

Description of *Hamakua Pamakani* Plume Moth from Hawaii (Lepidoptera: Pterophoridae)

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ABSTRACT

A new plume moth, *Oidaematophorus beneficus* n. sp., is described and figured. This plume moth has been introduced from Mexico to control a weed, *Ageratina riparia* (Regel) K. & R., known as *Hamakua pamakani* in Hawaii. This is the first record of the genus from Hawaii.

In the present paper, one new species of the genus *Oidaematophorus* from Hawaii is described. This plume moth has been introduced from Mexico to control a weed, *Ageratina riparia* (Regel) K. & R., known as *Hamakua pamakani* in Hawaii. The weed, a Compositae, originated in Mexico and has become a serious pest in rangelands especially on the island of Hawaii. The plume moth was one of the agents tried for use in its biological control. The introductions of this species from Mexico in 1959 and 1965 were unsuccessful. In 1973, it was collected again in Contreras, 40 km S.W. of Mexico City, Mexico, and was released afterwards (Nakao et al., 1973, 1975, 1981; Nakao & Funasaki, 1976, 1979). This introduction was successful, and the moth is damaging the weeds now (Hawaii coop. econ. insect rept., 1974-1980; Mau, 1977).

Oidaematophorus beneficus Yano & Heppner n. sp. (Figs. 1-6)

Male, and female (Fig. 1):

Head with front brown; vertex slightly lighter than front; labial palpus moderate, brown mixed with whitish scales at tip of second segment and third segment. Antenna whitish with dark dots above; tuft of scales at base. Occipital fringe dark brown on dorsum. Thorax brown with lighter broad anterior margin; posterior margin whitish. Legs with all coxae and femora brown mixed with whitish scales; fore tibia brown with inside whitish; fore tibia with moderate tuft of brown scales slightly mixed with whitish scales and the tuft covering anterior one-third; middle tibia similar to fore tibia in color and with two such tufts; hind tibia nearly brown through its length except whitish part at postero-inside; hind tibia with tuft of brownish scales at medial and terminal spurs, but not conspicuous as in preceding tibiae; all tarsi white slightly tinged with pale brown except brown basal segment of hind tarsus.

Forewing cleft from two-thirds; ground color brownish gray; light brown along costa from base of wing to about two-thirds; whitish patch at base of cleft, which is inwardly limited by subtriangular dark brown patch; the subtriangular patch nearly connected with costa, and spread to the base of first lobe; two whitish streaks running from whitish patch at base of cleft, one to two-thirds of first lobe along cleft, and one to beyond middle of second lobe; dark brown streak running from top of subtriangular patch to apex of first lobe; first lobe with another short streak at just above base of cleft, and with two small, dark dots on costa, one at about middle, and one before middle;

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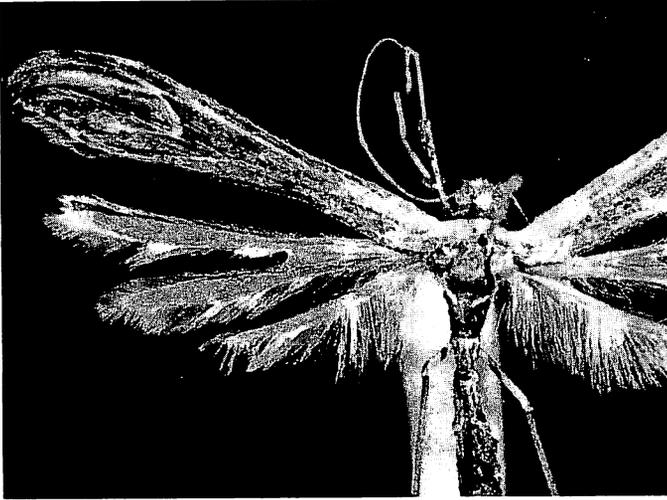


FIGURE 1. *Oidaematophorus beneficus* n. sp. Female.

two small whitish patches on costa just beyond and before base of cleft; fringe within cleft yellowish brown except towards anterior ends of both lobes; remaining fringe brownish gray. Hindwing including fringe brownish gray.

Abdomen brownish gray mixed with dark brown scales; basal two segments dark brown mixed with white scales; ventral side brownish gray throughout. Male genitalia (Fig. 2): Mid-ventral part of vinculum roundly incised at its cephalic end; both valvae almost same in length and width; left valva with a strongly curved, pointed harpe connecting with broad sclerotized part basally; right valva with a weakly sclerotized arm directed dorso-caudally; juxta with two arms which are curved outwardly; aedeagus incised apically. Female genitalia (Fig. 3): Apophyses posteriores long; apophyses anteriores not developed; ostium bursae situated mid-ventrally and sclerotized at caudal part; bulla seminalis large; corpus bursae long with nearly equal width through its length.

