

The Taxonomy of *Crawforda triopsyllina* Caldwell (Homoptera: Psyllidae) with Descriptions of the Immature Stages¹

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ABSTRACT. Taxonomic papers dealing with the endemic Hawaiian psyllid *Crawforda triopsyllina* Caldwell are reviewed, and its five nymphal instars are described and illustrated.

Caldwell (1940) proposed the genus *Crawforda* to accommodate a new endemic species, *Crawforda triopsyllina*, which was collected on *Tetraplasandra* (Araliaceae) on Molokai Island. Zimmermann (1948) considered *Crawforda* to be a weakly differentiated genus apparently derived from Hawaiian *Trioza*.

Phylogenetic relationships of the genera of Hawaiian psyllids have been inferred on the basis of adult morphology (Crawford 1918, Caldwell 1940, Zimmermann 1948). Very little taxonomic information on the immature stages exists which can be used to resolve problems of phylogeny. For this reason, descriptions and figures of the immature stages of *C. triopsyllina* are provided here. The terminology and the style of the descriptions follow those of Uchida and Beardsley (1992). The nymphs of *C. triopsyllina*, on which the descriptions in this paper are based, were taken from the general collection of the Bernice P. Bishop Museum and mounted on slides.

Crawforda triopsyllina Caldwell (Figs. 1-5).

Crawforda triopsyllina Caldwell 1940, Proc. Hawaii. Entomol. Soc. 10:397.

Type locality: Kainalu, Molokai Island. Holotype male and allotype female are located in the Bernice P. Bishop Museum, Honolulu.

Host: Nymphs attached to open surface of the upper side of leaves of *Tetraplasandra hawaiiensis* A. Gray.

Immature Stages.

FIRST INSTAR (Fig. 1).

Dimensions. Length 0.42-0.45mm; width 0.29-0.32mm.

Shape. Broadly elliptical.

Margin. Specialized structures absent.

Dorsum. Sclerotization pronounced; head and thoracic segments fused, divided longitudinally by mesal groove, cephaloprothorax, meso- and meta-

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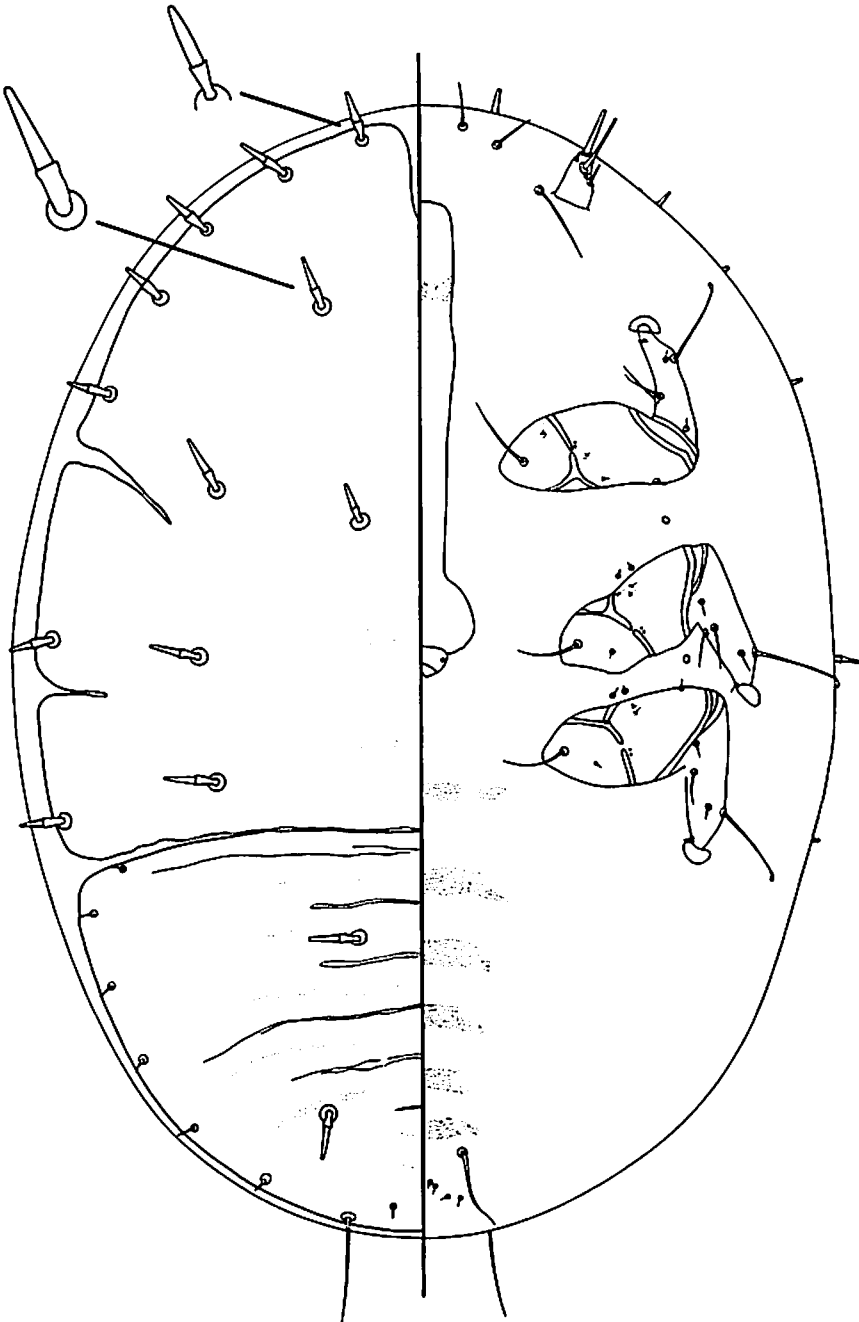


