

## Orchamoplatus, An Australasian Genus (Homoptera: Aleyrodidae)

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(Presented at the meeting of December 9, 1957)

*Orchamoplatus* is here proposed as a new name for *Orchamus* Quaintance and Baker (1917, pp. 381, 400) because the latter is preoccupied by *Orchamus* Stål (1876, p. 30) in the Orthoptera. This paper defines the genus and the species assignable to it. One species originally included in *Orchamus* Quaintance and Baker is synonymized, one is placed elsewhere, eight are redescribed, and two are described as new, bringing to ten the number of species now recognized in the genus.

The known distribution of *Orchamoplatus* ranges from Japan to New Zealand and from Australia to the Society Islands, and thus includes portions of three of the major zoogeographical regions of the world. Members of the group are recorded from plants of five genera belonging to five families, and the hosts of two species are undetermined. Only two species are known from more than one genus of plants. The host associations of four species are of special interest because each inhabits citrus and one is particularly injurious to this food plant, while another is destructive to citrus and to croton, a plant of ornamental value. Five species are known to be parasitized.

In material examined the individual species exhibit relatively little variation in their structures and are amply distinct from one another. The study is based on the pupae, though other available stages were examined and characters of value noted. Unfortunately, few auxiliary stages were obtainable.

The terminology used here is the same as I have used in earlier papers (1943, 1947, 1948), but additional terms are applied to structures absent from insects that I have described previously.

The magnifications for the different drawings are uniform for all species and are approximately as follows: Outline, or dorsal half of body,  $\times 86$ ; tracheal pore area, vasiform orifice, setae, and spines, each  $\times 283$ . The minute submarginal setae and the invaginated pores are not shown in the illustrations of the dorsal half of the body but are depicted in illustrations of the tracheal pore areas if present in the section drawn.

The illustrations were prepared by Arthur D. Cushman, Entomology Research Division, United States Department of Agriculture.

I am greatly indebted to the following persons for the loan of specimens

examined in this study: J. W. Beardsley, Jr., Hawaiian Sugar Planters Association, Honolulu, Hawaii; J. P. Doncaster, British Museum (Natural History), London, England; and L. J. Dumbleton, Christchurch, New Zealand. I am also grateful to Mr. Doncaster for bringing to my attention the fact that *Orchamus* Quaintance and Baker is preoccupied.

### *Orchamoplatus*, new name for *Orchamus* Quaintance and Baker

*Aleuroplatus* (*Orchamus*) Quaintance and Baker, 1917, U. S. NAT. MUS. PROC. 51:381, 400; Sampson, 1943, ENT. AMER. (n.s.) 23:208. (Type species, *Aleuroplatus* (*Orchamus*) *mammaeferus* Quaintance and Baker, by original designation).

*Orchamus* Quaintance and Baker, Dumbleton, 1956, ROY. ENT. SOC. LONDON PROC. (ser. B) 25 (pts. 7-8):131-132, 141.

Type species of *Orchamoplatus*: *Aleuroplatus* (*Orchamus*) *mammaeferus* Quaintance and Baker.

Quaintance and Baker established *Orchamus* as a subgenus on the basis of the dentation of the inner surface of the vasiform orifice in *mammaeferus*. Dumbleton elevated the subgenus to generic rank and mentioned the presence of a linear series of submarginal papillae.

Because of variation in the dentation of the vasiform orifice, this feature does not characterize the genus, nor does it separate *Orchamoplatus* from *Aleuroplatus*; but the two are readily distinguishable on the basis of other characters.

*Orchamoplatus* has a row of submarginal glands<sup>1</sup>; it has a pair of submedian setae on the first abdominal segment; in it the tracheal pore area teeth are dissimilar to the marginal teeth; and the tracheal pore areas usually are sharply demarked from the adjacent derm. *Aleuroplatus* does not possess any of these structures that characterize *Orchamoplatus* and separate it from all other genera.

*Generic Description*.—Living on the lower surface of leaves.

Secretion colorless or yellowish, transparent or translucent, glassy, present on the dorsal and ventral surface and around the body.

Body colorless or yellowish and membranous, or brown or black and sclerotized. Ovoid or oval, or subelliptical to subcircular; nearly flat.

Margin and submargin: Margin smooth, crenulate, or dentate. Anterior and posterior setae arising from edge of margin or tips of teeth. Tracheal pore areas with teeth strongly differentiated from rest of margin, demarked from adjacent derm. Ridges evident near margin. Glands present; each one a subcylindrical extension of body wall with outer end dentate; an internal

<sup>1</sup> These structures have been called papillae, pores, and tubercles by other writers; but since they are dissimilar to the structures that I have previously described under these names, I use "gland" in order to distinguish them from the other organs. They are secretory in function, wax emanating from them much as from other types of pores.

funnel-shaped duct extending inward from outer end and narrowing to a threadlike tube near inner end of gland. Minute setae distad of glands; three pairs on cephalic, two on mesothoracic, and one on each of abdominal segments 4 and 5. Invaginated pores distad of, and much less numerous than glands; minute and often barely distinguishable, somewhat resembling porettes but smaller and not associated with disk pores.

Dorsal disk: A pair of submedian setae on abdominal segment 1, on segment 8 near vasiform orifice, and a caudal pair. Disk pores and porettes, and invaginated pores present. Transverse molting suture anterior to thoracoabdominal one. Intersegmental sutures rather obscure except in median and submedian area of abdomen, but the posterior two abdominal ones curved laterocaudad into subdorsum. Eight segments apparent in median area of abdomen; segment 7 at least one-half the length of segment 6. Submedian depressions present. Submedian pockets well defined. Vasiform orifice subcircular or subcordate, rising above adjacent derm. Operculum subcircular or subcordate. Lingula spatulate.

Ventral surface: Marginal wax tubes very weak. Tracheal folds usually broad, shallow, and weak. Thoracic spiracles thimble-shaped, area around opening lightly sclerotized; anterior and posterior abdominal spiracles present, smaller than thoracic ones. Antenna reaching anterior thoracic spiracle, one-segmented, the end abruptly narrowed and bearing numerous minute spines and two very small sensory setae. Beak apparently two-segmented, apparently two pairs of minute setae at tip. Legs stout, outer side strongly curved, segmentation indistinct; each leg with three minute setae on inner basal area, one at anterior and posterior ends and one near midlength of middle and posterior legs, one at anterior and two near midlength of anterior leg; each leg with a minute slender seta near disk, and with a minute stout seta and two clear areas resembling setal bases at disk. A pair of submedian adhesive sacs on mesothorax. Ventral abdominal setae located at least their length from posterior spiracles. Male organ a bifid sac.

Third-stage larva: Margin dentate; tracheal pore area teeth differentiated from others. Marginal, submarginal, and dorsal setae as in pupae.

