

THE STATUS OF *TRAUBELLA* PRINCE, EADS AND BARNES, 1976
(SIPHONAPTERA: CERATOPHYLLIDAE)

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Abstract.—The ceratophyllid genus *Traubella* is redescribed in order to contrast it with the closely related genus *Malaraeus* Jordan, 1933. Its literary history is reviewed and its diagnostic characters are figured.

Key Words: *Traubella*, *Malaraeus*, *Amphipsylla*, Siphonaptera, distribution, host preferences, classification

Of the 28 ceratophyllid genera with representatives in North America a few of them are so similar that taxonomic discrimination is extremely difficult, especially in the females. In some groups of plants and animals generic characters are obvious and may involve anatomical modifications such as venation, leaf configuration or flower formulae, leaving genitalic characters for differentiation at the subgeneric and species levels. This is not true with fleas where practically the only characters used in identification are genitalic. This is further complicated by the fact that females of closely related genera are so similar as to be inseparable at the species level. It is the purpose of this study to clarify the relationship between *Traubella* Prince, Eads and Barnes, 1976, and the closely related genus *Malaraeus* Jordan, 1933.

Traubella was proposed for the taxon *Amphipsylla neotomae* I. Fox, 1940, which was originally placed in the Leptopsyllidae. It is a rare species that evidently is a parasite of *Neotoma lepida* Thomas, 1893 (Rodentia: Muridae), with

a very restricted range in southern California. An additional species, *T. grundmanni* Egoscue, 1989, has since been determined to belong to *Malaraeus* Jordan, 1933, according to Lewis (in press) and it is included in a study of that genus.

Genus *Traubella* Prince, Eads and Barnes, 1976

Traubella Prince, Eads, and Barnes, 1976: 162–168, figs. 1–13. Type species: *Amphipsylla neotomae* I. Fox, 1940.

Traubella: Lewis, 1990: 157. Adams and Lewis, 1995: 71.

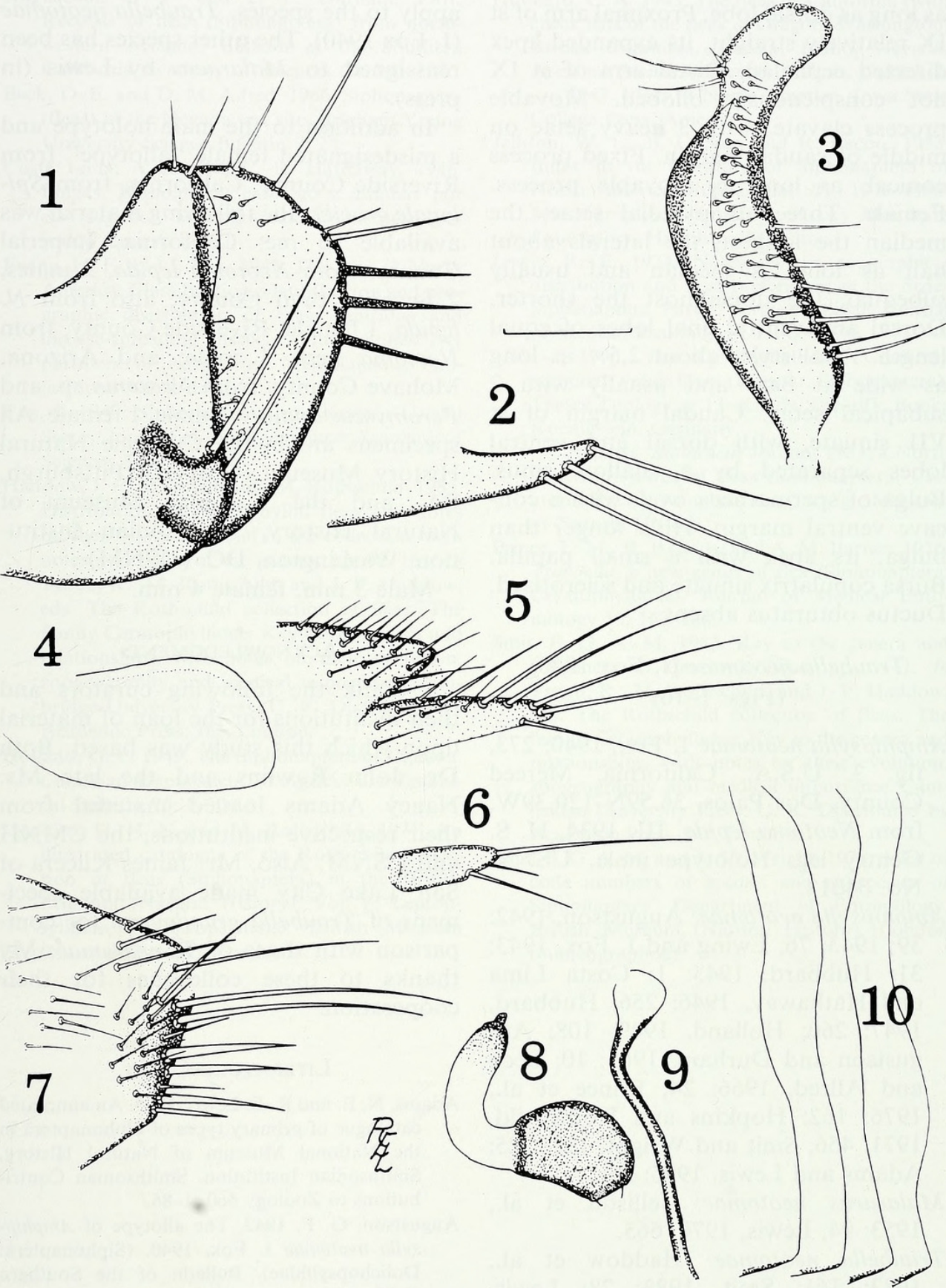
Generic diagnosis.—*Male*: Setae on caudal margin of legs coarse, heavy and forming false combs. Longest setae of hindtarsal segment II only extending to base of tarsal segment IV, while these in *Malaraeus* species are more delicate and extend at least to base of segment V. Sternite VIII short, linear and vestigial, its apex bearing 3–5 short setae, while this sclerite is asetose, very reduced or absent in *Malaraeus*. The proximal arm of st IX truncated, its terminus blunt and