FIGURE 1. *Crawforda triopsyllina*, first instar nymph, dorsal and ventral aspects and details.

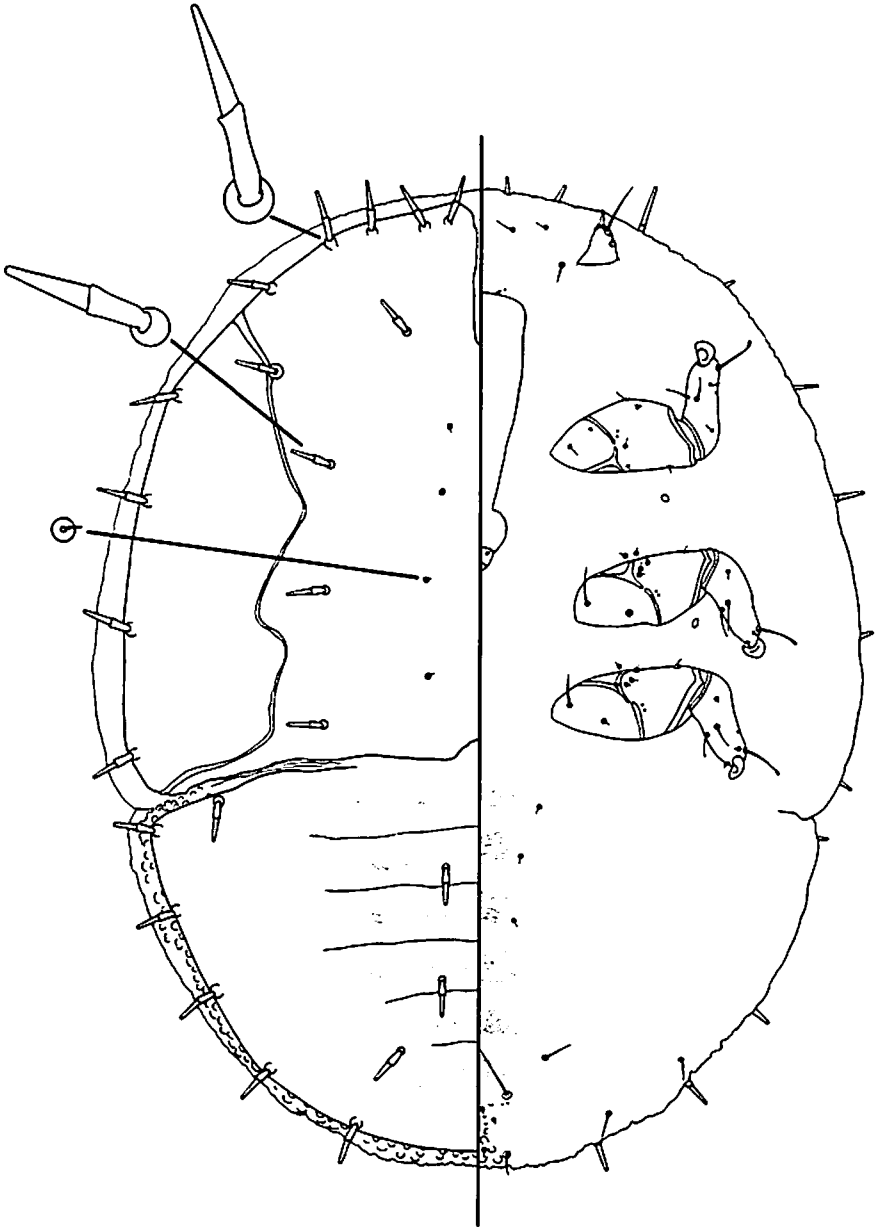


FIGURE 2. *Crawforda triopsyllina*, second instar nymph, dorsal and ventral aspects and details.

thorax partially separated by short submarginal sutures; wing pads undefined; abdomen separated by distinct suture, segments fused. **Indumenta:** sectasetae lanceolate, borne on short protuberances, in 1 marginal and 2 longitudinal rows on cephaloprothorax, and 1 longitudinal row on abdomen. Setae simple, mostly small, borne on weakly defined protuberance, in submarginal row on abdominal plate; elongate seta present submarginally on each side of abdomen apex. **Cuticular structures:** spinules present in short, relatively wide transverse band on meso- and metathorax, in row or narrow transverse band on each abdominal segment. Minute points absent.

Venter. Sclerotization: absent except for cuticular structures. **Indumenta:** setae simple, sparse, subequal in size; cephaloprothorax with 3 elongate setae on each side; few small setae laterad of leg bases; abdomen with elongate seta on apical segment; 4 setae normally associated with circumanal pore ring near apex of abdomen on each side. **Cuticular structures:** spinules arranged in transverse band extending across clypeus near base; in short medial transverse band across each abdominal segment. Minute points absent. **Antennae:** one segmented, short, stout; bearing 3 setae (1 enlarged, blunt apical seta, 1 relatively stout, long