#### KEY TO SPECIES OF ORCHAMOPLATUS

1. Each thoracic tracheal pore area expanded into a conspicuous plate that extends into the subdorsum, and teeth recessed in submargin with a narrow slit to margin . . . . . 2
  - Each thoracic tracheal pore area not expanded into a plate, and teeth not recessed in submargin or if so with a wider opening to margin . . . 3
2. Abdominal tracheal pore area expanded into a crescent-shaped plate that extends laterocephalad each side of the vasiform orifice; thoracic tracheal pore area plates large, with ends in line with sec-

- ond or third gland each side of pore area; each tracheal pore area with two teeth; caudal setae anterior to penultimate pair of glands; dorsum membranous throughout. . . . . **porosus** (Dumbleton), p. 406
- Abdominal tracheal pore area not expanded; thoracic tracheal pore area plates smaller, with ends in line with first gland each side of pore area; each tracheal pore area with four to six teeth; caudal setae mesad of posterior pair of glands; dorsum sclerotized in median area. . . . . **noumeae**, new species, p. 405
3. Ventral surface with numerous spines 2-25  $\mu$  long arranged in a definite pattern distad of legs, antennae, and mouthparts; glands in a single row and with four to six additional pairs mesad of row on abdominal segments 1 to 4. . . . . **citri** (Takahashi), p. 397
- Ventral surface without or with few spines and these not more than 5  $\mu$  long and not arranged as above; glands in a single row, without additional ones. . . . . 4
4. Dorsum entirely membranous and colorless or pale yellow. . . . . 5
- Dorsum partially or entirely sclerotized and partially or entirely dark brown or black. . . . . 6
5. Cephalic setae absent; tracheal pore area teeth slender; caudal setae at lateral margin of abdominal tracheal pore area and three times the width of a posterior gland apart. . . . .
- . . . . . **mammaeferus** (Quaintance and Baker), p. 393
- Cephalic setae present; tracheal pore area teeth less slender, finger-like; caudal setae at cephalic margin of abdominal tracheal pore area and the width of a posterior gland apart. . . . .
- . . . . . **montanus** (Dumbleton), p. 398
6. Margin smooth or weakly crenulate. . . . . 7
- Margin strongly dentate. . . . . 9
7. Dorsum colorless and membranous except for a brown, sclerotized area that extends from the cephalic segment to the posterior abdominal one in median and submedian area; cephalic setae absent. . . . . **incognitus** (Dumbleton), p. 399
- Dorsum entirely dark brown or black and sclerotized; cephalic setae present. . . . . 8
8. Tracheal pore area teeth about 20  $\mu$  long, slender, narrowly rounded apically, eight to thirteen in number; eye spots present; vasiform orifice 32-40  $\mu$  long and wide, its opening subcircular and well defined; margin crenulate. . . . . **caledonicus** (Dumbleton), p. 400
- Tracheal pore area teeth 12  $\mu$  long, stout, broadly rounded apically, six to nine in number; eye spots absent; vasiform orifice 96  $\mu$  long and 112 wide, its opening narrow, transverse, obscure; margin smooth. . . . . **plumensis** (Dumbleton), p. 408

9. Marginal teeth rounded; thoracic tracheal pore area teeth recessed within margin; about 40 glands on each half of body. . . . .  
 . . . . . *dentatus* (Dumbleton), p. 403  
 Marginal teeth acute; thoracic tracheal pore area teeth not recessed within margin; 57 to 66 glands on each half of body. . . . .  
 . . . . . *calophylli*, new species, p. 402

*Orchamoplatus mammaeferus* (Quaintance and Baker), new combination (fig. 1, A-D)

*Aleuroplatus (Orchamus) mammaeferus* Quaintance and Baker, 1917, U. S. NAT. MUS. PROC. 51:400-401, illus.; Drews and Sampson, 1940, BROOKLYN ENT. SOC. BUL. 35:92.

*Aleuroplatus mammaeferus* Quaintance and Baker, Dozier, 1928, JOURN. AGR. RES. 36(12):1002; Corbett, 1935, FED. MALAY STATES MUS. JOURN. 17:781-782, illus.; Takahashi, 1940, NAT. HIST. SOC. FORMOSA TRANS. 30(205):382.

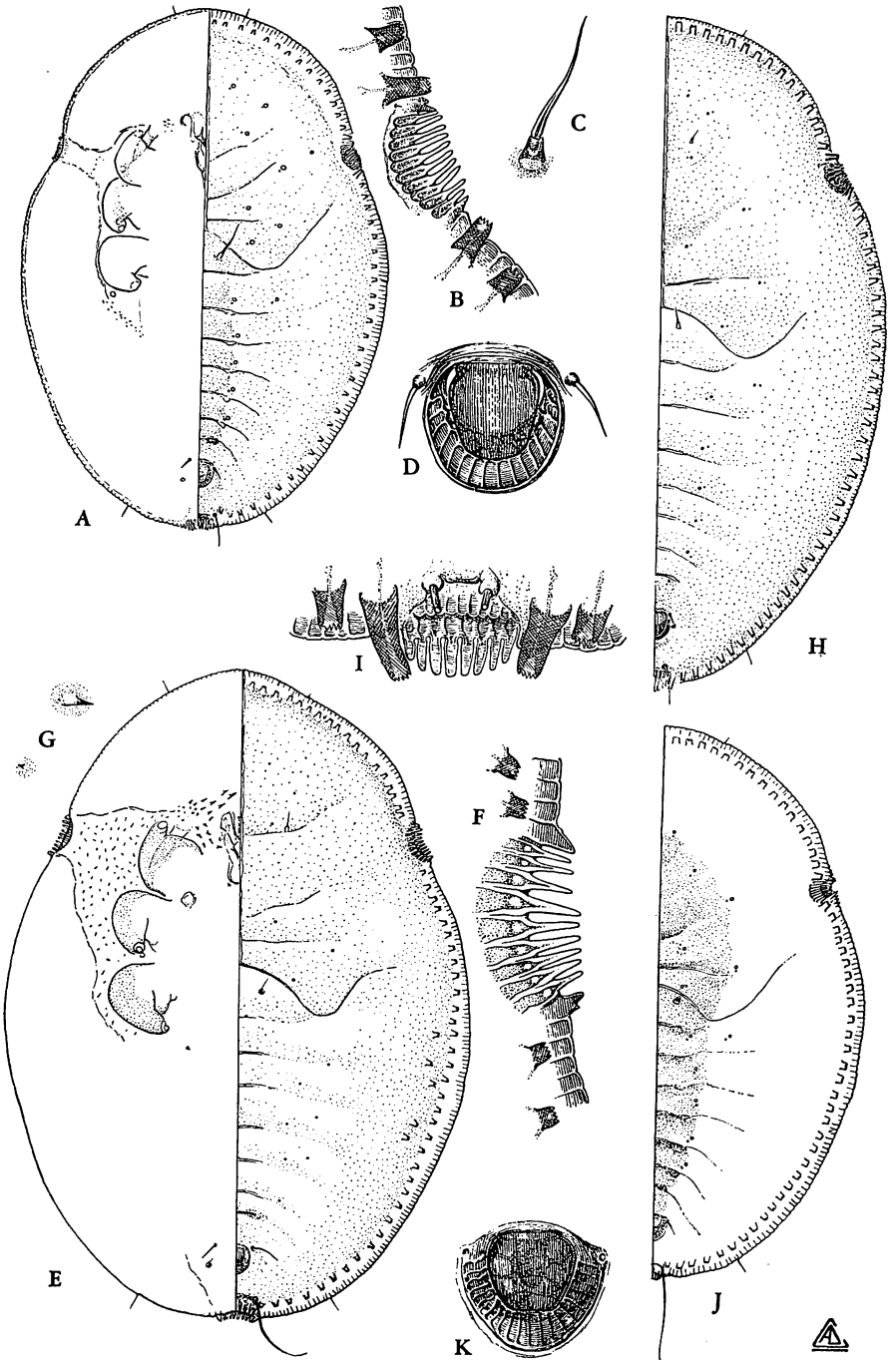
*Orchamus mammaeferus* (Quaintance and Baker), Dumbleton, 1956, ROY. ENT. SOC. LONDON PROC. (ser. B) 25(pts. 7-8):131.

*Aleuroplatus (Orchamus) samoanus* Laing, 1927, INSECTS OF SAMOA, pt. 2, fasc. 1:43-45, illus.; Dozier, 1928, JOURN. AGR. RES. 36(205):1002-1005, illus.; Dumbleton, 1953, HAWAIIAN ENT. SOC. PROC. 15:21-22, illus.; Dumbleton, 1956, ROY. ENT. SOC. LONDON PROC. (ser. B) 25(pts. 7-8):131-132. (New synonymy.)