Length of forewing (male and female): 11-13 mm.

Holotype, ♂, Contreras, Distrito Federal, Mexico (type locality), reared at Kona, Hawaii I., Hawaii Is., ii. 1978, S. Matayoshi (USNM Type 100427); allotype, ♀, and paratypes 1 ♂, 6 ♀♀, same data as holotype. Paratypes, 4 ♂♂, 3 ♀♀, 11 exs. (no abdomen), Contreras, Distrito Federal, Mexico, no date and collector name. Paratypes, 5 ♂♂, 2 ♀♀, reared at Honolulu, Oahu I., Hawaii Is., no other data.

Holotype and 3 paratypes are preserved in the collection of the USNM; allotype and 6 paratypes are in the collection of the Laboratory of Applied Entomology, Yamaguchi University; 21 paratypes are in the collection of the Hawaii State Dept. of Agric., Honolulu; and 2 paratypes are in the collection of the Instituto Biologica, Mexico City.

Distribution: Mexico, Hawaii (Introduced).

The present new species is allied to *O. mizar* Barnes and Lindsey from Arizona and New Mexico, but it differs from the latter by the following characters. First lobe of forewing in *O. mizar* with a conspicuous dark streak in basal half, while it is not distinct in the present species. A large white spot near inner margin about one-third

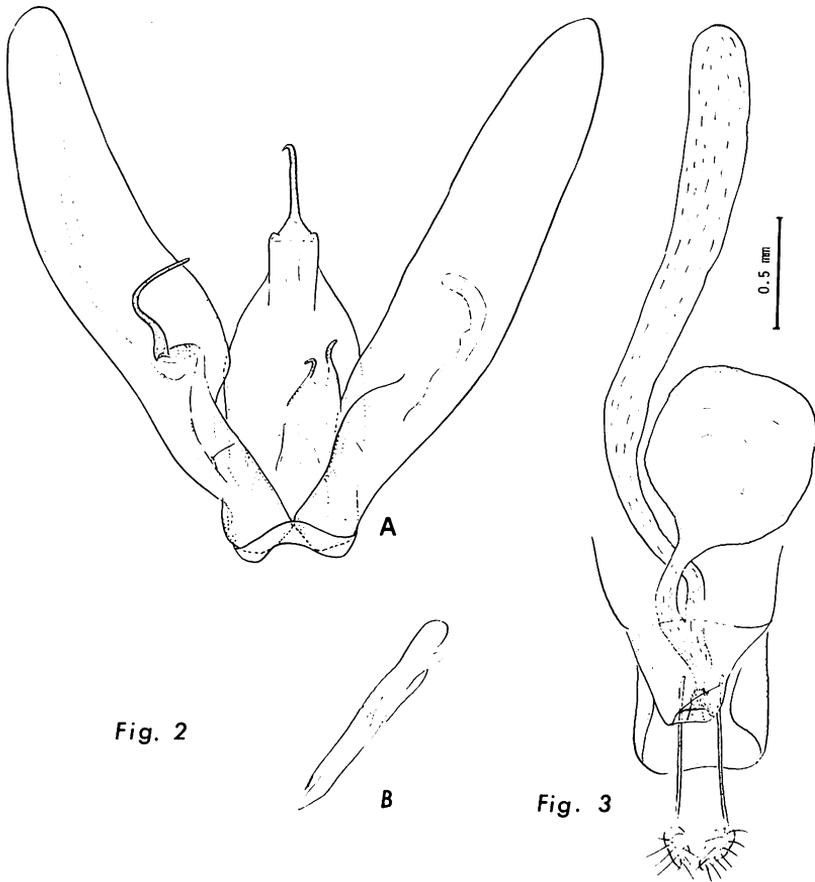


Fig. 2

Fig. 3

FIGURE 2. *Oidaematophorus beneficus* n. sp. (A) Male genitalia, (B) Ditto, aedeagus.

FIGURE 3. *Oidaematophorus beneficus* n. sp. Female genitalia.

from base of forewing is seen in *O. mizar*, but not in this species. Male genitalia of *O. mizar* with a long harpe extending beyond apex of left valva, while in this species a strongly curved harpe is seen. A weakly sclerotized arm in right valva with a caudally directed base in *O. mizar*, and not in this species. Regarding the character of harpe in left valva, this species is similar to *O. cadmus* Barnes and Lindsey and *O. homodactylus* Walker, but markings of the forewing are quite different in these species.