subapical seta, and 1 submedial specialized seta); with 3 sensoria, each with stout seta-like projection (2 subapical and 1 medial). **Labium:** with pair of minute seta at base. **Legs:** relatively stout; trochanter undefined; femora not reaching body margin; tibiotarsal articulations absent; claws present; pulvillus somewhat reniform; setae simple, sparse; tibiotarsus with long subapical capitate seta with bent apex; spinules sparse; femora with 2 basal sensoria. **Circum-anal pore ring:** absent; anal opening simple, circular in all nymphal stages of this species.

SECOND INSTAR (Fig. 2).

Dimensions. Length 0.66-0.71mm; width 0.53-0.63mm.

Margin. Abdominal margin with colliculate structures (= enlarged minute points).

Dorsum. Anterior and posterior wing pad bases separated from thorax by well defined suture. **Indumenta:** sectasetae in marginal row on abdominal plate; modified sectasetae may be present, reduced in size, nearly linear, blunt ended. Setae small, few in submedial longitudinal row on cephaloprothorax. **Cuticular structures:** spinules absent on meso- and metathorax.

Venter. Indumenta: seta few, small; abdomen with 1 submedial, longitudinal row, and 1 submarginal row on each side. **Cuticular structures:** minute points dense, arranged in submarginal elliptical pattern, interrupted on cephaloprothorax, enlarged on abdomen, intergrading to colliculate structures which form short strip from anus to posterior margin.

THIRD INSTAR (Fig. 3).

Dimensions. Length 1.04-1.11mm; width 0.89-0.94mm.

