by far the most common parasitoids reared from both *A. ferruginea* and *A. michaeli.*

Acknowledgments

We sincerely thank A. C. Sanders, Curator of the Herbarium, Department of Botany and Plant Sciences, University of California, Riverside, for identification of plants. Parasitoids were identified by H. E. Andersen, Huntington Beach, CA., and by S. V. Triapitsyn, Principal Museum Scientist, Department of Entomology, University of California, Riverside. We also are grateful to F. L. Blanc, D. H. Headrick, J. D. Pinto, and G. J. Steck for their helpful comments on earlier drafts of this paper.

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NOTES ON *CERATAPHIS BRASILIENSIS* AND SYNONYMS *PALMAE, VARIABILIS* AND *FRANSSENI* (HOMOPTERA: APHIDIDAE), WITH A KEY TO *CERATAPHIS* SPECIES LIVING ON PALMS AND ORCHIDS

LOUISE M. RUSSELL

Systematic Entomology Laboratory, PSI, Agricultural Research Service, U.S. Department of Agriculture, 10300 Baltimore Avenue, Beltsville, MD 20705, U.S.A.

Abstract.—*Cerataphis brasiliensis* (Hempel) is established as a valid species. This specific name predates *Cerataphis palmae* (Ghesquière), *Cerataphis variabilis* Hille Ris Lambers and *Cerataphis fransseni* (Hille Ris Lambers) which are considered synonyms of *C. brasiliensis.* The availability of topotypes of *C. brasiliensis* and syntypes of *C. palmae* is disclosed, lectotypes and paralectotypes of *C. palmae* and *C. variabilis* are designated, and the life cycle of *C. fransseni* is noted. A key is provided for the identification of species of *Cerataphis* living on palms and orchids.

Key Words: Aphididae, *Cerataphis,* aphids, synonyms, lectotypes, paralectotypes, topotypes, palms, orchids, key

The objectives of this article are to establish the validity of *Cerataphis brasiliensis* (Hempel) as the correct name of a palm-inhabiting aphid, to indicate synonymy of three names, to designate lectotypes and paralectotypes of two species and provide a key for the identification of species of *Cerataphis* found on palms and orchids.

Cerataphis brasiliensis (Hempel) (Figs. 1, 2)

Ceratovacuna brasiliensis Hempel 1901: 384–385.

Cerataphis brasiliensis (Hempel); Embleton 1903: 95–96.

Aleurocanthus palmae Ghesquière 1934: 30.

Cerataphis palmae (Ghesquière); Ghesquière 1947: 177, 282, *in* Lepesme; **new synonym** of *C. brasiliensis.*

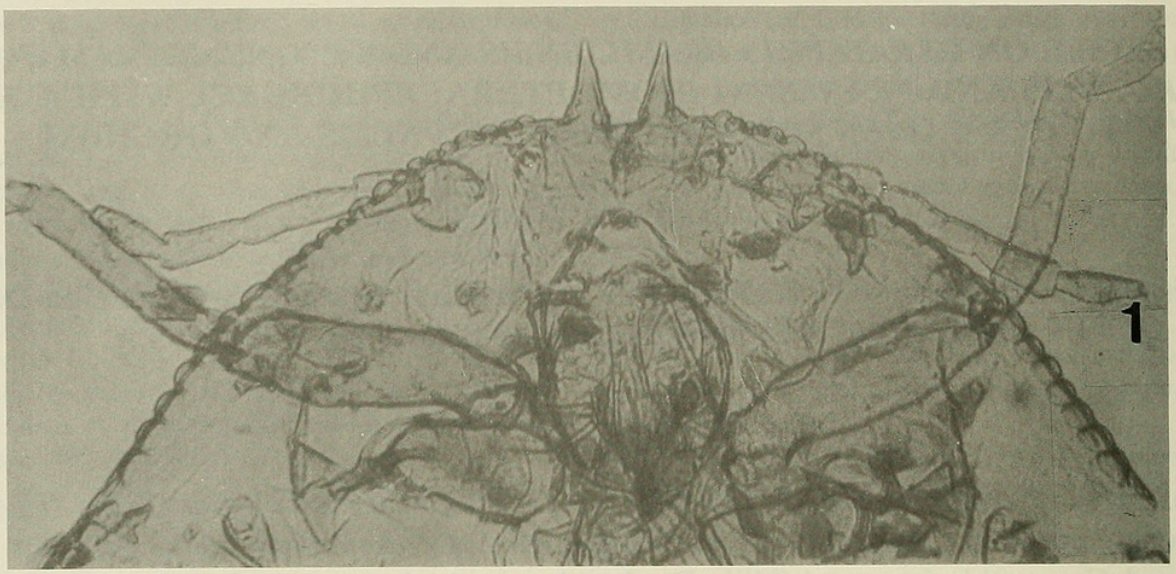
Cerataphis variabilis Hille Ris Lambers 1953: 95; **new synonym** of *C. brasiliensis.*

