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*(The pages of the publication follow this cover sheet)*

NEW ALEYRODIDAE (HEMIPTERA: HOMOPTERA)  
FROM NEW CALEDONIA.

By L. J. DUMBLETON, F.R.E.S.

Subfamily UDAMOSELINAE Enderlein.

Genus *Dialeurodicus* Cockerell.

***Dialeurodicus elongatus* sp. n.** (Figs. 1-9.)

*Larva* (fig. 1).—Length 0.38 mm., width 0.2 mm. Margin without teeth. Ovoid red eye spots half way between mid-dorsal line and margin. Submargin with 17 setae on each side. Two pairs of cephalic setae anterior to eye spots, two pairs of thoracic setae, one pair on first abdominal segment and one pair on eighth abdominal segment cephalad of orifice. Four pairs of medium-sized simple pores midway between mid-dorsal line and margin on abdominal segments three to six inclusive.

*Pupal case* (figs. 2-4).—Length 1.6-2.1 mm., width 0.65-0.95 mm. Widest at mid-length, flat, elongate, not constricted between thoracic tracheal pores. Colour light brown. Margin crenulated, about 5 or 6 crenulations in 0.1 mm. Submargin (figs. 3 and 4) defined by radial lines and submarginal ridges, each of the latter with a bordered pore or gland occupying the inner end. Mesad of the submargin on each side are 17 setae, which are about as long as the submarginal ridges. Of these setae nine are on the cephalothorax, six anterior to the pore and three posterior, and eight on the abdomen. Between these setae, especially on the cephalo-thorax and the anterior half of the abdomen, is an irregular linear series of small bordered pores. The caudal setae are not differentiated. There are two pairs of paramedian cephalic setae and three pairs of para-median thoracic setae. Transverse moulting suture extends to submargin. Thoracic tracheal fold not evident. Thoracic tracheal pore (fig. 3) visible as one or two smaller teeth or crenulations. Abdominal tracheal fold not evident, pore represented by one or two smaller teeth. Abdomen without setae on first segment and with setae on eighth segment cephalad of orifice. Vasiform orifice (fig. 4) 0.13 mm. long, 0.1 mm. wide, subcordate. Operculum sub-rectangular, 0.075 mm. wide, 0.045 mm. long, occupying less than half the orifice and with two short setae on the posterior margin. Lingula occupies full length of orifice, length 0.1 mm., width 0.045 mm., with two subapical setae 0.04 mm. long.

*Adult* (figs. 5-9).

*Male*.—Head with rounded vertex. Between base of antenna and eye is a finger-like finely setose process (fig. 5) about 0.1 mm. long and 0.025 mm. wide, equal in length to the first two antennal segments. Antennal segment 3, 0.21 mm. long; 4, 0.04; 5, 0.045; 6, 0.075; 7, 0.07 mm. long. Fore wing (fig. 6) 1.3 mm. long, R<sub>1</sub>, R<sub>s</sub>, M and Cu present, also a clear fold between M and Cu and with dark maculation on proximal half of M and on distal half of Cu. Hind wing 1.0 mm. long with R<sub>1</sub> and R<sub>s</sub> present and one other vein. Fore femur with a comb of 9 setae on proximal half. Hind tibia with a comb of 16-17 setae. A median ventral truncate-conical process present caudad of the posterior pair of abdominal sternites. Claspers (fig. 8) of genitalia, stout with prominent thumb-like subapical ventral process. Vasiform orifice (fig. 9), transverse subcircular. Operculum transverse, posterior margin concave and with two minute paramedian setae. Lingula exposed, elongate, bluntly pointed, with two subapical setae.

*Holotype*.—Pupal case on slide mount. Deposited in the Institut Français d'Océanie, Noumea, New Caledonia.

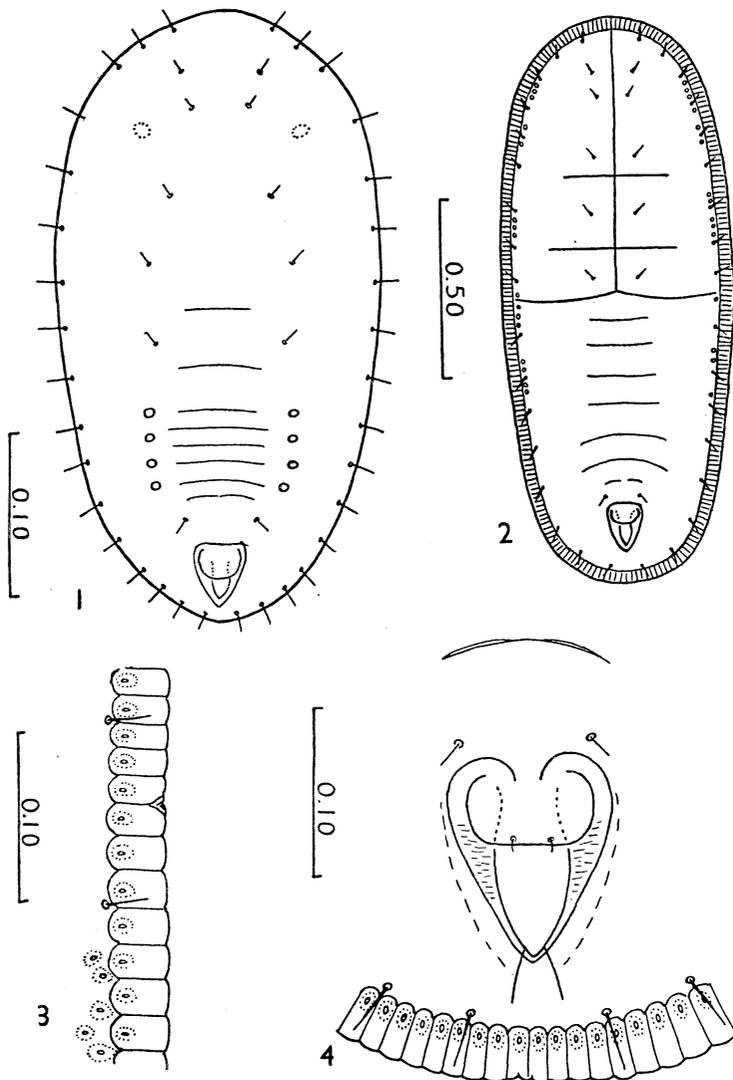
PROC. R. ENT. SOC. LOND. (B) 25. PTS. 7-8. (AUGUST, 1956.)