Margin. Abdominal margin lacking colliculate structures except at apex.

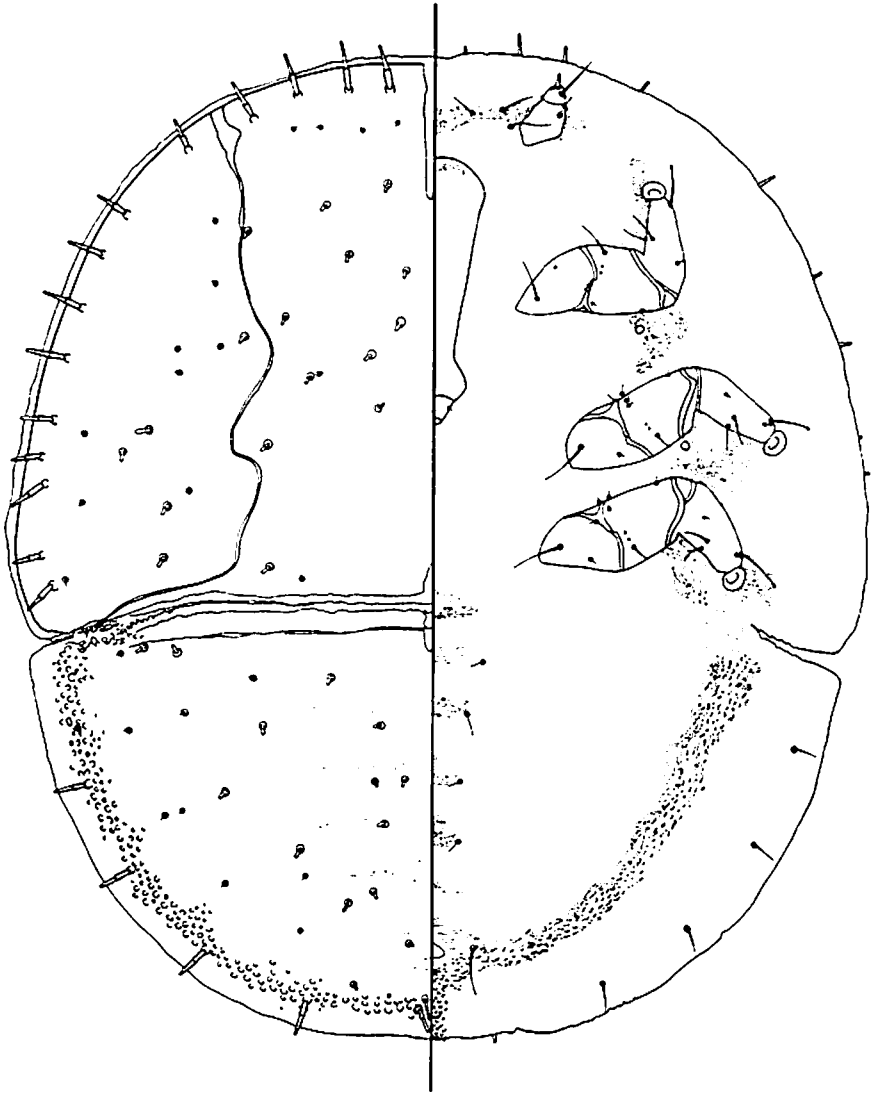


FIGURE 3. *Crawforda triopsyllina*, third instar nymph, dorsal and ventral aspects.

Dorsum. Indumenta: sectasetae in marginal row; absent on abdomen, modified sectasetae clavate, many scattered on dorsum.

Venter. Antennae: two-segmented: basal segment with 2 setae (1 subapical, 1 submedial); apical segment with 2 setae (1 blunt apical seta, 1 elongate subapical seta); with 2 subapical sensoria.