Quaintance and Baker described *mammaeferus* from *Codiaeum variegatum* Blume, Botanical Gardens, Buitenzorg, Java; and Laing described *samoanus* from cultivated croton, Apia, Upolu Island, Samoa. Dozier identified specimens from *Citrus medica* Linn. from Tahiti, Society Islands, as *samoanus*, stating that the species was closely allied to *mammaeferus*. Corbett implied that *samoanus* was a synonym of *mammaeferus*, and pointed out that "cultivated croton" in Malaya does not belong to the genus *Croton* but is *Codiaeum variegatum* Blume. Dumbleton (1953) recorded *samoanus* from orange from Rarotonga, Cook Islands, and later (1956) stated that this species might be a synonym of *mammaeferus*. Dumbleton (1954, p. 87) also stated that *samoanus* was reported from citrus in Guam by G. D. Peterson in 1953. Peterson did not record the presence of this species, however, and no member of *Orchamoplatus* is known from Guam.

I have studied type material of *mammaeferus* and *samoanus* and representatives of the material identified by Dozier and Dumbleton and believe that all these insects are *mammaeferus*.

Dozier, and also Dumbleton (1953), indicated that some of the specimens examined by Dozier may have been collected on Hikueru in the Tuamotu Islands. If this is the case, *mammaeferus* and the genus *Orchamoplatus* are distributed farther eastward than recorded here. Washburn's second expedition



to the South Pacific took place in 1925 rather than in 1926, as stated by Dozier and Dumbleton.

Laing, Dozier, and Dumbleton mentioned the enormous numbers of *mammaeferus* on the leaves, and Dumbleton stated that this species was one of the main pests of orange in Rarotonga. The abundance of the insects may be striking indeed, they and their secretions virtually covering the lower surface of the leaves. I have not observed a parasitized insect in the hundreds of specimens examined.

Secretion colorless or yellowish, transparent, that from one insect often coalesced with wax from others, extending outward nearly as far as greatest width of body.

Colorless or yellowish, membranous. Oval, slightly indented at thoracic tracheal pore areas, widest across metathorax; 0.75–1 mm. long and 0.50–0.70 mm. wide (males in lower brackets of figures).

Margin and submargin: Marginal crenulations weak except for 1 to 4 (usually 1 or 2) each side of tracheal pore areas that are produced into strong teeth; 15 to 18 in 100  $\mu$ . Anterior marginal setae about 10  $\mu$  long, posterior marginal about 25  $\mu$ . Tracheal pore area teeth 6 to 14 (usually 7 to 11) in number, slender, narrowly rounded apically, swollen and sharply demarked from adjacent derm at base, the longest thoracic ones about 36–40  $\mu$  including base, and the longest abdominal ones about 20  $\mu$ . Ridges moderately defined from margin to glands. Glands in a single row terminating about the length of one laterocephalad of abdominal tracheal pore area; 40 to 47 in number with 12 to 17 anterior and 26 to 31 posterior to thoracic tracheal pore area on each half of body; 1 to 2 times the width of one apart and approximately the length of one from margin; the majority 10–12  $\mu$  long and 8–9 wide, but one 16–20  $\mu$  long each side of thoracic tracheal pore areas. Invaginated pores about one-fourth as numerous as glands, midway between margin and glands. Submarginal setae 4  $\mu$  long, slightly nearer to glands than to margin. A weak ridge curved similarly to anterior margin of body, proximad of glands, usually terminating at thoracic tracheal pore areas but sometimes extending onto abdomen.

Dorsal disk: Transverse molting suture with midpoint slightly posterior to meso-metathoracic suture, extending laterocaudad at a sharp angle nearly to first abdominal suture, then recurved and terminating slightly cephalad of ends of meso-metathoracic suture or continued laterocephalad into outer subdorsum. Median length of abdominal segment 7 about three-fourths that

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FIG. 1. *Orchamoplatus mammaeferus*: A, dorsal and ventral halves of body; B, thoracic tracheal pore area and adjacent derm; C, first abdominal seta; D, vasiform orifice. *O. citri*: E, dorsal and ventral halves of body; F, thoracic tracheal pore area and adjacent derm; G, ventral spines. *O. montanus*: H, half of dorsum; I, abdominal tracheal pore area and adjacent derm. *O. incognitus*: J, half of dorsum; K, vasiform orifice.

of segment 6. Disk pores and porettes unusually large, submedian ones in 2 pairs on cephalic segment and in 1 pair on meso- and metathoracic and on abdominal segments 2 to 6; subdorsal disk pores and porettes in 1 pair on cephalic, meso- and metathoracic, and abdominal segments 2 or 3. A pair of subdorsal invaginated pores on cephalic, mesothoracic, metathoracic, and on abdominal segments 3 to 6 and 8. Setal bases elongate; length of setae including bases: first abdominal 60–70  $\mu$ ; eighth abdominal 32  $\mu$ , close to and slightly anterior to widest part of vasiform orifice; caudal 80–100  $\mu$ , contiguous to laterocephalic edge of abdominal tracheal pore area, bases about twice the length of a gland apart. Vasiform orifice subcircular, 32–40  $\mu$  long and wide, approximately its length from posterior suture and from abdominal tracheal pore area; rising above adjacent derm and highest at posterior end, sclerotized; inner wall vertical, with narrow vertical ridges; bottom sometimes reticulated, extending cephalad about one-half the length of the orifice. Operculum subcircular, 24–28  $\mu$  long and wide. Lingula shorter than operculum.

Ventral surface: Minute spines sparse, located between antenna and mouthparts, slightly nearer to spiracle than to body margin in thoracic tracheal fold, laterad of anterior abdominal spiracle and extending mesocaudad to abdominal segment 3.

Third-stage larva: Marginal teeth as long as wide; 5 to 7 at each tracheal pore area slightly longer and more slender than others. Dorsal setae located as in pupae. Two pairs of submedian elongate tubular ducts on cephalic segment; a subdorsal pair on meso- and metathoracic and on abdominal segments 4, 5, 6, and 8. A pair of submedian disk pores and porettes on meso- and metathorax.

Redescribed from numerous unmounted and mounted specimens as given below. On *Codiaeum variegatum* Blume, Botanical Garden, Buitenzorg, Java, R. S. Woglum, January 1911, lectotype and syntypes of *mammaeferus*. On *Codiaeum* sp., Japan, intercepted at Philadelphia, Pa., A. B. Wells, Oct. 2, 1939. On croton as follows: Apia, Upolu, Samoa, P. A. Buxton and G. H. Hopkins, April 1925, lectotype and syntypes of *samoanus*; Apia, Samoa, L. J. Dumbleton, Oct. 30, 1953; Fiji, intercepted at New South Wales, W. W. Froggatt, one lot May 14, 1898, one lot with letter of May 6, 1919; Java, one lot, and two lots without locality, Harold Compere; Singapore, Straits Settlements, one lot S. I. Kuwana, May 8, 1924, one lot C. P. Clausen, 1929, one lot intercepted at New Orleans, La., J. C. Pritchett, Aug. 26, 1935; Federated Malay States, intercepted at New Orleans, La., K. E. Miller, July 18, 1935; Japan, intercepted at Baltimore, Md., L. M. Scott, Oct. 29, 1934; Nelson, New Zealand, from W. J. Hall, letter Jan. 6, 1954; Australia, intercepted at Honolulu, Hawaii, J. P. Young, Apr. 10, 1955. On *Citrus medica* Linn., Tahiti, Society Islands, F. L. Washburn, August 1925, reported as *samoanus* by Dozier. On citrus, Rarotonga, Cook Islands, L. J. Dumbleton, July 1949. On unnamed host, one lot from Japan, intercepted at Philadelphia, Pa.,



J. H. Ramos, July 3, 1935; one lot from Suva, Fiji, R. A. Lever, Sept. 16, 1940, from E. C. Zimmerman.

It is likely that at least some of the hosts listed as croton are *Codiaeum variegatum*, since this plant is commonly known as croton in many of the areas from which *mammaeferus* is reported.