*Paratypes*.—In the author's collection.

*Type locality*.—NEW CALEDONIA: Anse Vata, Noumea, 20. v. 55.

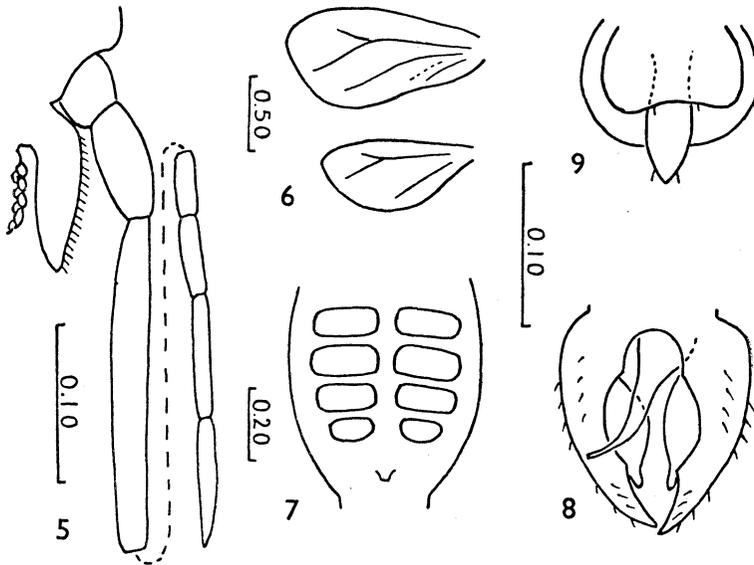
*Food plant*.—Coconut (*Cocos nucifera*).

What was apparently this species was described and figured as *Aleyrodicus destructor* Mackie by Risbec (1942). The abundant long wax filaments, which have a blueish tinge, are similar to those of *destructor*.



FIGS. 1-4.—*Dialeurodicus elongatus* sp. n. (1) Larva; (2) pupal case; (3) pupal case, margin and thoracic tracheal pore; (4) pupal case, vasiform orifice, margin and abdominal tracheal pore.

The absence of compound or agglomerate pores would indicate that this species is a *Dialeurodicus*, though there is no cone-shaped process on the vertex of the adult. The claspers of the male are similar to those of *Septaleurodicus mexicanus* Sampson, which has, however, a more reduced wing venation.



FIGS. 5-9.—*Dialeurodicus elongatus* sp. n. (5-8) Adult male: (5) antenna and cephalic process; (6) wings; (7) venter of abdomen and median process; (8) genitalia, claspers and penis; (9) adult female, vasiform orifice.

#### Subfamily ALEYRODINAE Enderlein.

#### Genus *Orchamus* Quaintance and Baker.

*Orchamus* was created as a subgenus of *Aleuroplatus* Q. & B. by Quaintance and Baker (1917) with *A. (O.) mammaeferus* Q. & B. from Java as the type of the subgenus. The principal diagnostic character given was the series of teeth on the inner caudolateral margin of the vasiform orifice. The existence of numerous papillae in a linear series on the submargin was not mentioned in the subgeneric prescription. Since then *samoanus* Laing and *citri* Takahashi have been placed in this subgenus. The discovery in New Caledonia of six new species of similar facies and all with a linear series of submarginal papillae makes it desirable to raise *Orchamus* to generic rank.

As it is known at present it is restricted to Java, Australia and Pacific Islands. The New Caledonian species are not known to occur elsewhere. The origin of *samoanus*, which may be a synonym of *mammaeferus*, is not known. It was described from Western Samoa and is known to me from Fiji, Rarotonga and Tahiti, but as it occurs commonly on Croton and Citrus it is likely to have been widely spread by man.

The following amended generic prescription is given :

*Pupal case*.—Flat, elliptical, often constricted across thoracic combs. Colourless or black. Margin with a single row of crenulations or teeth. Submarginal line often present especially on anterior half of body. A linear series of subcylindrical papillae on submargin and rarely a few laterad on disc of abdomen. Papillae with two apparent side pieces and the margin between their apices notched. Submarginal minute setae and anterior and posterior marginal setae usually present. Thoracic and abdominal tracheal folds present or absent, usually faint, but thoracic folds rarely well marked. Combs present in tracheal pore areas, usually varying from two to many long slender teeth, often invaginated but sometimes nearly continuous with margin and with short rounded well-separated teeth. Usually with a pair of hair-like cephalic setae between the thoracic combs and another pair on the first abdominal segment. One pair of setae on eighth abdominal segment may be distant from base of orifice or situated on it. Eye spots present or absent. Suture between meso- and metathorax usually distinct medially. Transverse moulting suture with a deep or shallow concavity medially which may be rounded or angulate, sides sometimes turning antero-laterally and nearly meeting submarginal line. Abdominal segmentation usually distinct in median line and with five pairs of small paramedian pores present. Vasiform orifice subcircular to subcordate, sometimes with inner caudo-lateral margin toothed. Operculum usually subcordate, nearly filling orifice. Lingula usually concealed, subparallel-sided, apex rounded.

*Adult*.—Wings white, immaculate, vein R1 absent. Antennae with seven segments. Claspers of male curved and pointed apically and with a sub-apical ventral gibbosity. Penis, in lateral view, curved and tapering. Lingula long, subparallel-sided, apex rounded.

*Type species*. *Orchamus mammaeferus* Quaintance and Baker.