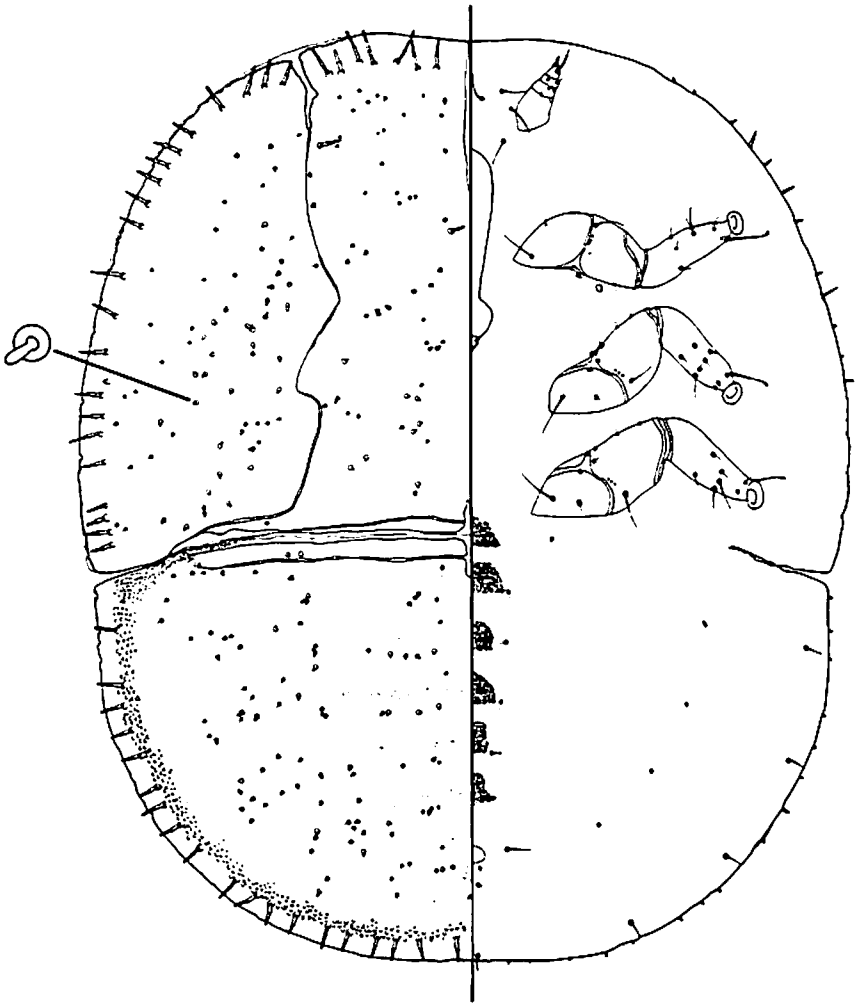


FIGURE 4. *Crawforda triopsyllina*, fourth instar nymph, dorsal and ventral aspects and detail.

FOURTH INSTAR (Fig. 4).

Dimensions. Length 1.56-1.75mm; width 1.33-1.48mm.

Dorsum. Indumenta: modified sectasetae and setae more numerous than on the third instar.

Venter. Indumenta: cephaloprothorax with 4 setae on each side. **Cuticular structures:** minute points similar in pattern to third instar (not illustrated). **Antennae:** four-segmented; first two segments each with 1 subapical seta, and 1 apical sensorium; third segment with 2 subapical setae (1 simple and 1 specialized); apical segment resembling third instar.