*Mammaeferus*, *dentatus*, and *incognitus* are alike in lacking cephalic setae and in having unusually large disk pores, but they are amply distinct and may readily be recognized by differences in color, in the vasiform orifice, and in other characteristics. The third-stage larvae differ from those of *caledonicus*, *citri*, and *noumeae* in lacking cephalic setae, and from the last two in having eight pairs of elongate tubular ducts.

*Orchamoplatus citri* (Takahashi), new combination (fig. 1, E-G)

*Aleuroplatus citri* Takahashi, 1940, NAT. HIST. SOC. FORMOSA TRANS. 30(205):381-382, illus.; Anonymous, 1952, VICTORIA DEPT. AGR. JOURN. 50(pt. 1):10-11, 14; Jenkins and Shedley, 1953, JOURN. AGRIC. WEST AUSTRALIA 2(ser. 3):49-55, illus.; Jenkins and Shedley, 1953, WEST. AUSTRAL. DEPT. AGRIC. LEAFLET 2027:3-[7], illus. (reprint of last article).

*Orchamus citri* (Takahashi), Dumbleton, 1956, ROY. ENT. SOC. LONDON PROC. (ser. B) 25(pts. 7-8):131-132.

Although the anonymous writer did not use the scientific name of the whitefly on citrus, the insect is believed to be *Orchamoplatus citri*; the report is from "Citrus Field Day at Mildura," and specimens of *citri* are at hand from this host and locality.

The anonymous writer, and Jenkins and Shedley discussed the injuriousness of this species, and the latter authors stated that a slight measure of control of the insects was being achieved by parasites.

In material examined, the insects are very abundant and numerous specimens are parasitized.

Differing from *mammaeferus* as described below.

Not yellowish. Ovoid, scarcely indented at thoracic tracheal pore areas, anterior end narrower than posterior, widest across abdominal segments 1 and 2.

Margin and submargin: None, or 1 to 3 marginal crenulations each side of tracheal pore areas produced into strong teeth. Tracheal pore area teeth 7 to 15 (usually 9 to 12) in number, bluntly pointed apically, less sharply demarcated from adjacent derm at base, the longest thoracic ones about 30, and the longest abdominal about 24  $\mu$ ; the thoracic ones in a space about 60, and abdominal ones in a space 48  $\mu$  wide. Glands in a single row and 4 to 6 additional ones mesad of row on abdominal segments 1 to 4 inclusive; 50 to 58 in number with 15 to 18 anterior and 34 to 43 posterior to thoracic tracheal pore area on each half of body; terminating laterad of abdominal tracheal pore area; the majority 10  $\mu$  long and 8 wide but posterior pair 8  $\mu$  long, those

beside thoracic tracheal pore areas same length as others; outer ones on abdominal segments 1 to 4 times the length of one from margin. Ridge absent proximad of glands.

Dorsal disk: Transverse molting suture terminating nearly opposite its midpoint, ends directed laterad. Disk pores and porets very small, no submedian pair on abdominal segment 2. Invaginated pores obscure, observed only on abdominal segments 3, 4, and 5. Cephalic setae present, 20–25  $\mu$  long; first abdominal 60  $\mu$ ; eighth abdominal 32–40  $\mu$ ; caudal 160–200  $\mu$ , bases 4 to 5 times the length of a gland apart.

Ventral surface: Spines numerous on cephalothorax; a few outside posterior legs and extending cephalad along tracheal fold in a broad band to margin, continued cephalad around anterior legs and mouthparts to median line, also present between anterior legs and mouthparts; the majority about 2  $\mu$  long but many cephalic ones larger and as much as 25  $\mu$  long. A pair of minute submedian setae on abdominal segment 2.

Third-stage larva: Marginal teeth as long as wide, 7 to 10 at each tracheal pore area longer and more slender than others. Submarginal setae as in pupae except that cephalic pair is proximad of submargin, in subdorsum. Dorsal setae located as in pupa and with 1 additional pair on cephalic segment laterad of cephalic pair, and a subdorsal pair on prothoracic and on abdominal segments 4 and 5; set in elongate bases. Ventral surface with spines arranged as in pupa except that they extend caudad to abdominal segment 5.

Redescribed from numerous mounted and unmounted specimens on citrus from Australia as follows: Sydney, New South Wales, N. S. Noble, Jan. 17, 1937, data the same as that of type material except for date; Sydney, New South Wales, from A. L. Tonnoir, May 4, 1936; Maddington, Western Australia, F. E. Ryan, from C. F. H. Jenkins, Nov. 30, 1950; Mildura District, Burnley, Victoria, C. J. R. Johnston, letter Feb. 15, 1951. On orange, Warawee, New South Wales, H. Compere, Nov. 18, 1927.

This species is rather closely related to *mammaeferus*, but is easily separated from it and other species of *Orchamoplatus* by having more than a single row of glands on the dorsal surface, and by the presence of numerous spines of various sizes on the ventral surface. The third-stage larvae differ from those of *caledonicus*, *mammaeferus*, and *noumeae* in having numerous spines on the ventral surface.

***Orchamoplatus montanus*** (Dumbleton), new combination (fig. 1, H–I)

*Orchamus montanus* Dumbleton, 1956, ROY. ENT. SOC. LONDON PROC. (ser. B) 25(pts. 7–8):132, 136, 141, illus.

Mounted specimens differing from *mammaeferus* as described below.

Not yellowish. Subelliptical, not indented at thoracic tracheal pore areas, widest across abdominal segment 1; 1.05 mm. long and 0.75 wide.

Margin and submargin: Tracheal pore area teeth 8 in number, rather stout,

fingerlike, the longest 28  $\mu$ ; abdominal ones in a space 40  $\mu$  wide. Glands terminating less than the width of one laterocephalad of abdominal tracheal pore area; 55 in number with 16 anterior and 39 posterior to thoracic tracheal pore area on each half of body; one-half to one times the width of one apart, the majority one-fourth to one-half the length of one from margin but posterior pair extending just beyond margin; the majority 14–16  $\mu$  long and 11–12 wide but one 24–28  $\mu$  long each side of tracheal pore areas. Invaginated pores in line with outer end of glands. Submarginal setae near outer end of glands. Ridge absent proximad of glands.

Dorsal disk: Transverse molting suture with midpoint as near to thoraco-abdominal as to meso-metathoracic suture; broadly curved laterocaudad to first abdominal suture, recurved and terminating opposite its midpoint. Disk pores and porettes small. Invaginated pores apparently in 2 pairs on abdominal segments 4 and 6. Cephalic setae 24  $\mu$  long; first abdominal broken near base; eighth abdominal broken near base, located on side of vasiform orifice; caudal setae broken but at least 80  $\mu$  long, on cephalic margin of abdominal tracheal pore area, their bases the width of a gland apart. Vasiform orifice 40  $\mu$  long and wide, lower portion of rim sclerotized and forming a thick ridge above adjacent derm but the top thin and membranous; inside membranous and less distinctly ridged, slightly expanded at posterior end. Operculum 36  $\mu$  long and wide.

Ventral surface: Minute spines absent.

Redescribed from one mounted paratype on a plant belonging to the Cunoniaceae, Mt. des Sourcés, New Caledonia, L. J. Dumbleton, Dec. 7, 1954.

Resembling *mammaeferus* but differing from it most prominently in the closeness of the caudal setae, the size of the posterior pair of glands, the shape of the tracheal pore area teeth, and the modification of the vasiform orifice.

**Orchamoplatus incognitus** (Dumbleton), new combination (fig. 1, J–K)

*Orchamus incognitus* Dumbleton, 1956, ROY. ENT. SOC. LONDON PROC. (ser. B) 25(pts. 7–8):132, 136–138, 141, illus.