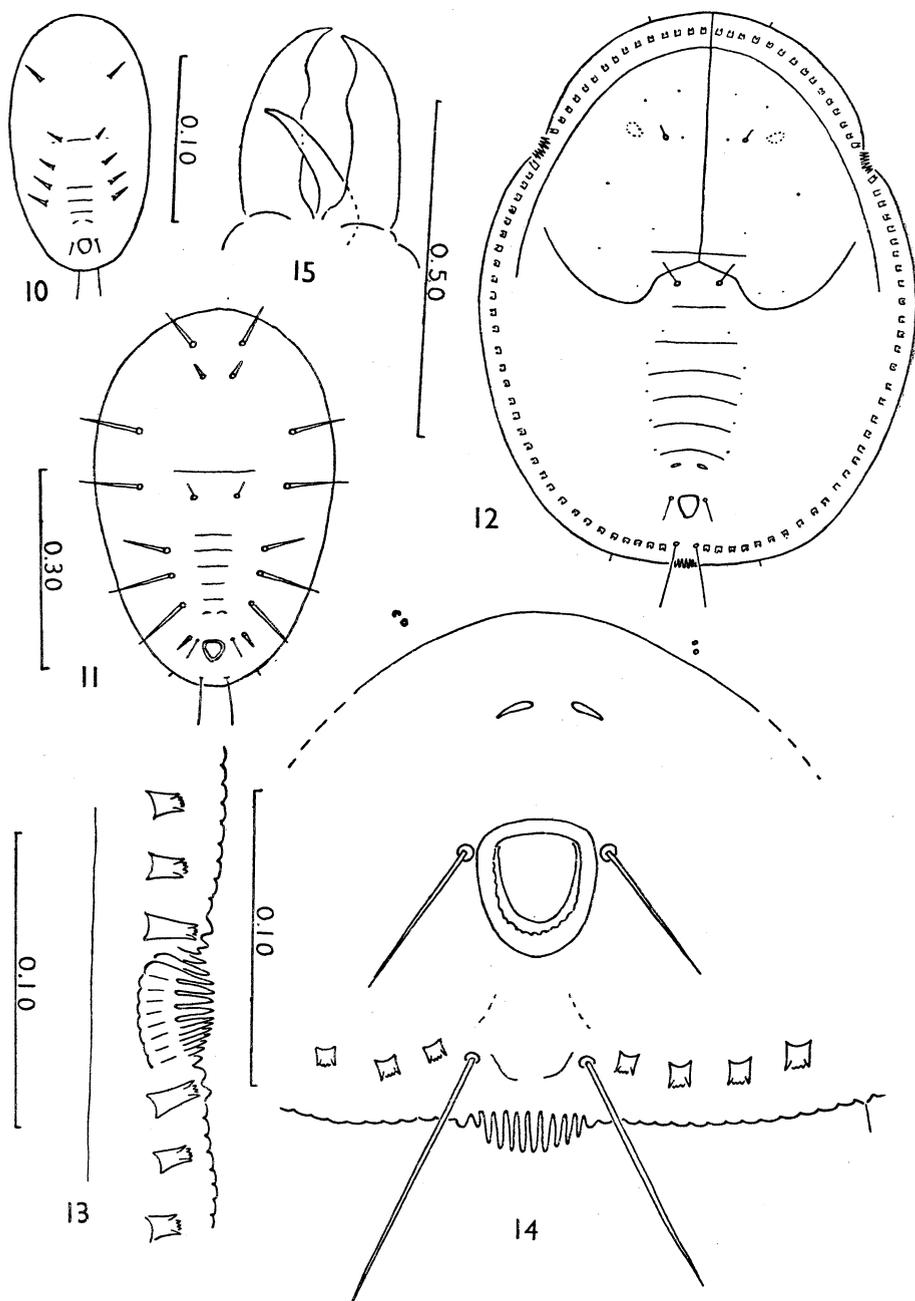
Key to the pupal cases of the genus *Orchamus*.

- 1 Black species . . . . . (2)  
Colourless or pigmented only in median area . . . . . (4)
- 2 Thoracic tracheal comb with seven or eight short, rounded well-separated teeth; eye spots and submarginal line absent . . . . . **plumensis** sp. n.  
Not as above . . . . . (3)
- 3 Margin with strong teeth, thoracic combs deeply invaginated, eye spots subtriangular, touching submarginal line which nearly meets lateral termination of transverse moulting suture . . . . . **dentatus** sp. n.  
Margin crenulated, combs not deeply invaginated, eye spots elliptical, distant from submarginal line which continues caudad of lateral ends of transverse moulting suture . . . . . **caledonicus** sp. n.
- 4 Papillae confined to single row on submargin, thoracic tracheal fold, if present, narrow and without mesally directed spines at inner end . . . . . (5)  
Six or seven papillae laterad on disc of abdomen, tracheal fold wide, with about ten spines at inner end directed mesally . . . . . **citri** Takahashi
- 5 With prominent large pore plates mesad of thoracic and cephalad of abdominal tracheal combs . . . . . **porosus** sp. n.  
Not as above . . . . . (6)
- 6 Pigmented in median area . . . . . **incognitus** sp. n.  
Unpigmented . . . . . (7)
- 7 Comb teeth subparallel-sided, apices rounded; caudal setae close together; eighth abdominal setae rising from base of orifice . . . . . **montanus** sp. n.  
Comb teeth tapered, pointed; caudal setae wider at bases; eighth abdominal setae distant from base of orifice . . . . . **samoanus** Laing

(*N.B.*—*mammaeferus* is not included as I have seen no specimens. It is possible that *samoanus* is a synonym of *mammaeferus*.)

**Orchamus caledonicus** sp. n. (Figs. 10-15.)

Larva (early stage) (fig. 10) with five pairs of stout setae; caudal setae and those of eight abdominal segment hair-like.



FIGS. 10-15.—*Orchamus caledonicus* sp. n. (10) Larva, early stage. (11) larva, later stage. (12) Pupal case. (13) Pupal case, margin and thoracic tracheal comb. (14) Pupal case, vasiform orifice, margin and abdominal tracheal comb. (15) Adult male, genitalia, clasper and penis.