This is the only representative of the genus *Oidaematophorus* in Hawaii.

All descriptions of the immature stages, including color mentioned below, were based on specimens preserved in alcohol.

Egg (Fig. 4):

Elliptical and creamy white. Length: 0.43-0.48 mm, width: 0.28-0.30 mm, height: 0.23-0.25 mm (mean: 0.44, 0.30, 0.23 m in 10 specimens).

Mature larva (Figs. 4 and 5):

Body nearly cylindrical. Head brown except adfrontal area, anteclypeus, ocellar area and labrum where light brown; AF1 and AF2 almost equidistant from end of

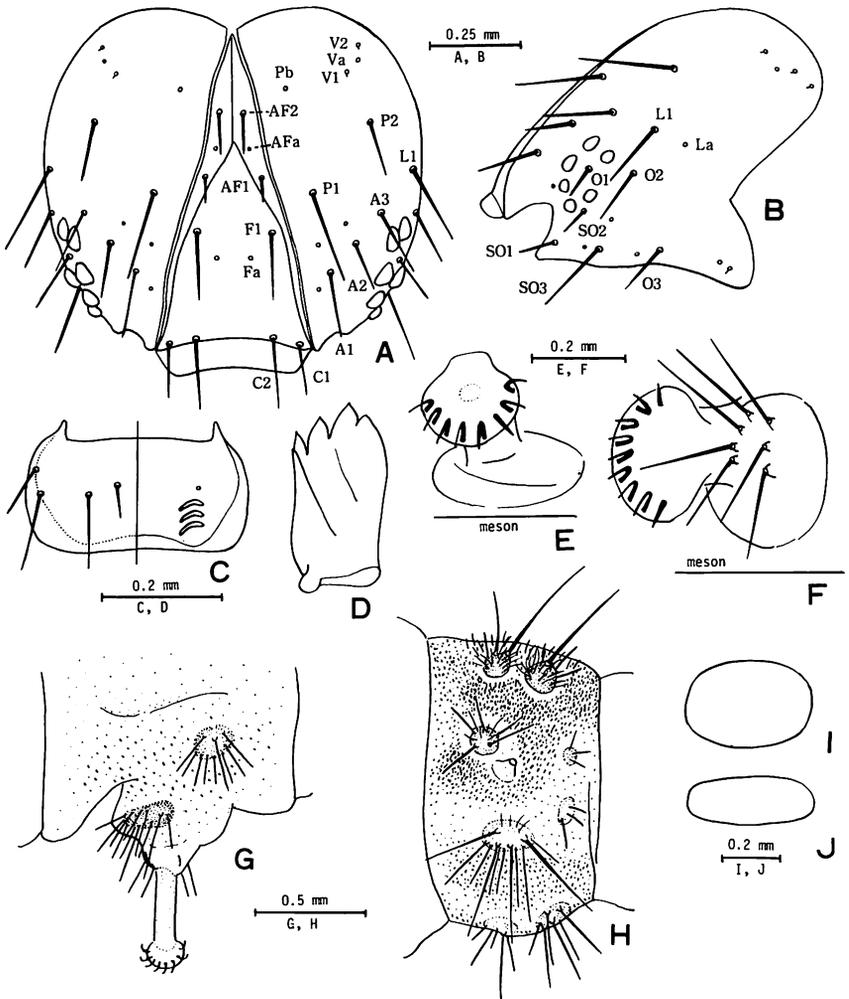


FIGURE 4. *Oidaematophorus beneficus* n. sp. A-H Mature larva, I and J. Egg. (A) Head, frontal view, (B) Head, lateral view, (C) Labrum, with epipharyngeal surface on right, (D) Mandible, (E) Left ventral proleg of abdominal segment 4, (F) Left anal proleg, ventral view, (G) Left ventral proleg of abdominal segment 4, lateral view, (H) Abdominal segment 7, lateral view, (I) Dorsal view, (J) Lateral view.

fronto-clypeal area; AFa slightly ventrad from end of fronto-clypeal area; P1 slightly ventrad from the level of AF1; A2 nearly equidistant from A1 and A3. Labrum without a median incision; M3 and La3 invisible. Mandible with 5 teeth; 1 on oral side; innermost one shorter.