Differing from *mammaeferus* as described below.

Dorsal surface brown in median and submedian area from cephalic segment to posterior abdominal one, colorless elsewhere. Widest across abdominal segment 1; 0.75–0.85 mm. long and 0.55–0.65 wide.

Margin and submargin: Tracheal pore area teeth 7 to 10 in number. Glands 49 to 51 in number with 16 anterior and 33 to 36 posterior to thoracic tracheal pore area on each half of body; about the width of one apart and slightly more than the length of one from margin; the majority 14  $\mu$  long and 12 wide but one 20–24  $\mu$  long each side of thoracic tracheal pore areas. Ridge proximad of glands faint, terminating at thoracic tracheal pore areas.

Dorsal disk: Longitudinal molting suture absent from meso- and meta-thorax of available specimens. Transverse molting suture with midpoint as

near to thoracoabdominal as to meso-metathoracic suture, broadly curved laterocaudad and broadly recurved laterocephalad. First abdominal setae broken at base; eighth abdominal setae broken, located the width of its base from opening of vasiform orifice; caudal setae 140  $\mu$  long. Vasiform orifice weakly sclerotized; expanded inside, walls curved outward, and this portion larger than opening; expanded portion 44–48  $\mu$  long and wide, opening 32  $\mu$  long and wide; bottom extending cephalad three-fourths the length of orifice. Operculum 32  $\mu$  long and wide.

Redescribed from two mounted paratypes on undetermined host, New Caledonia, F. Cohic, collector, from L. J. Dumbleton.

This species is similar to *mammaeferus* in lacking cephalic setae, in having unusually large disk pores, and in having minute spines on the ventral surface. It differs from *mammaeferus* in having the inside of the vasiform orifice expanded, in having the median portion of the transverse molting suture curved instead of angular, and in being brown in the central portion of the dorsum.

**Orchamoplatus caledonicus** (Dumbleton), new combination (fig. 2, A–B)

*Aleuroplatus* (*Orchanus*) (sic!) *samoanus* Laing, Williams, 1944, HAWAIIAN PLANTERS' RECORD 48(2):100, in part.

*Orchamus caledonicus* Dumbleton, 1956, ROY. ENT. SOC. LONDON PROC. (ser. B) 25(pts. 7–8):132–134, 141, illus.

The insects recorded by Williams belong to the species *caledonicus* (Dumbleton) and *noumeae* new species. The spelling *Orchanus* doubtless is a typographical error, since in specimens labeled by Williams the spelling is *Orchamus*.

In material examined the insects are fairly abundant, with the waxy secretion from one specimen often reaching that from others. The pupae frequently are parasitized.

Differing from *mammaeferus* as described below.

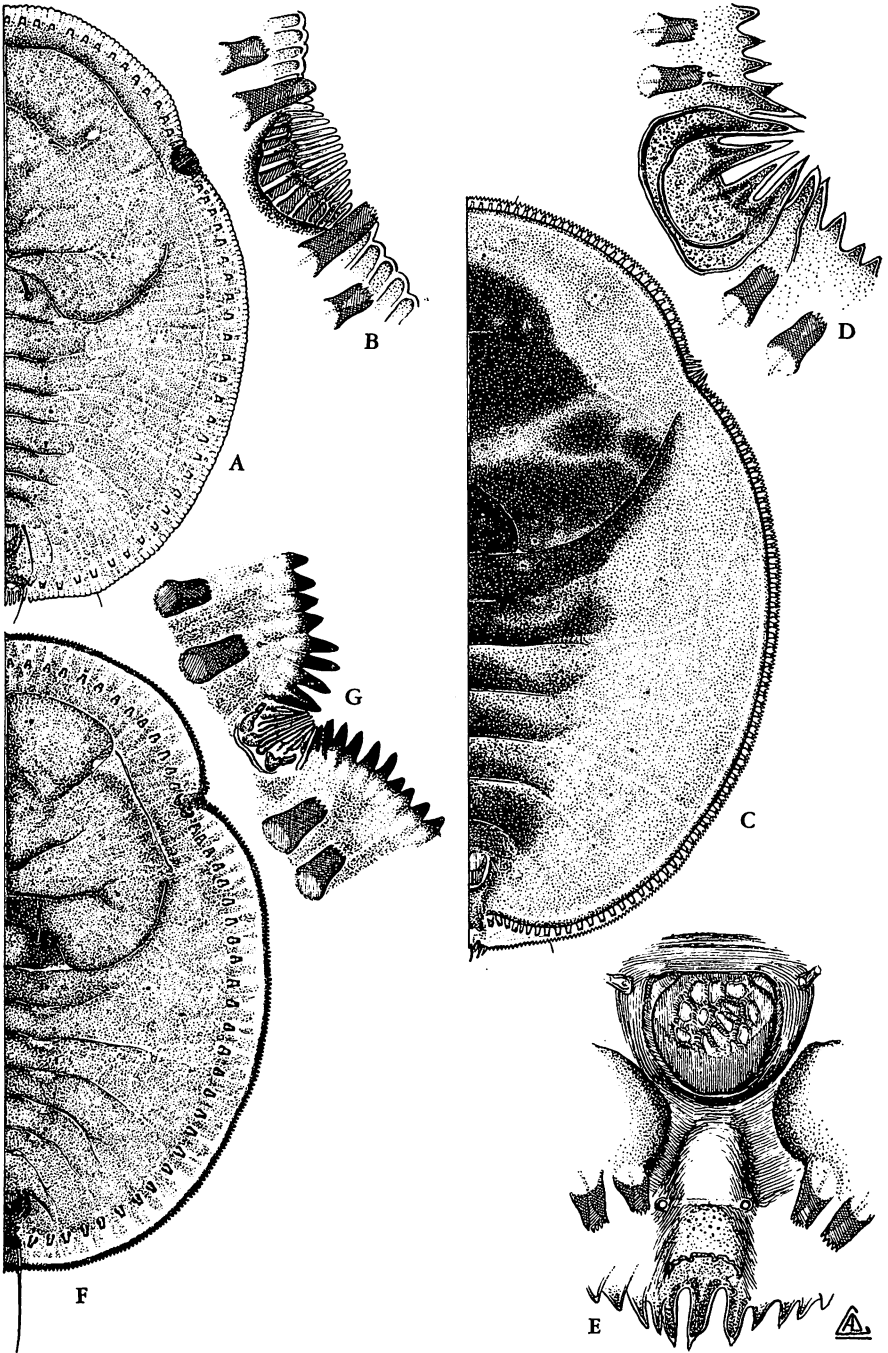
Waxy secretion not yellowish.

Dorsal surface dark brown, sclerotized, lightly sculptured in subdorsum. Broadly ovoid, widest across abdominal segments 1 and 2; 0.70–0.90 mm. long and 0.50–0.75 wide.

Margin and submargin: Marginal crenulations slightly stronger, 13 to 15 in 100  $\mu$ . Tracheal pore area teeth 8 to 13 in number; the abdominal ones in a space about 40  $\mu$  wide, basal portion of abdominal pore area porous appearing and strongly demarked from adjacent derm. Ridges defined for one-third the distance from margin to glands. Glands 39 to 49 in number with 13 to 16 anterior and 25 to 33 posterior to thoracic tracheal pore area on each half of body; the majority 12–16  $\mu$  long and 10–12 wide but one 20–24  $\mu$  long each

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FIG. 2. *Orchamoplatus caledonicus*: A, half of dorsum; B, thoracic tracheal pore area and adjacent derm. *O. calophylli*: C, half of dorsum; D, thoracic tracheal pore area and adjacent derm; E, part of posterior segment. *O. dentatus*: F, half of dorsum; G, thoracic tracheal pore area and adjacent derm.



side of thoracic tracheal pore areas. Ridge proximad of glands well defined on cephalothorax, weaker on abdomen and terminating between segments 3 and 7.