*Larva* (later stage) (fig. 11).—First abdominal, eighth abdominal and caudal setae hairlike. Eight pairs of stout setae, posterior cephalic pair and one pair on eighth abdominal segment much shorter than others.

*Pupal case* (figs. 12–14).—Length 0.82 mm., width 0.63 mm. Widest at mid-length, flat, elliptical, slightly constricted between thoracic combs. Colour black. Margin crenulated. Anterior and posterior marginal setae present. Submarginal line present, extending to mid-length. Submargin with a single row of papillae, about 14 anterior to comb and 32 posterior to comb on each side. Papillae about 0.05 mm. long and 0.04 mm. wide at base, those adjoining thoracic comb nearly twice as long as others. Papillae distant by their length from margin. Submarginal minute setae present. Caudal setae 0.12 mm. long. Eye spots present, ovoid, distant about 0.05 mm. from submarginal line. A pair of short cephalic setae between eye spots. Transverse moulting suture nearly meeting submarginal line, which ends further caudad. Thoracic tracheal fold not evident. Thoracic tracheal comb (fig. 13) with eight or nine slender tapering, pointed teeth; central teeth 0.013 mm. long. Bases of teeth separated by lines and internal margin of comb base crenulate or scalloped. Two or three crenulations on margin adjoining comb conically produced. Abdominal tracheal fold faintly indicated. Abdominal tracheal comb (fig. 14) with eight or nine slender teeth 0.01 mm. long and somewhat rounded apically. Two or three adjoining marginal crenulations conically produced. First abdominal segment with one pair of setae 0.08 mm. long, eighth abdominal segment with one pair of setae distant from orifice. Vasiform orifice (fig. 14) 0.045 mm. long, 0.04 mm. wide, posterior internal margin toothed. Operculum subcordate, occupying most of orifice. Lingula short, parallel-sided, rounded apically.

*Adult*.—*Male*: Antennal segment 3, 0.15 mm. long; 4, 0.035 mm.; 5, 0.037; 6, 0.05; 7, 0.045 mm. Wings white immaculate,  $R_1$  not present. Clasper (fig. 15) of genitalia 0.12 mm. long. Penis 0.1 mm. long, in lateral view, curved, tapering. Lingula long finger-like. Hind tibia with about 29 setae in comb.

*Holotype*.—Slide mount of pupal case. Deposited in Institut Français d'Océanie, Noumea, New Caledonia.

*Paratypes*.—In the author's collection.

*Type locality*.—NEW CALEDONIA: Anse Vata, Noumea, 24.v.55.

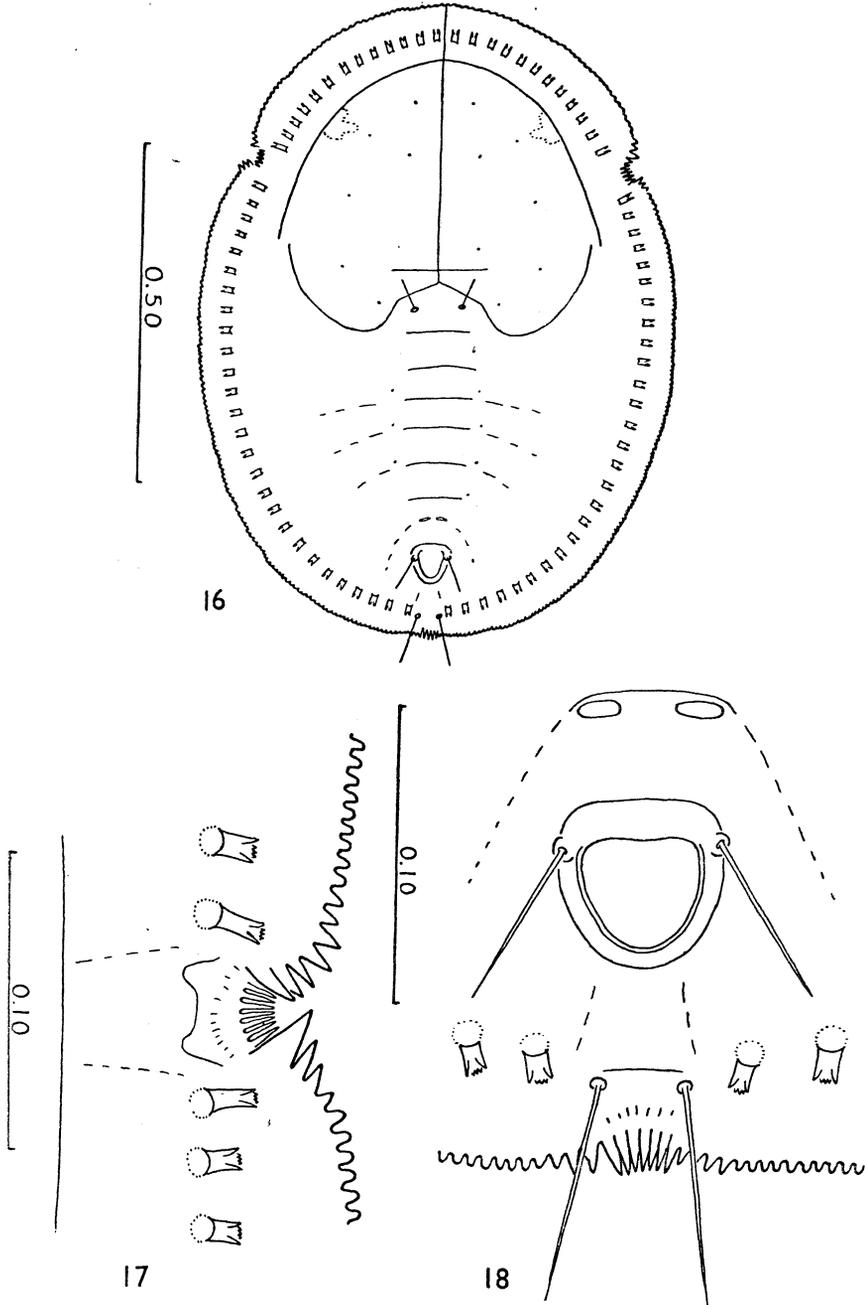
*Food plant*.—Orange.

