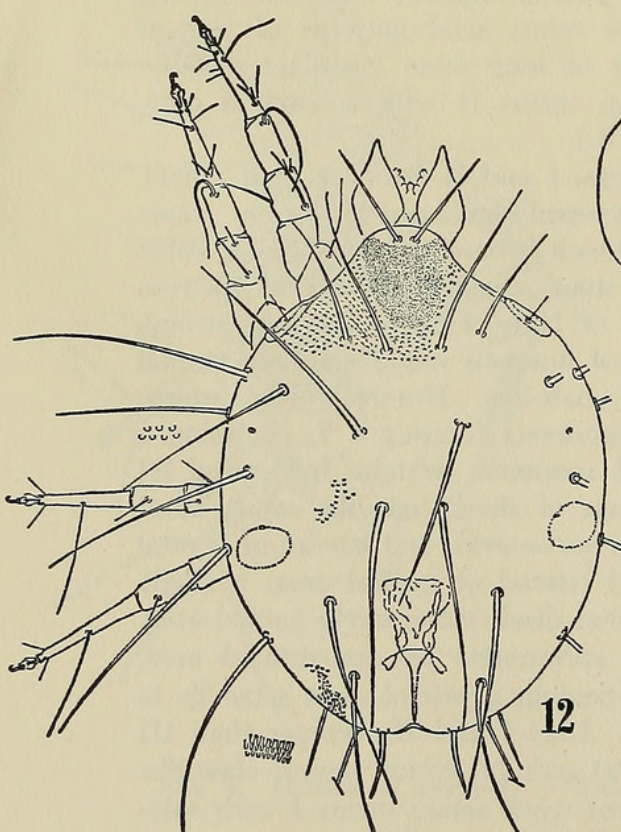


FIG. 12. Dorsum of female.

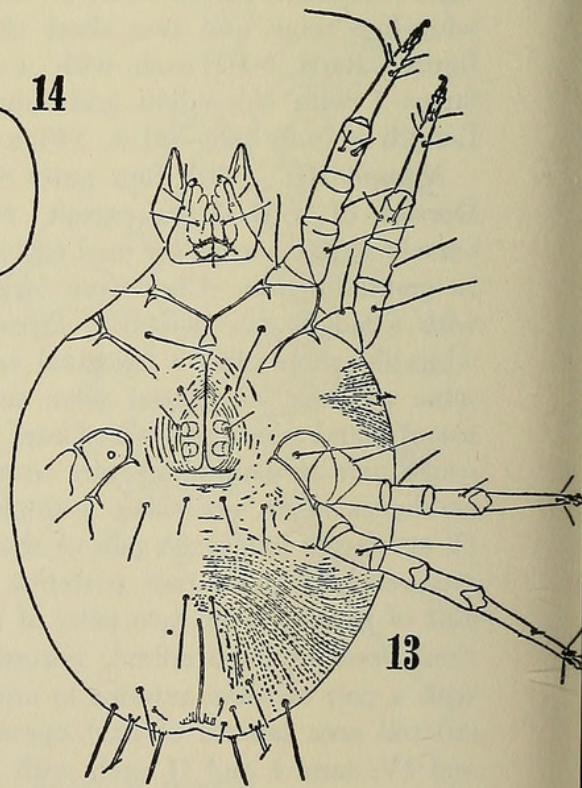


FIG. 13. Venter of female.

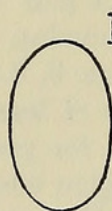


FIG. 14. Egg.

and hair-like seta, other setae as figured. Length of body 408–427 μ . (Figs. 10, 11.)