Dorsal surface: Eye spots light in color, oval, well removed from ridge. Transverse molting suture with midpoint slightly nearer to meso-metathoracic than to thoracoabdominal suture. Intersegmental sutures more distinct. Median length of abdominal segment 7 equal to that of segment 6. Disk pores and porettes smaller. Cephalic setae  $25\ \mu$  long; first abdominal broken but at least  $60\ \mu$ ; eighth abdominal  $60\text{--}68\ \mu$ ; caudal  $120\ \mu$ .

Ventral surface: Minute spines absent.

Third-stage larva: Marginal teeth longer than wide, 5 to 7 at each tracheal pore area more slender than others. Dorsal setae located as in pupa. Two pairs of submedian elongate ducts on cephalic segment, one at about mid-length of segment and one mesad of cephalic setae; a subdorsal pair on meso- and metathoracic and on abdominal segments 4, 5, 6, and 8.

Redescribed from approximately 100 unmounted and mounted specimens collected in New Caledonia as follows: On citrus, Noumea, F. X. Williams, Oct. 31, 1940; on citrus, Noumea, L. J. Dumbleton, 30/12 paratype; on orange, Noumea, F. Cohic, May 1953, from L. J. Dumbleton; on *Ochrosia* sp., intercepted at Washington, D. C., J. F. Schoen, Feb. 28, 1956.

This species can be distinguished from *mammaeferus*, to which it is rather closely related, by the brown color of the dorsal surface, by the presence of eye spots, and by the presence of cephalic setae. The third-stage larvae of *caledonicus* differ from those of *mammaeferus* in having the marginal teeth longer than wide, and in the presence of cephalic setae.

### *Orchamoplatus calophylli*, new species (fig. 2, C-E)

In the small sample available the pupae are scattered, and only two are connected by their waxy secretion. A few specimens are parasitized.

Differing from *mammaeferus* as described below.

Secretion not yellowish, sometimes dull and translucent, very thick near body.

Dorsal surface black and heavily sclerotized except on submargin which is colorless and membranous. Subcircular, not indented at thoracic tracheal pore areas, widest across abdominal segment 2; 1-1.25 mm. long and 0.90-1 wide. Submargin strongly deflexed, upper portion nearly vertical; only the ends of glands and marginal teeth in view when insects are in normal position.

Margin and submargin: Teeth strong, triangular, apices acute, 12 to 13 in  $100\ \mu$ ; the majority 8-10  $\mu$  long and wide but none or 1 to 3 each side of tracheal pore areas larger than the others. Anterior marginal setae  $12\ \mu$  long, posterior marginal  $32\ \mu$ . Thoracic tracheal pore area teeth 6, and abdominal ones 3 to 6, in number, gradually or sharply tapered to acute apices, sometimes forked near tip, bases not swollen, the longest about  $45\ \mu$ ; area proximad

of teeth porous appearing, ridged and strongly demarked from adjacent derm. Ridges well defined. Glands 57 to 66 in number with 16 to 20 anterior and 41 to 48 posterior to thoracic tracheal pore area on each half of body; the majority one-half to the width of one apart and about two-thirds the length of one from margin; 24–30  $\mu$  long and 10–12 wide; those adjacent to thoracic tracheal pore areas no larger than others. Ridge absent but a somewhat membranous line occupying its position proximad of glands, terminating near pro-mesothoracic suture.

Dorsal disk: Longitudinal molting suture terminating at membranous line. Transverse molting suture curved laterocaudad to first abdominal suture, broadly recurved and terminating at end of ridge near pro-mesothoracic suture; area encompassed within line and transverse molting suture easily broken from adjacent derm. Median length of abdominal segment 7 equal to that of segment 6. Disk pores and porettes small. Invaginated pores in 2 nearly contiguous pairs in each location. Setal bases not elongate; cephalic, first abdominal, and eighth abdominal setae broken at base; the last located the width of its base from opening of vasiform orifice, opposite anterior end of orifice; caudal setae 220  $\mu$  long, at cephalic end of abdominal tracheal pore area, bases about three-fourths the length of a gland apart. Vasiform orifice broadly cordate, about 60  $\mu$  long and 52 wide, area around posterior part of orifice slightly expanded; inside of orifice rather membranous and broadly ridged. Operculum about 45  $\mu$  long and 40 wide, its dorsal surface sclerotized and anterior half sculptured by 12 to 18 short longitudinal pits.

Ventral surface: Minute spines absent. A pair of minute submedian setae on abdominal segment 2.

Redescribed from about 15 unmounted and mounted specimens on *Calophyllum* sp., Neiafu, Vavau Island, Tonga, N. L. H. Krauss, February 1956, holotype and paratypes in the collection of the United States National Museum.

This interesting species is rather closely allied to *caledonicus* but differs from it in several ways, the most obvious being the acute marginal teeth, the smaller number and different shape and size of the tracheal pore area teeth, and the strongly deflexed submargin.

The densely black, heavily sclerotized pupae are difficult to mount satisfactorily, and most of those available are in unsatisfactory condition, being infested with fungus, parasitized, or broken.

### **Orchamoplatus dentatus** (Dumbleton), new combination (fig. 2, F–G)

*Orchamus dentatus* Dumbleton, 1956, ROY. ENT. SOC. LONDON PROC. (ser. B) 25(pts. 7–8):132, 134–136, 141, illus.

Mounted specimens differing from *mammaeferus* as described below.

Dorsal surface black, sclerotized, lightly sculptured in subdorsum. Broadly

oval, deeply indented at thoracic tracheal pore areas, widest across abdominal segment 1; 0.85–0.95 mm. long and 0.70–0.80 wide.

Margin and submargin: Teeth strong, triangular, apices rounded, 17 to 18 in 100  $\mu$ ; the majority 8  $\mu$  long and 6 wide but 1 to 4 each side of tracheal pore areas longer and more sharply pointed than others. Anterior marginal setae 20  $\mu$  long, posterior marginal 32  $\mu$ . Thoracic tracheal pore area teeth 8 to 9 in number, recessed within margin and adjacent marginal teeth nearly enclosing them; a small differentiated area proximad of teeth. Abdominal tracheal pore area teeth 6 to 8 in number, the longest about 32  $\mu$ ; basal portion of area porous appearing and strongly demarked from adjacent derm. Ridges defined one-third the distance from margin to glands. Glands 38 to 39 in number with 12 to 13 anterior and 25 to 28 posterior to thoracic tracheal pore area on each half of body; the majority about twice the width of one apart and twice the length of one from margin; the majority 20  $\mu$  long and 10 wide but one 24–28  $\mu$  long each side of thoracic tracheal pore areas, inner end of gland sculptured on upper surface. Invaginated pores readily apparent. Ridge proximad of glands well defined on cephalothorax, terminating near meso-metathoracic suture.

Dorsal disk: Eye spots light in color, inner portion nearly circular but an irregular area extending outward to ridge. Longitudinal molting suture terminating at ridge. Transverse molting suture with midpoint just cephalad of thoracoabdominal one, extending laterocephalad at a broad angle, then abruptly caudad to first abdominal suture, broadly recurved and terminating at or near end of ridge. Intersegmental sutures well defined, extending into subdorsum. Disk pores and porettes smaller but unusually large, those on abdominal segments 5 and 6 largest. Invaginated pores readily apparent. First abdominal setae broken but at least 40  $\mu$  long; eighth abdominal 60  $\mu$ , located on swollen rim; caudal 160 $\mu$ , bases the length of a gland apart. Vasiform orifice modified, its rim heavily sclerotized except at top, lower portion strongly expanded outward above adjacent derm and a shallow furrow around posterior portion, this area about 60  $\mu$  long and 80 wide and much larger than opening which is about 25  $\mu$  long and wide; inside expanded similarly to outside, ridges observed only near top, bottom extending cephalad nearly to anterior end of orifice; expanded area two-thirds its length from posterior suture and one-third its length from abdominal tracheal pore area. Operculum subcircular, 25  $\mu$  long and wide, sclerotized, its dorsal surface with minute spines at posterior end and with longitudinal striations anteriorly. Lingula not observed.