This appears to be the species which was recorded from New Caledonia by Williams (1944) as *Aleuroplatus (Orchamus) samoanus* Laing. Mr. C. E. Pember-ton, who kindly examined Williams' specimens for me, informs me that they are black. They are, therefore, not *samoanus* and are probably *caledonicus* sp. n.

### ***Orchamus dentatus* sp. n. (Figs. 16–18.)**

*Pupal case* (fig. 16).—Length 0.92 mm., width 0.74 mm. Widest about mid-length, flat, elliptical, deeply constricted across thoracic combs. Colour black. Margin with prominent rounded teeth, as long as wide. Submarginal line about 0.1 mm. distant from margin, ending caudad of thoracic comb and nearly meeting lateral ends of transverse moulting suture. Submargin with a single row of papillae, 13 anterior to comb and 26 posterior to comb on each side, distant by more than their length from the margin, longer than wide, length about 0.01 mm. Those on each side of thoracic comb 0.015 mm. long, those adjoining abdominal comb not longer than others. Caudal setae about 0.1 mm. long. Eye spots irregular, somewhat triangular, cephalad of line between thoracic combs and contiguous with submarginal line. Thoracic tracheal fold faintly indicated. Three or four marginal teeth on each side of comb increasing in length and becoming more conical as they approach comb. Thoracic tracheal comb (fig. 17) deeply invaginated with seven or eight slender, tapering, pointed teeth, free portion 0.013 mm. long, basal portions separated by lines and comb base bounded internally by a line. Abdominal thoracic fold faintly indicated if at all. Abdominal thoracic comb (fig. 18) with six or seven teeth about 0.013 mm. long. Marginal

teeth on each side longer and more conical. First abdominal segment with one pair of setae about 0.1 mm. long. Setae of eighth abdominal segment arising from prominent tubercles on base of orifice, length 0.05 mm. Vasiform orifice (fig. 18) subcordate, width 0.06 mm. Operculum subcordate, occupying whole orifice. Lingula not evident.



FIGS. 16-18.—*Orchamus dentatus* sp. n. (16) Pupal case. (17) Pupal case, margin and thoracic tracheal comb. (18) Pupal case, vasiform orifice, margin and abdominal tracheal comb.

*Holotype*.—Pupal case on slide mount. Deposited in Institut Français d'Océanie, Noumea, New Caledonia.

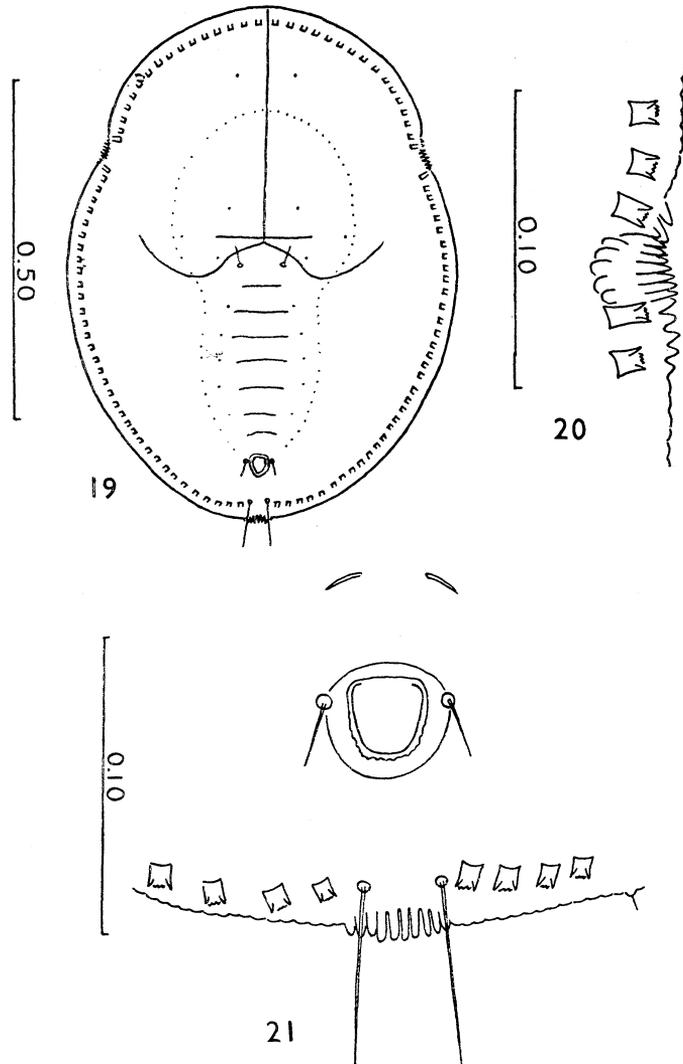
*Paratypes*.—In the author's collection.

*Type locality*.—NEW CALEDONIA: Carenage, 8.iv.55.

*Food plant*.—Myrtaceous plant? *Môorea artensis* Montr.