Female: Chelicerae large, chelate. Dorsum of body with 15 pairs of setae, those on dorsum long, whip-like, those on posterior margin short; external vertical setae absent; supracoxal seta short, hair-like. Propodosomal shield small, punctate; rest of dorsum tuberculate, the tubercles following a more or less transverse pattern, dorsal anterior tubercles rounded, posterior tubercles elongate, finger-like. Humeral and hysterosomal gland pores present. Bursa copulatrix posterior, spermatheca as figured. Venter of rostrum with single pair of setae. Apodemes I forming a Y, stem end short, the apodemes enclosing a pair of hair-like setae; apodemes II short, free; apodemes III and IV enclosed, surrounding a pair of hair-like setae. Genital opening longitudinal, reaching nearly to sternum (fused apodemes I), with transverse opening posteriorly; with two pairs of genital discs, with two pairs of genital setae, and with two pairs of setae posterior to opening; genital area surrounded by smooth striae. Anal opening not quite reaching posterior margin of body, with a pair of long anterior anal setae, a pair of pores located behind these setae, and with three pairs of posterior anal setae, decreasing in length from anterior to posterior, laterad of posterior half of anus; other setae assumed to be dorsal setae. Smooth circular striae surround genitalia; transverse tuberculate striations between coxae II and III, not meeting medially; tuberculate striations surrounding anal area and meeting medially anterior to anal opening. Legs slender in relation to body, legs I and II stronger than III and IV; setation as figured; tarsus I with solenidion, famulus, and hair-like seta; all tarsi with distal ventral claw-like setae, those on tarsi I and II only slightly stronger than those on III and IV. Length of body 542–669 μ . (Figs. 12, 13.)

Male: Chelicerae chelate, small in relation to body. Dorsum of body with 15 pairs of setae, of varying lengths and sizes, all whip-like except for two pairs on posterior margin of body; humeral seta long, slender. Propodosomal shield small, punctate; rest of dorsum covered with sharp conical tubercles. Humeral and hysterosomal gland pores present. Venter of rostrum with single pair of setae. Coxae I apodemes forming a Y, enclosing a pair of hair-like setae; apodemes of coxae II free, nearly straight; apodemes III enclosed with apodemes IV, surrounding a pair of hair-like setae. Genitalia located posterior of coxae IV; an anterior pair of setae between coxae III, another pair anterior and laterad of genitalia. Anal opening posterior, with anterior lateral pair of pores, and a pair of short, posterior anal setae; a pair of longer setae laterad of anal opening in tuberculate area. Legs relatively slender, as figured. In all other stages empodial claw connected with tarsus by two rods, but in male only one rod present. Tarsus I with solenidion, famulus, and hair-like seta; tarsus II with solenidion and hair-like seta only. Length of body 453–478 μ . (Figs. 15, 16.)

Legs: The legs of both sexes, as well as those of all stages, have a relatively simple setal pattern. The legs of the male and female are