Thorax and abdomen pale yellowish brown in ground color with brownish verrucae; long secondary setae from verrucae and relatively minute scattered secondary setae especially on dorsum; thorax and abdomen invested with minute scobinations; these scobinations are especially dense forming dark area on dorsum of thorax and abdominal segments 3-6. Spiracles on prothorax and abdominal segments 1-8 almost

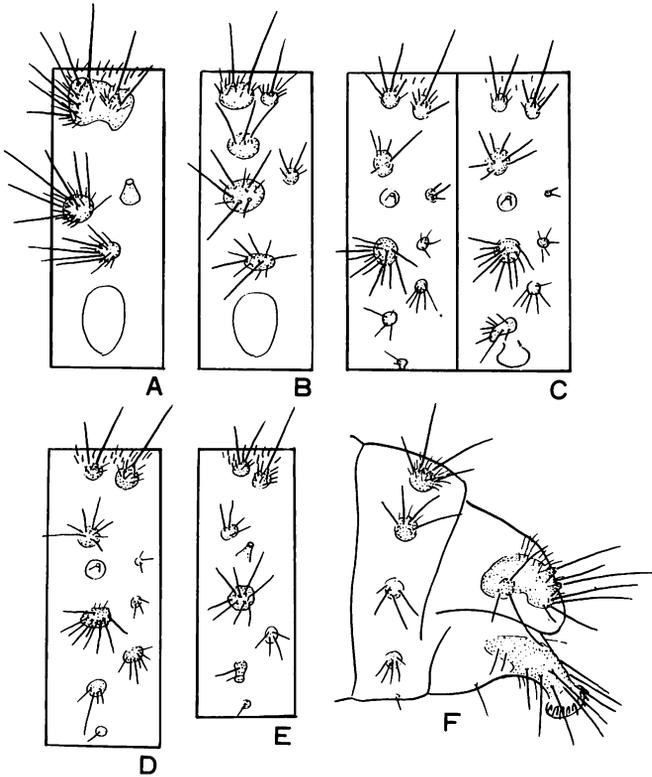


FIGURE 5. *Oidaematophorus beneficus* n. sp. Chaetotaxy of mature larva. (A) Prothorax, (B) Mesothorax, (C) Abdominal segments 2 and 3, (D) Abdominal segment 7, (E) Abdominal segment 8, (F) Abdominal segments 9 and 10.

circular and protruded; those on prothorax larger than those on abdominal segments. Ventral and anal proleg long with uniordinal crochets; ventral proleg yellowish brown, anal one brown. Crochets of ventral proleg 8-10, rarely 11; those of anal proleg 10-11.

Length: 12-14 mm (7 specimens), head width: 1.08-1.16 mm (mean: 1.14 mm in 10 specimens).

Pupa (Fig. 6):

Pale yellowish brown with brown markings. Body with greatest width at boundary between meso- and metathorax. Cephalic end of body with a pair of roundly pointed projections; top of projection with many setae; caudal margin of mesothorax roundly elevated on dorsum. Head with antenna long exposed extending beyond caudal end of wing or reaching to it; distal end of maxilla exposed again scarcely beyond distal end of middle leg (Fig. 6-B), or sometimes not reaching it; fore leg approaching distal end of wing; fore leg with a tuft of minute, broad setae at about one-third from base of leg, and a minute rugged part at about two-thirds of its length; middle leg extending beyond end of antenna; hind leg rarely exposed slightly beyond distal end of maxilla. Base of forewing expanded laterally forming round and flat edge with many setae.