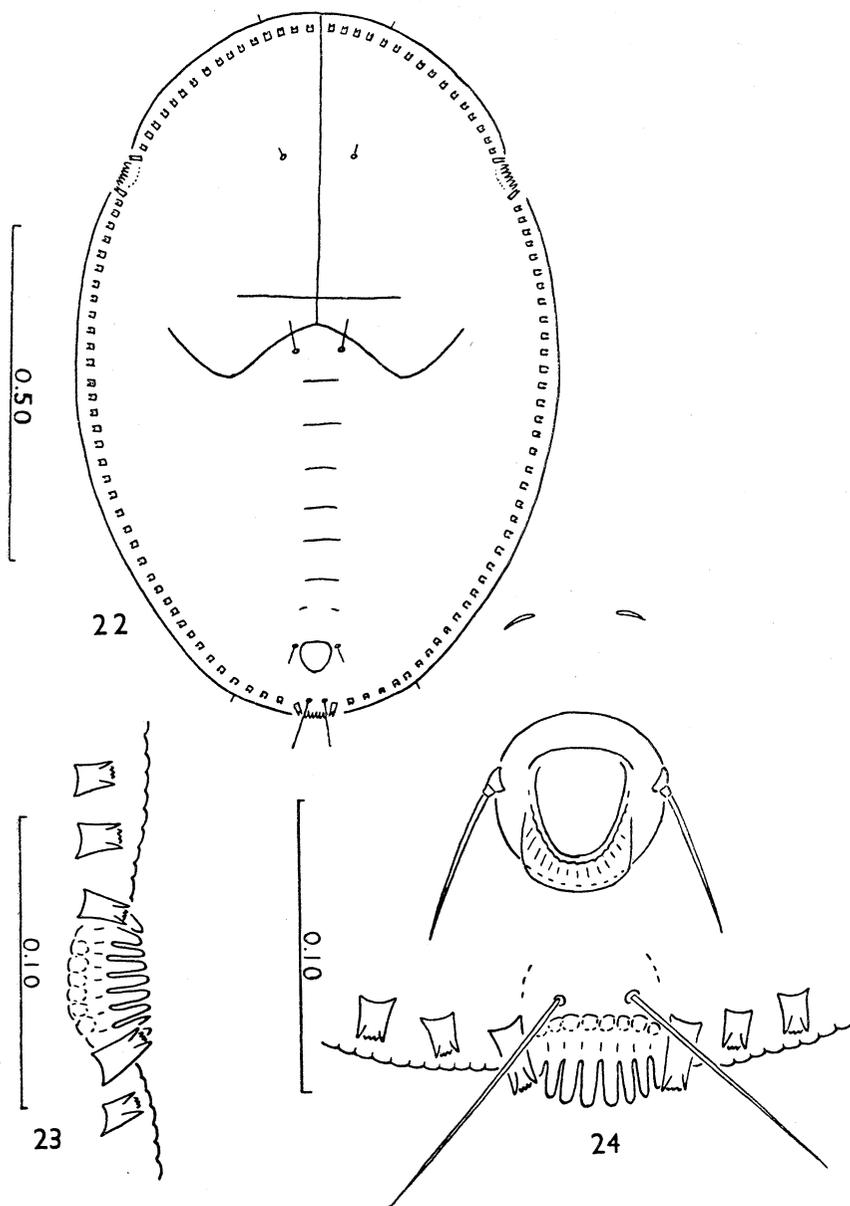
***Orchamus incognitus* sp. n.** (Figs. 19–21.)

*Pupal case* (fig. 19).—Length 0.77 mm., width 0.56 mm. Widest at mid-length, flat, elliptical, slightly constricted across thoracic tracheal combs. Colourless except for median area, which is light brown. Margin crenulated. Posterior marginal setae present. Sub-



FIGS. 19–21.—*Orchamus incognitus* sp. n. (19) Pupal case. (20) Pupal case, margin and thoracic tracheal comb. (21) Pupal case, vasiform orifice, margin and abdominal tracheal comb.

marginal line not evident. Single row of papillae on submargin, about 16 anterior and 33 posterior to comb on each side. Papillae slightly longer than width at base, those on each side of thoracic comb slightly longer than others. Caudal setae 0.07 mm. long. Eye spots absent. Thoracic tracheal fold not evident. Thoracic tracheal comb (fig. 20) with six or seven teeth 0.013 mm. long and slightly rounded apically. Two or three marginal teeth adjoining comb conically produced. Bases of comb teeth divided, interior margin of comb



FIGS. 22-24.—*Orchamus montanus* sp. n. (22) Pupal case. (23) Pupal case, margin and thoracic tracheal comb. (24) Pupal case, vasisform orifice, margin and abdominal tracheal comb.

base crenulate or scalloped. Abdominal tracheal fold not evident. Abdominal tracheal comb (fig. 21) with about eight teeth, rounded apically and not strongly tapered. First abdominal segment with one pair of setae 0.03 mm. long. Setae of eighth abdominal segment 0.015 mm. long, on or close to base of orifice. Vasiform orifice (fig. 21) subcircular, 0.04 mm. wide, 0.035 mm. long, posterior internal margin toothed. Operculum elongate sub-rectangular, filling orifice. Lingula not evident.

*Holotype*.—Pupal case on slide mount. Deposited in the Institut Français d'Océanie, Noumea, New Caledonia.

*Paratype*.—In the author's collection.

*Type locality*.—NEW CALEDONIA. Coll. F. Cohic.

*Food plant*.—Undetermined.

#### ***Orchamus montanus* sp. n. (Figs. 22–24.)**

*Pupal case* (fig. 22).—Length 1.05 mm., width 0.7 mm. Widest at midlength, flat, elliptical, slightly constricted between thoracic combs. Colourless. Margin crenulated. Anterior marginal setae present. Submarginal line not evident. Submargin with a single row of papillae, 18 anterior to comb and 40 posterior to comb on each side. Papillae 0.012 mm. long, 0.01 mm. wide at base, distant less than their length from margin, those adjoining comb much longer. Submarginal minute setae present. Eye spots absent. Two paramedian setae between thoracic combs. Caudal setae 0.09 mm. long, bases close together. Thoracic tracheal fold not evident. One or two marginal crenulations adjoining comb produced as conical teeth. Thoracic tracheal comb (fig. 23) with seven or eight teeth 0.015 mm. long, finger-like with rounded apices and subcircular bases. Abdominal tracheal fold faint. Abdominal tracheal comb (fig. 24) with seven or eight teeth 0.015 mm. long, similar to those of thoracic comb. First abdominal segment with two setae 0.05 mm. long. Setae on eighth abdominal segment on base of orifice, 0.05 mm. long. Vasiform orifice (fig. 24) with posterior rim raised, thin, and folded over in mounts showing the ridges which end on the rim as teeth, subcircular, 0.06 mm. wide. Operculum subcordate, filling orifice. Lingula not evident.