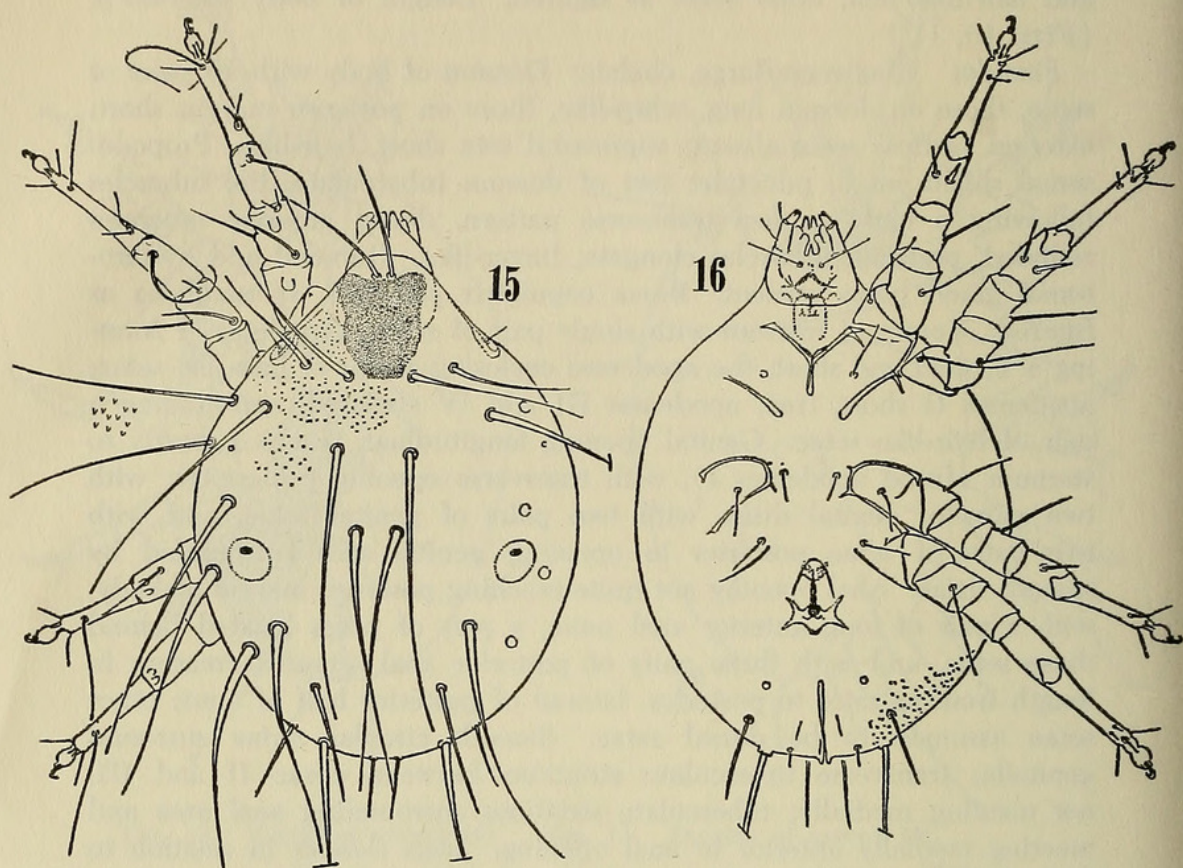


FIG. 15. Dorsum of male.

FIG. 16. Venter of male.

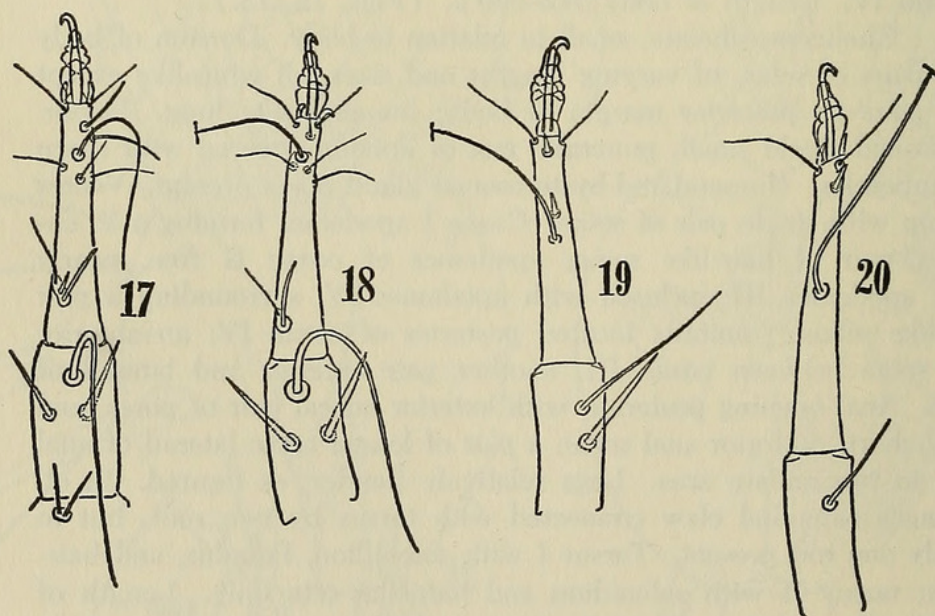


FIG. 17. Tibia and tarsus I ♀.