directed cephalad. This structure in *Malaraeus* is not truncated, its terminus bluntly rounded, the arm flexed caudad $\sim 90^\circ$. Cephalic arm of manubrium blunt, its apex only slightly flexed dorsad, while in *Malaraeus* this structure is sharply pointed and flexed dorsad. Movable process crescentric, semicircular, its caudal margin with 3 evenly spaced long setae. In *Malaraeus* species this structure is more rectangular, its setation varying by species, *Female*: In the female, though similar to those of *Malaraeus*, some *Megabothris* Jordan, 1933, and *Monopsyllus vison* Baker, 1904, they differ in the following characters. The ductus obturatus is absent; the spermathecal hilla is papillate and the anal stylet is $\sim 2\times$ as long as wide, widest in middle and with 2–3 subapical setae. Females of the 3 species of *Malaraeus* possess a ductus obturatus; the hilla of the spermatheca is apapillate, and the anal stylet is 4–5 \times as long as wide at base, its margins subparallel, tapering to a narrow apex, and with only 1 well developed lateral seta.

Following is a redescription of the genus, including additional characters, some shared by related genera that in combination with those listed above, are diagnostic for the genus.

Redescription.—No genal comb. Tentorium visible as a vestige in a few specimens, never conspicuous. No inter-antennal suture. Clavus of male antenna extending onto propleuron. Metanotum and some anterior abdominal tergites with marginal spinelets. Sternite VIII of male narrow, sometimes reduced but always present and with 3–4 setae on apex. *Head*: Frontal tubercle present but inconspicuous in both sexes. Frontal setal row of 5–7 bristles on males, 4–6 in females. Trabecula centralis small, circular, above and before the eye. Eye well developed although somewhat reduced, slightly oval, with only the periphery heavily pigmented. A vestige