*Holotype*.—Pupal case on slide mount. Deposited in Institut Français d'Océanie, Noumea, New Caledonia.

*Paratypes*.—In the author's collection.

*Type locality*.—NEW CALEDONIA: Montagne des Sources, 7. xii. 54.

*Food plant*.—Undetermined Cunoniaceous plant.

#### ***Orchamus plumensis* sp. n. (Figs. 25–29.)**

*Larva*.—Length 0.7 mm. Two pairs of paramedian cephalic setae, one pair first abdominal, one pair eighth abdominal and one pair caudal setae, all hair-like. One pair anterior cephalic, one pair thoracic, one pair first abdominal, three pairs abdominal setae on segments 5–7, all short, stout, conical.

*Pupal case* (fig. 26).—Length 0.88 mm., width 0.62 mm. Widest behind mid-length, flat, elliptical, very slightly constricted across thoracic combs. Colour black. Margin with rather weak crenulations. Submarginal line not evident. Submargin with a single row of papillae, 12–13 anterior to thoracic comb and 26 posterior to comb on each side. Papillae wider at base than length, length 0.01 mm., somewhat strongly tapered; those adjoining combs little if at all longer. Caudal setae 0.05 mm. long. Eye spots absent. One pair of setae between anterior margins of thoracic combs. Thoracic tracheal fold not evident. Thoracic tracheal comb (fig. 27) consisting of about seven short rounded teeth, length of teeth 0.005 mm., slightly longer than wide, tips in a straight line. Abdominal tracheal fold faintly indicated. Abdominal tracheal comb (fig. 28) with about six teeth, 0.01 mm. long, longer than wide, apices rounded, well separated, tips in a straight line. First abdominal segment with one pair of setae. Setae on eighth abdominal segment rising from prominent

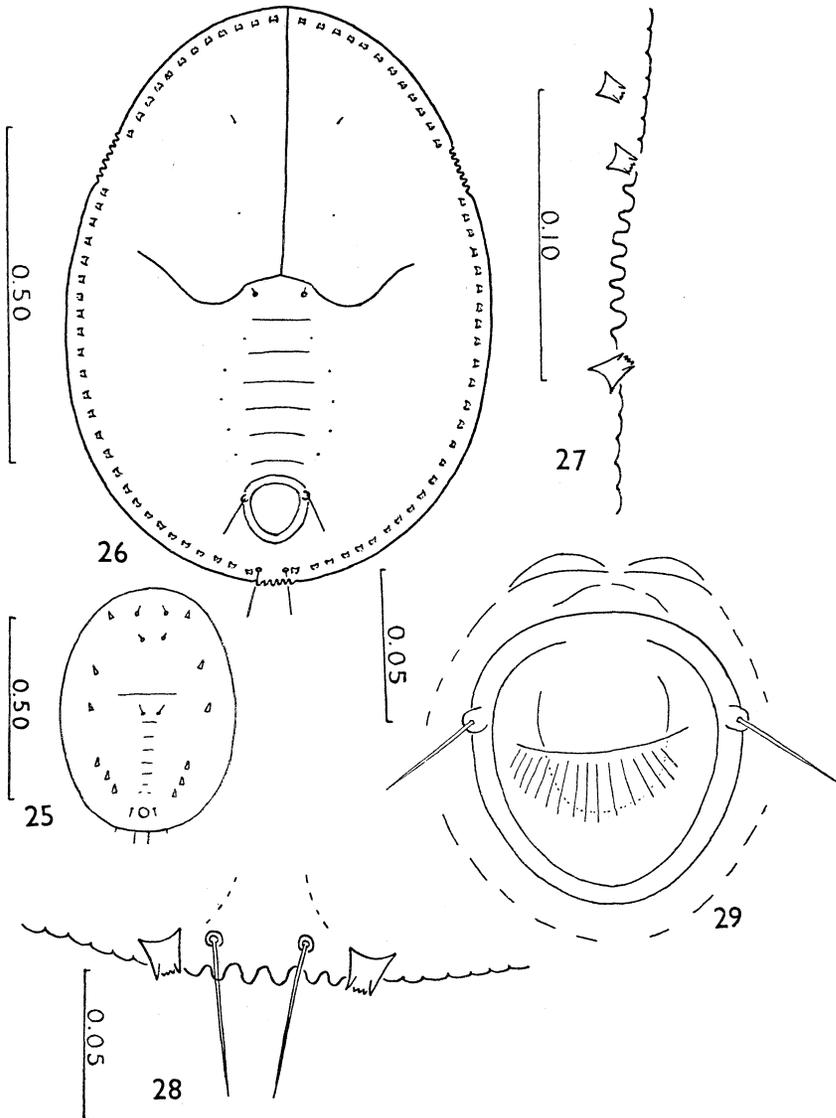
tubercles on base of orifice, 0.03 mm. long. Vasiform orifice (fig. 29) subcircular, 0.1 mm. long, posterior rim thin and in the mount folded over so that the ridges ending as teeth are evident. Operculum subcircular. Lingula not evident.

*Holotype*.—Pupal case on slide mount. Deposited in Institut Français d'Océanie, Noumea, New Caledonia.

*Paratypes*.—In the author's collection.

*Type locality*.—NEW CALEDONIA: Plum.

*Food plant*.—Undetermined.



FIGS. 25-29.—*Orchamus plumensis* sp. n. (25) Larva. (26) Pupal case. (27) Pupal case, margin and thoracic tracheal comb. (28) Pupal case, margin and abdominal tracheal comb. (29) Pupal case, vasiform orifice.