FIG. 18. Tibia and tarsus II ♀.

FIG. 19. Tibia and tarsus III ♀.

FIG. 20. Tibia and tarsus IV ♀.

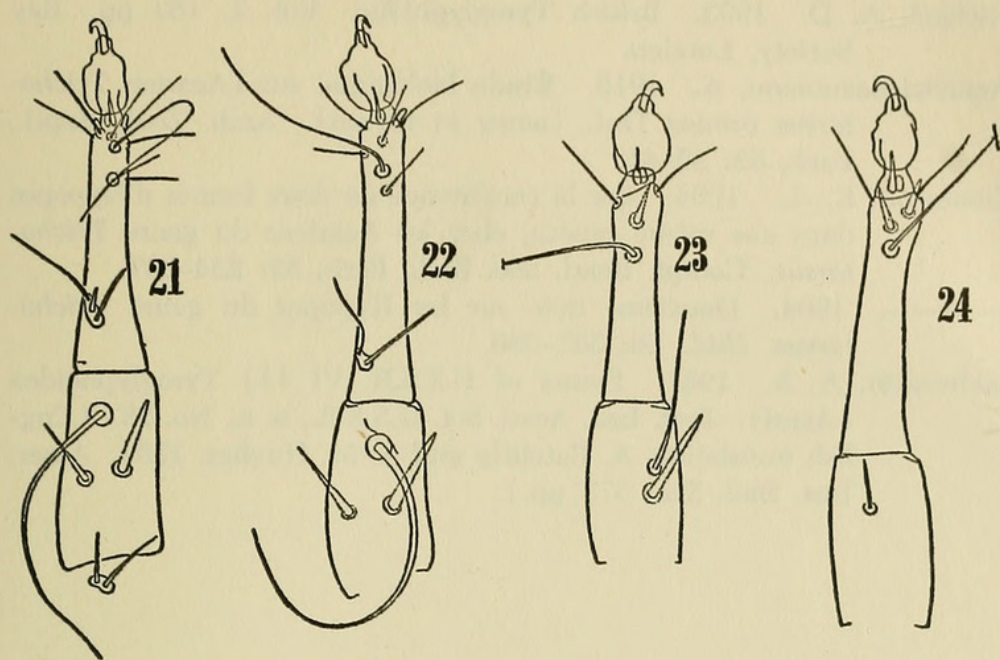


FIG. 21. Tibia and tarsus I ♂. FIG. 22. Tibia and tarsus II ♂.
FIG. 23. Tibia and tarsus III ♂. FIG. 24. Tibia and tarsus IV ♂.

figured. Of interest is the presence of the two rods connecting the empodial claw to the tarsus in the female, but in the male one rod has dropped out, although the base is present, and the remaining rod reaches only about halfway to the claw. The membrane containing the empodial claw of the female is very ornate, while that of the male is simple. On tarsus I the solenidion is accompanied by the famulus and a hair-like seta. (Figs. 17-24.)

Holotype: Migratory hypopial nymph, U. S. National Museum No. 2815, ex *Osmia lignaria* Say, Plummers Island, Maryland, 17 October 1961, by K. V. Krombein.

Paratypes: Ten migratory hypopial nymphs with the above data. Three larvae from nest K 41 of *Osmia lignaria*, 10 August 1961. Forty-five nymph I's from nest, 3 October 1961. Thirteen encysted hypopi from nest, 10 August 1961, and 20 encysted hypopi from nest, 3 October 1961. Two nymph III's from nest, 10 August 1961. Four males from nest, 3 October 1961, and one male from nest, 9 May 1958. Six females from nest, 13 October 1961. All collections were made by K. V. Krombein at Plummers Island, Maryland.

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