Ventral surface: Minute spines apparently absent.

Redescribed from two mounted paratypes on *Mooria artensis* Montr., Carenage, New Caledonia, L. J. Dumbleton, Apr. 8, 1955.

This species is rather closely related to *incognitus* but can be distinguished from it by the color of the dorsum, the presence of eye spots, the recessed



position of the thoracic tracheal pore areas, and the dentation of the body margin.

**Orchamoplatus noumeae**, new species (fig. 3, A-B)

*Aleuroplatus (Orchanus)* (sic!) *samoanus* Laing, Williams, 1944, HAWAIIAN PLANTERS' RECORD 48(2):100, in part.

The insects from New Caledonia listed as *samoanus* by Williams include both *caledonicus* (Dumbleton) and *noumeae*.

Representatives of *noumeae* are fairly abundant in the material examined. The pupae are infrequently parasitized.

Differing from *mammaeferus* as described below.

Secretion not yellowish, very thin, extending outward about one-half the greatest width of body; individual filaments sometimes apparent in fused mass.

Dorsal surface brown in median and submedian area from cephalic submargin to abdominal segment 4 or 5. Ovoid, widest across abdominal segments 1 and 2; 0.75–0.95 mm. long and 0.55–0.75 wide.

Margin and submargin: Marginal crenulations with 2 each side of thoracic tracheal pore areas, and 1 each side of abdominal tracheal pore area, produced into strong teeth. Thoracic tracheal pores recessed in submargin with a narrow slit leading to margin, a stout tooth on sides of pore, and 4 to 5 slender, tapering ones between them, with the longest about 20  $\mu$ ; base of teeth not swollen; area proximad of teeth expanded into a pore plate that extends into subdorsum the depth of the pore, and cephalad and caudad in line with glands adjacent to pore; pore plate strongly demarked from adjacent derm. Abdominal tracheal pore area with 5 or 6 slender, fingerlike teeth, the longest about 20  $\mu$ , bases not swollen, a porous appearing area proximad of them. Glands terminating 1 to 2 times the length of one from abdominal tracheal pore area; 36 to 44 in number with 11 to 15 anterior and 24 to 30 posterior to thoracic tracheal pores on each half of body; about 3 times the width of one apart and one-half the length of one from margin; 8–10  $\mu$  long and 6–8 wide, ones near tracheal pore areas same size as others. Submarginal setae 2  $\mu$  long, in line with outer end of glands. Invaginated pores obscure, in line with ends of glands.

Dorsal disk: Transverse molting suture with midpoint slightly nearer meso-metathoracic suture than thoracoabdominal one, extending laterocaudad at a broad angle. Disk pores and porettes small. Cephalic setae 50  $\mu$  long; first abdominal setae broken but at least 60  $\mu$ ; eighth abdominal 32  $\mu$ , contiguous to vasiform orifice; caudal setae broken but at least 40  $\mu$ , bases about twice the width of a gland apart. Vasiform orifice 32–36  $\mu$  long and wide. Operculum 22–26  $\mu$  long and wide.

Ventral surface: Thoracic tracheal folds with minute spines from near legs nearly to margin, absent elsewhere.

Third-stage larva: Marginal teeth slightly longer than wide, tapered, apices rounded; 5 to 6 at each tracheal pore area more slender than others and not tapered. Dorsal setae located as in pupa and with 1 additional submedian pair on cephalic segment anterior to cephalic pair, and 1 subdorsal pair on meso- and metathoracic and on abdominal segments 4, 5, 6, and 8. A strong median tubercle on each of abdominal segments 2 to 6.

Described from about 50 unmounted and mounted specimens on citrus, Noumea, New Caledonia, F. X. Williams, Oct. 31, 1940; holotype and paratypes in the collection of the United States National Museum; paratypes in the collection of the Hawaiian Sugar Planters' Association.

This species is distinctive in having the combination of a recessed thoracic tracheal pore with an expanded pore plate, a median brown stripe on the dorsum, glands located near the margin, and numerous spines in the thoracic tracheal folds. The third-stage larva differs from those of *caledonicus*, *citri*, and *mammaeferus* in having median abdominal tubercles.

**Orchamoplatus porosus** (Dumbleton), new combination (fig. 3, C-D)

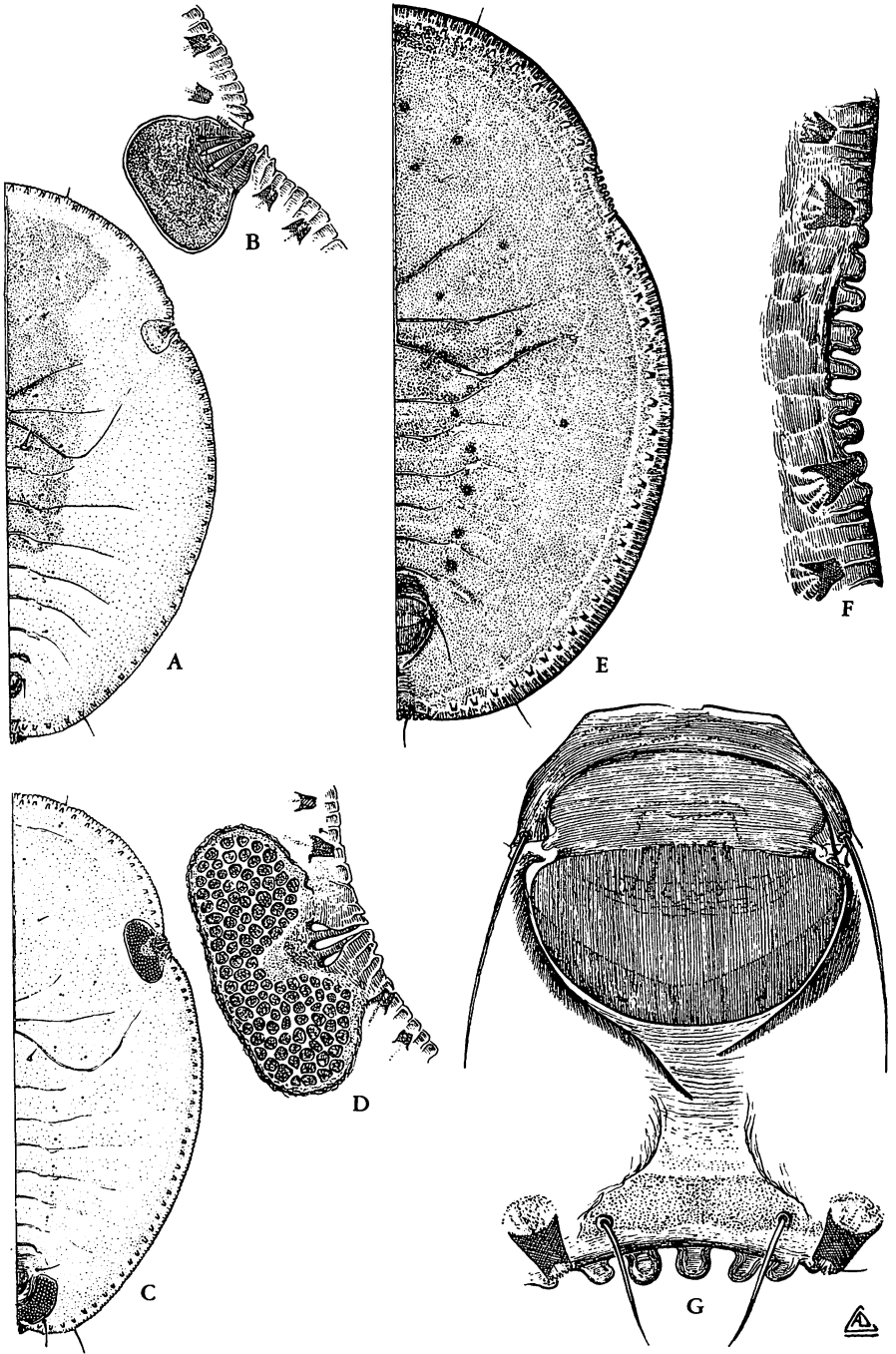
*Orchamus porosus* Dumbleton, 1956, ROY. ENT. SOC. LONDON PROC. (ser. B) 25 (pts. 7-8):132, 140-141, illus.