of the tentorium persists in some specimens but is not conspicuous. Ocular setal row of 3 bristles in both sexes. Postocular seta absent. Pedicellar setae short in males, extending to claval segments 4–6 in females. With 1 preoccipital setal row of 1–3 bristles in males, usually 0 in females. Occipital setal row of 5–6 setae in both sexes. Labial palpi and stylets extending to apex of forecoxa. *Thorax*: Setae per side in pronotal row, 5–6 in males, 4–6 in female. Spines in pronotal comb, 22–24 in males, 19–26 in females. Setae per side in main mesonotal row, 5–6 in both sexes and 4–6 pseudosetae under the mesonotal collar. Setae per side in main metanotal row usually 5, occasionally 6. Marginal metanotal spinelets 1/1 or 2/1. Metepisternal squamulum present as a low thickening on the margin above the middle, its height about $2\times$ its depth. Metepisternal setae 7–11 in 3 irregular rows. *Legs*: Midcoxal sulcus incomplete. Notches in caudal margin of fore, mid and hindfemur 5, 6 and 8 in both sexes. No apical setae on hindtarsal segment I in either sex reaching segment III. Lateral plantar setae on tarsal segment V 5 per side, pair I slightly shifted on to the plantar surface. Tarsal unguis unmodified, sculptured ventrally. *Abdomen (unmodified segments)*: No tergal “mane” on anterior abdominal segments in either sex. Marginal spinelets on anterior segments 1, 1–2, 1–2 and 1–2. Spiracular fossae circular and very small. Main setal row of anterior segments, 6–8 per side. *Modified segments*: Male. Wagner’s organ absent. Apex of manubrium blunt to rounded, but not hooked dorsad. Terminal appendage of penis plate usually poorly developed (broken off in holotype). Penis rods coiled $<180^\circ$. Antepygidial seta single, bordered dorsally and ventrally by short setae (not setulae). Spiculose area on inner surface of st VIII absent. Sternum VIII present but reduced and bearing 3–4 setae near apex. Ventral anal lobe about half again



Figs. 1–10. *Traubella neotomae*. 1, Clasper of holotype male. 2, Sternite VIII of male holotype. 3, Sternite IX of male holotype. 4, Crochet of male holotype. 5, Dorsal and ventral anal lobes of male holotype. 6, Anal stylet of female. 7, Dorsal and ventral anal lobes of female. 8, Spermatheca of female. 9, Bursa copulatrix of female. 10, Variation in caudal margin of st VII in females.

as long as dorsal lobe. Proximal arm of st IX relatively straight, its expanded apex directed cephalad. Distal arm of st IX not conspicuously bilobed. Movable process clavate, with 3 heavy setae on middle of caudal margin. Fixed process conical, as long as movable process. Female. Three antepygial setae, the median the longest, the laterals about half as long as median and usually subequal, the dorsalmost the shorter. Dorsal and ventral anal lobes of equal length. Anal stylet about $2.5\times$ as long as wide at base and usually with 2 subapical setae. Caudal margin of st VII sinuate, with dorsal and ventral lobes separated by a shallow sinus. Bulga of spermatheca oval, with a concave ventral margin. Hilla longer than bulga, its apex with a small papilla. Bursa copulatrix sinuate and sclerotized. Ductus obturatus absent.

Traubella neotomae (I. Fox 1940)

(Figs. 1–10)

Amphipsylla neotomae I. Fox, 1940: 273, fig. 3. U.S.A., California, Merced County, Dos Palos, 36.59N 120.39W. from *Neotoma lepida*, III. 1934, H. S. Gentry leg. Holotype male, USNM No. 54012.

Amphipsylla neotomae: Augustson, 1942: 39; 1943: 76; Ewing and I. Fox, 1943: 31; Hubbard, 1943: 1; Costa Lima and Hathaway, 1946: 256; Hubbard, 1947: 260; Holland, 1949: 108; Augustson and Durham, 1961: 10; Beck and Allred, 1966: 24; Prince et al., 1976: 162; Hopkins and Rothschild, 1971: 456; Smit and Wright, 1978: 25; Adams and Lewis, 1995: 25.

Malaraeus neotomae: Jellison et al., 1953: 94; Lewis, 1974: 665.

Traubella neotomae: Haddow et al., 1983: 161; Smit, 1983: 28; Lewis, 1990: 157; Adams and Lewis, 1995: 25.

Remarks.—Since this is a monotypic genus, the characters listed above also

apply to the species, *Traubella neotomae* (I. Fox 1940). The other species has been reassigned to *Malaraeus* by Lewis (in press).

In addition to the male holotype and a misdesignated female “allotype” from Riverside County, California, from *Spi-logale gracilis*, the following material was available to me: California, Imperial County, from *Neotoma lepida*, 2 males, 2 females; Inyo County, also from *N. lepida*, 1 female; Riverside County, from *Neotoma* nest, 1 male; and Arizona, Mohave County, from *Neotoma* sp. and *Peromyscus crinitus*, 1 male, 1 female. All specimens are in the Carnegie Natural History Museum (CMNH), Pittsburgh, PA, and the National Museum of Natural History, Smithsonian Institution, Washington, DC. (USNM)

Male 3 mm, female 4 mm.

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