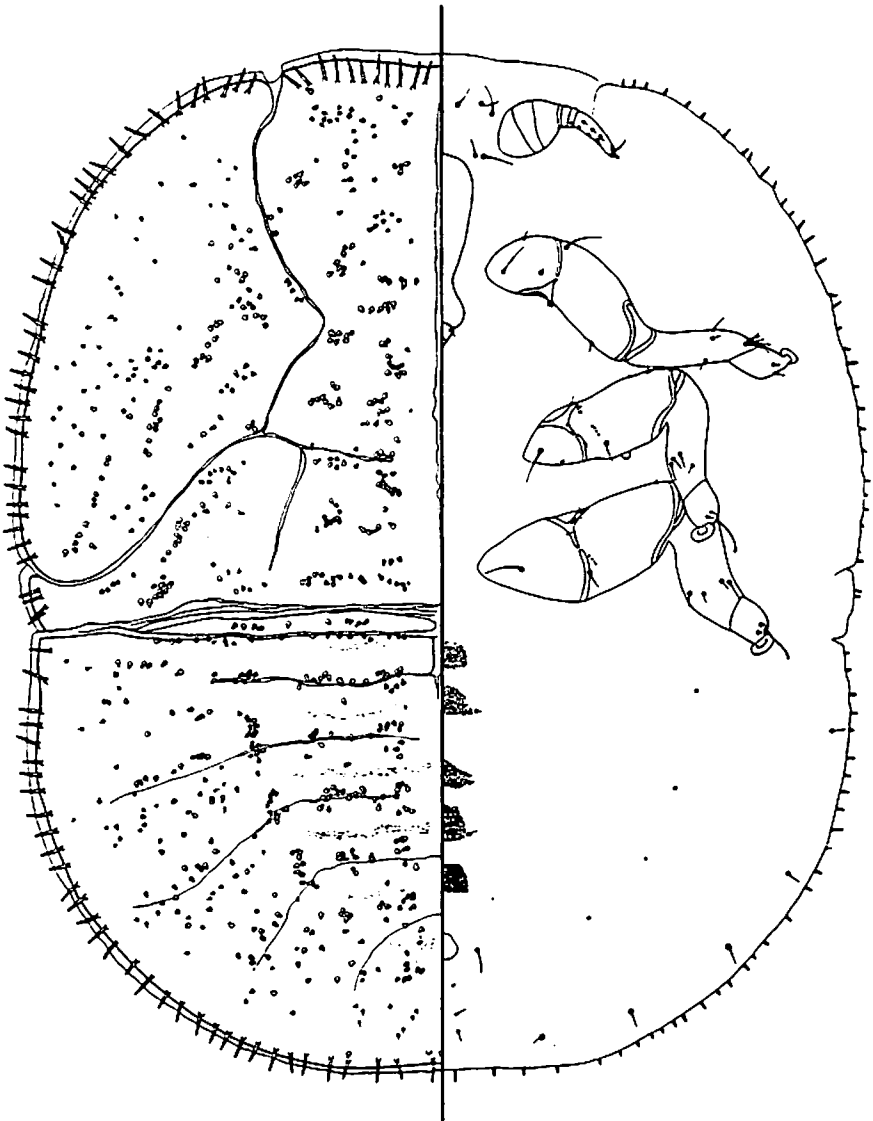


FIGURE 5. *Crawforda triopsyllina*, fifth instar nymph, dorsal and ventral aspects.

FIFTH INSTAR (Fig. 5).

Dimensions. Length 2.62-2.87mm; width 2.18-2.30mm.

Venter. Antennae. seven-segmented; segments 1-5 without setae or sensoria; segment 6 with 1 medial sensorium; segment 7 with 6 setae (1 short, blunt apical seta, 1 elongate subapical seta, 2 nearer apex, 1 medial, and 1

near base), and with 4 sensoria (2 subapical, 1 medial, and 1 near base).
Legs: tibiotarsal articulations defined.

Specimens Examined.

Molokai, Kainalu, 1,600 ft, VII•24•1927, E.H. Bryan, Jr., on leaves of *Tetraplasandra hawaiiensis*, 27 nymphs (6 I, 6 II, 5 III, 5 IV, 5 V).

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REFERENCES CITED

- Caldwell, J.S. 1940. New genera and species of jumping plant-lice from the Hawaiian Islands with descriptions of several immature stages (Homoptera: Psyllidae). Proc. Hawaii. Entomol. Soc. 10:389-397.
- Crawford, D.L. 1918. The jumping plant lice (Family Psyllidae) of the Hawaiian Islands. Proc. Hawaii. Entomol. Soc. 3:430-457.
- Uchida, G.K. and J.W. Beardsley. 1992. The genus *Hemischizocranium* Tuthill (Homoptera: Psyllidae) with descriptions of immature stages. Proc. Hawaii. Entomol. Soc. 31:183-196.
- Zimmerman, E.C. 1948. Insects of Hawaii. Vol. 5. Homoptera: Sternorhyncha. University of Hawaii Press, Honolulu. 464 pp.