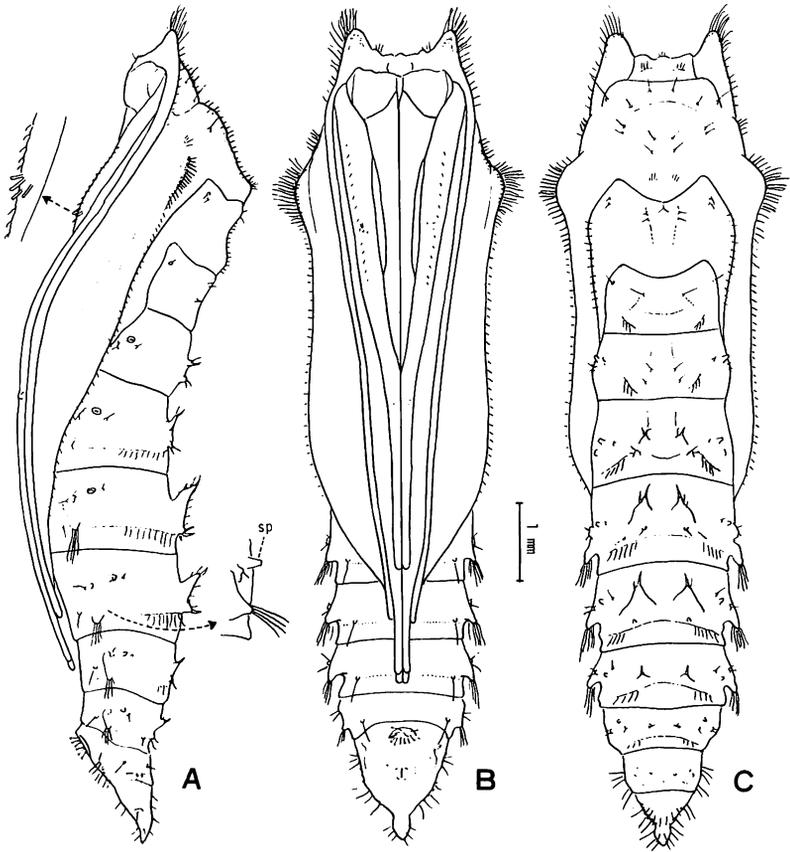


FIGURE 6. *Oidaematophorus beneficus* n. sp. Pupa, male. (A) Lateral view, (B) Ventral view, (C) Dorsal view.

Abdomen with a conspicuous spinous projection on each side of dorsum of segments 1-8; those on abdominal segments 1 and 8 indistinct; those on abdominal segments 4 and 5 very conspicuous; each projection bifurcated; spiracles on segments 2-7 protruded; segments 4-7 with a latero-caudally directed projection on subspiracular line, top of this projection with tuft of long setae; series of setae situated from base of spinous projection on dorsum to lateral projection on segments 3-7; similar weaker one but differently directed on segments 1 and 2.

Length: 10-11.7 mm (mean: 10.8 mm in 8 specimens).

Biological notes:

The following notes on the biology of this species in Hawaii are based on Nakao et al. (1973) and Nakao (personal communication).

Eggs are laid singly on the lower surface of young leaves or on stem terminals of the host plant. The egg stage lasts from 5 to 7 days. Mature larvae feed on the upper epidermis. The larval period is 30-35 days, the prepupal stage 1-3 days and the pupal stage 10 days. Pupation takes place on leaves, or in litter at the base of the plant, or on

stems. The moth has been rarely observed below 1500 ft. in elevation, and has been effective from 1500 ft. to 4000 ft. for control of the weed. A braconid species, *Meteorus laphygmae* Vierweg, was observed parasitizing the larva of this plume moth in Hawaii.

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REFERENCES CITED

- Hawaii cooperative econ. insect report 1974-1980.** Beneficial insect. *Oidaematophorus* sp. 1974 (Apr. 26), 1975 (Apr. 18; July 18, 25; Oct. 24; Dec. 5, 19), 1976 (June 18; July 16; Sept. 17; Nov. 19; Dec. 17; summary), 1977 (Jan. 14; Feb. 11; Apr. 29; May 20; July 15; Aug. 12; Sept. 30; Nov. 18; Dec. 16), 1978 (Jan. 20; Feb. 17; March 17; May 12; June 16; July 14; Aug. 18; Sept. 22; Nov. 3), 1979 (Jan. 5, 12; Feb. 23; June 15), 1980 (Apr. 18; May 30; July 25; Sept. 19; Dec. 5, 19). (Mimeographed)
- Mau, R. 1977.** *Oidaematophorus* sp. Proc. Hawaii. Entomol. Soc. 22:411.
- Nakao, H.K. and G.Y. Funasaki. 1976.** Introductions for biological control in Hawaii, 1974. Proc. Hawaii. Entomol. Soc. 22:329-331.
- _____. 1979. Introductions for biological control in Hawaii: 1975 & 1976. Proc. Hawaii. Entomol. Soc. 23:125-128.
- _____ and **C.J. Davis. 1975.** Introductions for biological control in Hawaii, 1973. Proc. Hawaii. Entomol. Soc. 22:109-112.
- Nakao, H.K., G.Y. Funasaki, S.Y. Higa and P.Y. Lai. 1981.** Introductions for biological control in Hawaii — 1977 and 1978. Proc. Hawaii. Entomol. Soc. 23:425-430.
- Nakao, H., E. Yoshioka and W. Rose. 1973.** Host specificity tests with *Oidaematophorus* sp. (Family Pterophoridae), a biological control candidate for *Ageratina (Eupatorium) riparia* (Regel) K. & R. State Dept. of Agr., Hawaii, 2 pp. (Mimeographed)