Mounted specimens differing from *mammaeferus* as described below.

Not yellowish. Widest across abdominal segment 1; 0.86 mm. long and 0.63 wide.

Margin and submargin: Marginal crenulations near tracheal pore areas not produced into strong teeth. Tracheal pores recessed in submargin; each one with sides produced into a short, stout tooth that extends just beyond adjacent marginal crenulations, and with 2 slender elongate teeth between them, the longest in any pore 16  $\mu$ ; the thoracic pores with a narrow slit, but abdominal one with a wider opening leading to margin; each thoracic tracheal pore with a greatly expanded pore plate that extends into subdorsum and extends cephalad in line with the second, and caudad in line with the third gland from pore; abdominal pore with a crescent-shaped pore plate occupying the space between the pore and the vasiform orifice and extending cephalad beside orifice nearly to the eighth abdominal setae. Glands terminating about 3 times the length of one from abdominal tracheal pore; 49 to 50 in number with 15 anterior and 34 to 35 posterior to thoracic tracheal pore on each half of body; 2 to 3 times the width of one apart and the length of one from margin; 8-10  $\mu$  long and 6-8 wide, those each side of tracheal pore areas the same size as others. Submarginal setae 2  $\mu$  long, in line with outer end of glands. Invaginated pores in line with outer end of glands. Ridge proximad

FIG. 3. *Orchamoplatus noumeae*: A, half of dorsum; B, thoracic tracheal pore, pore plate, and adjacent derm. *O. porosus*: C, half of dorsum; D, thoracic tracheal pore, pore plate, and adjacent derm. *O. plumensis*: E, half of dorsum; F, thoracic tracheal pore area and adjacent derm; G, part of posterior segment.



of glands inconspicuous, terminating just cephalad of thoracic tracheal pore plates.

Dorsal disk: Transverse molting suture with midpoint slightly nearer meso-metathoracic than thoracoabdominal suture, terminating just laterocaudad of meso-metathoracic suture. Disk pores and porettes very small. Cephalic and first abdominal setae broken at base; eighth abdominal setae broken but at least 20  $\mu$  long, located twice the width of its base from vasiform orifice; caudal setae broken but at least 24  $\mu$  long, located cephalad of penultimate pair of glands, adjacent to pore plate. Vasiform orifice 60  $\mu$  long and wide, about two-thirds its length from posterior suture and one-third its length from abdominal tracheal pore; a narrow furrow between it and tracheal pore plate; inner wall rather membranous and not ridged. Operculum subcordate, about 44  $\mu$  long and 48 wide. Lingula 40  $\mu$  long and extending beyond operculum in available specimen.

Ventral surface: Minute spines absent.

Redescribed from one mounted paratype on a plant belonging to the Myrtaceae, Carenage, New Caledonia, L. J. Dumbleton, Apr. 8, 1955.

This species resembles *noumeae* in having well developed pore plates associated with the tracheal pores, in having recessed thoracic tracheal pores, and in having rather small glands of uniform size well removed from one another but near the margin. It differs from *noumeae* and all other species in having a greatly expanded, crescent-shaped abdominal tracheal pore plate and in having the caudal setae far removed from the abdominal tracheal pore and posterior pair of glands.

**Orchamoplatus plumensis** (Dumbleton), new combination (fig. 3, E-G)

*Orchamus plumensis* Dumbleton, 1956, ROY. ENT. SOC. LONDON PROC. (ser. B) 25(pts. 7-8):132, 138-139, 141, illus.

One of the four available specimens is parasitized.

Mounted specimens differing from *mammaeferus* as described below.

Dorsal surface black, heavily sclerotized. Broadly oval, anterior end narrower than posterior end, widest across abdominal segment 2; 1 mm. long and 0.85 wide.

Margin and submargin: Margin entirely smooth or 1 short broad tooth on one or each side of tracheal pore areas. Anterior marginal setae about 32  $\mu$  long, posterior marginal about 44  $\mu$ . Tracheal pore area teeth 6 to 9 in number, the majority well separated from one another but 2 sometimes fused; short, stout, the longest 12  $\mu$ ; 8-12  $\mu$  wide; bases of teeth not swollen and not strongly demarked from adjacent derm but pore area somewhat swollen and ridgelike, and differentiated from adjacent derm. Ridges well defined, varying in width. Glands terminating laterad of abdominal tracheal pore area, 37 to 41 in number with 10 to 11 anterior and 26 to 30 posterior to thoracic tracheal pore area on each half of body; twice the width of one apart and

twice the length of one from margin; the majority 12–14  $\mu$  long and 10–12 wide but one each side of tracheal pore areas 16–20  $\mu$  long and these nearly attaining margin. Submarginal setae close to margin. Ridge not evident proximad of glands.

Dorsal disk: Weakly sculptured. Transverse molting suture with midpoint nearer to thoracoabdominal than to meso-metathoracic suture; broadly curved laterocaudad to first abdominal suture, then recurved and terminating opposite its own midpoint. Intersegmental sutures well defined and some extending into subdorsum. Median length of abdominal segment 7 approximately one-half that of segment 6. Disk pores and porettes small. Two pairs of invaginated pores on cephalic segment. Cephalic setae 32  $\mu$  long; first abdominal 32  $\mu$ ; eighth abdominal 100  $\mu$ , contiguous to widest part of vasiform orifice; caudal 80  $\mu$ , located on cephalic margin of abdominal tracheal pore area, bases slightly more than the length of a posterior gland apart. Vasiform orifice 96  $\mu$  long and 112 wide; about one-fifth its length from posterior suture and two-thirds its length from abdominal tracheal pore area; sunk in a depression in the derm, its sides bounded by a narrow furrow that extends cephalad to the posterior suture and opens into a caudal furrow posterior to orifice; outer wall of orifice sclerotized, but inner wall rather membranous; a lightly sclerotized membrane covering orifice, and opening apparently a narrow transverse line between the eighth abdominal setae. Inside of orifice with the walls convex; broad, longitudinal ridges apparently on inner surface of membrane covering orifice but position of these not positively determined in available specimens; bottom of orifice apparently extending full length of organ. Operculum apparently 48  $\mu$  long and wide, completely enclosed in orifice, sclerotized and sculptured by minute pits on anterior portion.

Ventral surface: Abdominal tracheal fold with a few minute spines; presence or absence of other spines not determinable.

Redescribed from four mounted paratypes on an undetermined plant, Plum, New Caledonia, L. J. Dumbleton.

This species is unique in having a strongly modified vasiform orifice, a caudal furrow, a smooth body margin, and in having the tracheal pore area teeth as wide as long and the pore areas ridgelike.

***Aleuroplatus* (Orchamus) *premae*** Corbett, 1926, BUL. ENT. RES. 16(pt. 3):272–273, illus.

This species does not have submarginal glands or the other structures that characterize *Orchamoplatus* and should not be placed in this genus. It may be left in *Aleuroplatus* pending the further study of it and related species.

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