***Orchamus porosus* sp. n.** (Figs. 30–32.)

*Pupal case* (fig. 30).—Length 0.90 mm., width 0.62 mm. Widest at mid-length or slightly before, flat, elliptical, slightly constricted across thoracic combs. Colourless. Margin slightly crenulated. Anterior and posterior marginal setae present, submarginal line not evident. Single submarginal row of papillae, 0.07 mm. long, 0.05 mm. wide at base, distant by their length from margin, 14–15 anterior to thoracic comb and 35–38 posterior to comb on each side. Submarginal minute setae present, sparse. Caudal setae 0.09 mm. long, widely separated, bases 0.11 mm. apart. Eye spots absent. Two setae between anterior margins of pore plates. Thoracic tracheal fold not evident. Thoracic tracheal comb (fig. 31) completely invaginated, with two teeth 0.01 mm. long. Mesad of the comb is a prominent pore plate 0.115 mm. long and 0.06 mm. wide, the long axis parallel to the margin and bearing numerous closely packed subcircular or subhexagonal pores about 0.003–0.004 mm. in diameter. The pores are absent from an area extending mesad from the comb base to two-thirds the width of the plate. Abdominal tracheal fold not evident. Abdominal tracheal comb (fig. 32) invaginated, with two teeth each 0.008 mm. long. Cephalad of comb is a horseshoe-shaped pore plate which encloses the orifice posteriorly and laterally. Total width of plate 0.14 mm., more or less divided in median line by base of comb leaving only a single row of pores. First abdominal segment with one pair of setae 0.04 mm. long. Setae on eighth abdominal segment 0.03 mm. long, distant from and anterior to orifice. Vasiform orifice (fig. 32) 0.06 mm. long, 0.05 mm. wide. Operculum subtriangular, filling two-thirds of orifice. Lingula exposed, subparallel-sided, apex rounded.

*Holotype*.—Pupal case on slide mount. Deposited in Institut Français d'Océanie, Noumea, New Caledonia.

*Paratypes*.—In the author's collection.

*Type locality*.—NEW CALEDONIA: Carenage, 8. iv. 55.

*Food plant*.—Myrtaceous plant? *Moorea artensis* Montr.

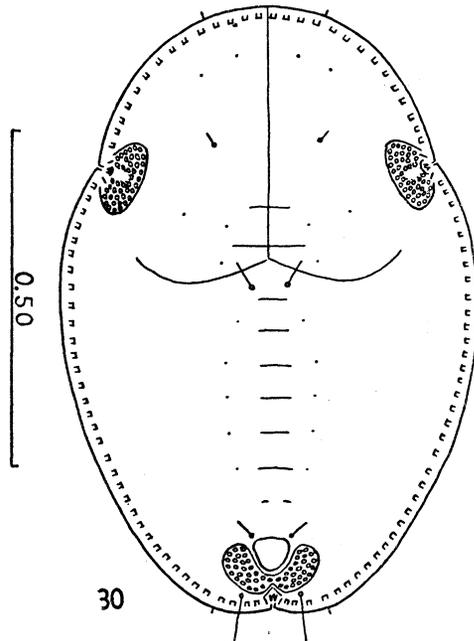
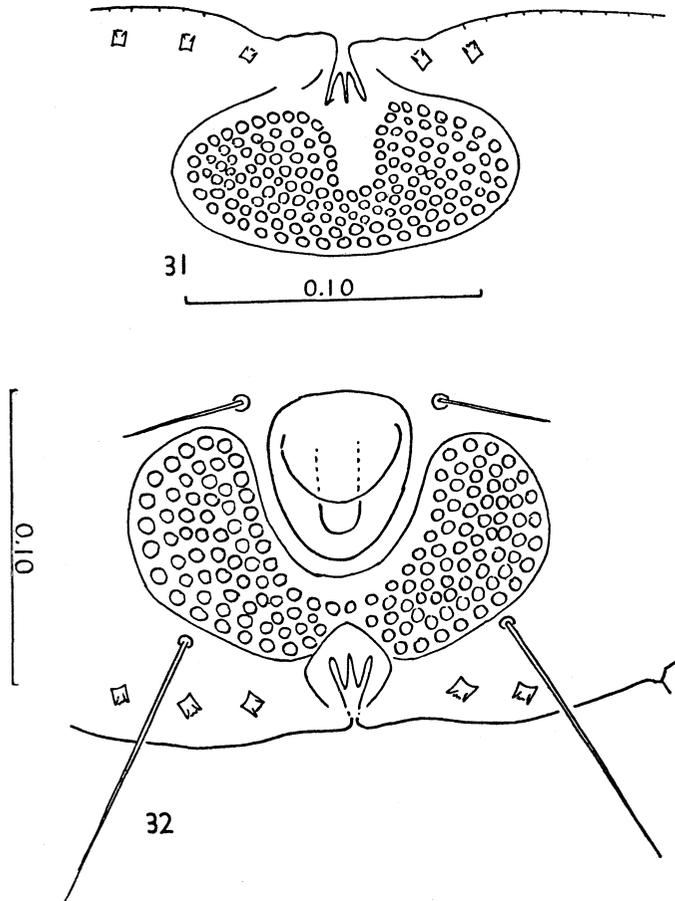


FIG. 30.—*Orchamus porosus* sp. n. Pupal case.

SUMMARY.

Seven new species—*Dialeurodicus elongatus*, *Orchamus caledonicus*, *O. dentatus*, *O. incognitus*, *O. montanus*, *O. plumensis* and *O. porosus*—are described from New Caledonia.

*Orchamus* Quaintance and Baker, a subgenus of *Aleuroplatus*, is raised to generic rank and a key to the species included is given.



FIGS. 31-32.—*Orchamus porosus* sp. n. (31) Pupal case, margin and thoracic tracheal comb. (32) Pupal case, vasiform orifice, margin and abdominal tracheal comb.

REFERENCES.

- QUAINTANCE, A. L., and BAKER, A. C. 1917, A contribution to our knowledge of the white flies of the subfamily Aleyrodinae (Aleyrodidae). *Proc. U.S. nat. Mus.* 51: 400-401.
- RISBEC, J., 1942, *Observations sur les Insectes des Plantations en Nouvelle Caledonie*. Secretariat d'état aux colonies. Direction des affaires économiques, Section Technique d'agriculture tropicale. Imprimerie Nationale, Paris, 128 pp.
- WILLIAMS, F. X., 1944, A survey of the insect pests of New Caledonia. *Hawaii. Plant. Rec.* 48, No. 2.