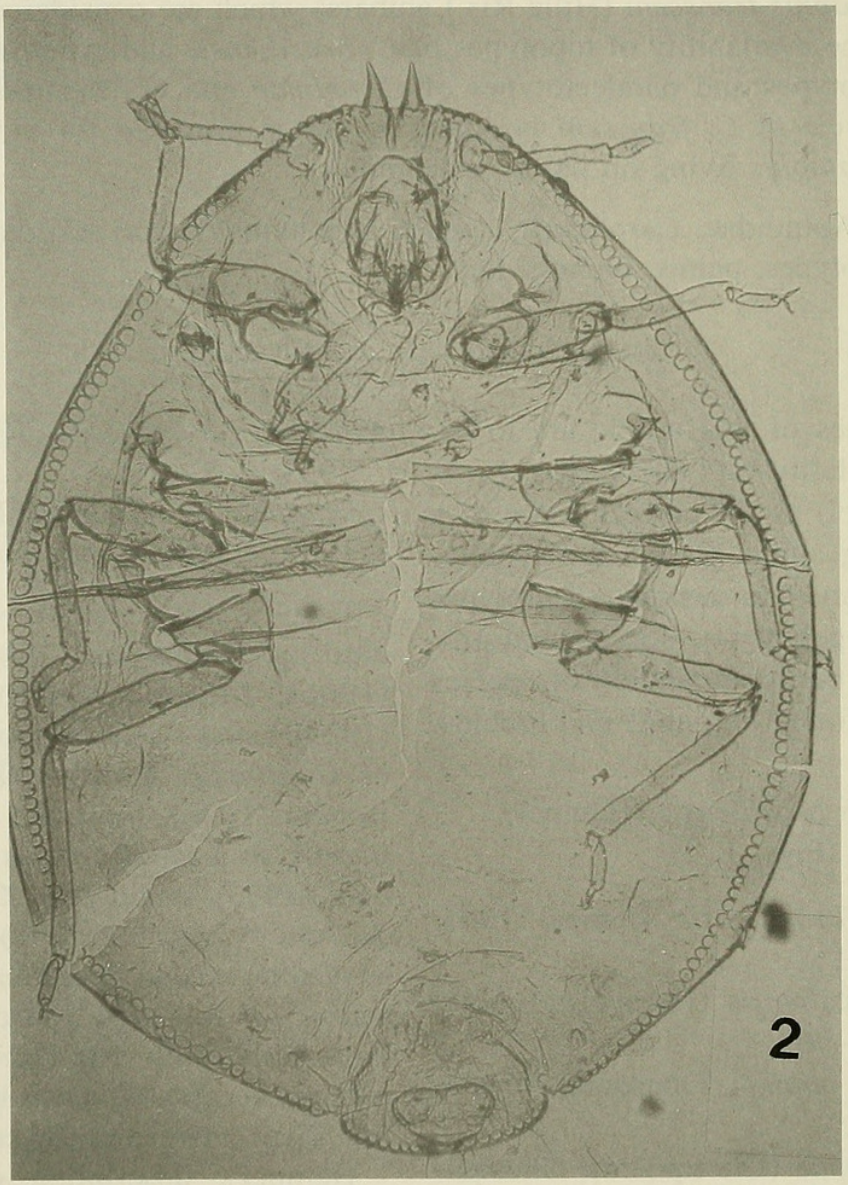
Astegopteryx fransseni Hille Ris Lambers 1933: 1–3.

Cerataphis fransseni (Hille Ris Lambers) 1953: 2; **new synonym** of *C. brasiliensis.*

Early in this century several workers, including Embleton (1903), Schouteden (1906), Moreira (1925) and Theobald (1929) listed *C. brasiliensis* as a synonym of *Cerataphis lataniae* (Boisduval 1867). Bondar (1926), however, recognized *brasiliensis* as a valid species. Hille Ris Lambers (1953) stated that *Cerataphis orchidearum* (Westwood 1879) "is also known as *Ceratovacuna brasiliensis.*" The latter action was followed by Holman (1974) and Eastop and Hille Ris Lambers (1976), but it is not acceptable when the description of *brasiliensis* is examined critically.

Hempel's description of the wingless adult of *C. brasiliensis* stated, "On the anterior margin of the abdominal [*lapsus calami,* correct abdominal to cephalic] surface there are two stout horns or spines, varying from 68–80 microns in length. The ventral





Figs. 1, 2. *Cerataphis brasiliensis,* topotypes. 1, Head and prothorax: antennae 5 segmented; 2 pairs of spines, 1 pair of setae, each with tuberculate base, proximad of antennae. 2, Body outline.

surface also bears two stout lance-shaped spines and four stout hairs near the base of the antennae. Antennae of four joints." Regarding the "larva" of the winged form, Hempel wrote, "On the ventral surface near the anterior margin there are two groups of three spines each. These spines are tuberculate and lance-shaped, one pointing forward, the other two downward." His collection data for *C. brasiliensis* were "Campinas, Brazil, on a species of palm; S. Paulo, on another species of palm, on a species of *Epidendron,* and on *Cattleya Harrisonia.*"

Hempel unknowingly included a species from palms and one from orchids in the description. But the relevant characters are the stout, lance-shaped spines and setae with tuberculate bases that may be present in specimens on palms but are absent from specimens on orchids. Four or five antennal segments occur in specimens on palms and four may be present in specimens on orchids, but five are more common. These characteristics place *brasiliensis* with specimens described as *C. palmae* and *C. variabilis,* and separate it from *C. lataniae* and *C. orchidearum.*

In the following discussions, the three pairs of characteristic processes proximad of the antennae are called spines if they are short and dagger- or lance-shaped and setae if they are long and slender.

After diligent search, type specimens of *C. brasiliensis* have not been found in Brazil or North America and they are presumed to have been lost. Fortunately, topotypes of *brasiliensis* are available. I have examined one partial and three complete adult apterae labeled "on *Cocos nucifera* L., Campinas, Brazil, 18-VIII-1942, H. F. G. Sauer." The specimens have large cephalic horns, 72–84 μ long, wax glands around the body margin except at the cephalic horns; cornicles rather near the body margin, each with two to four setae 12–16 μ long. Two specimens have four and two have five segmented antennae.

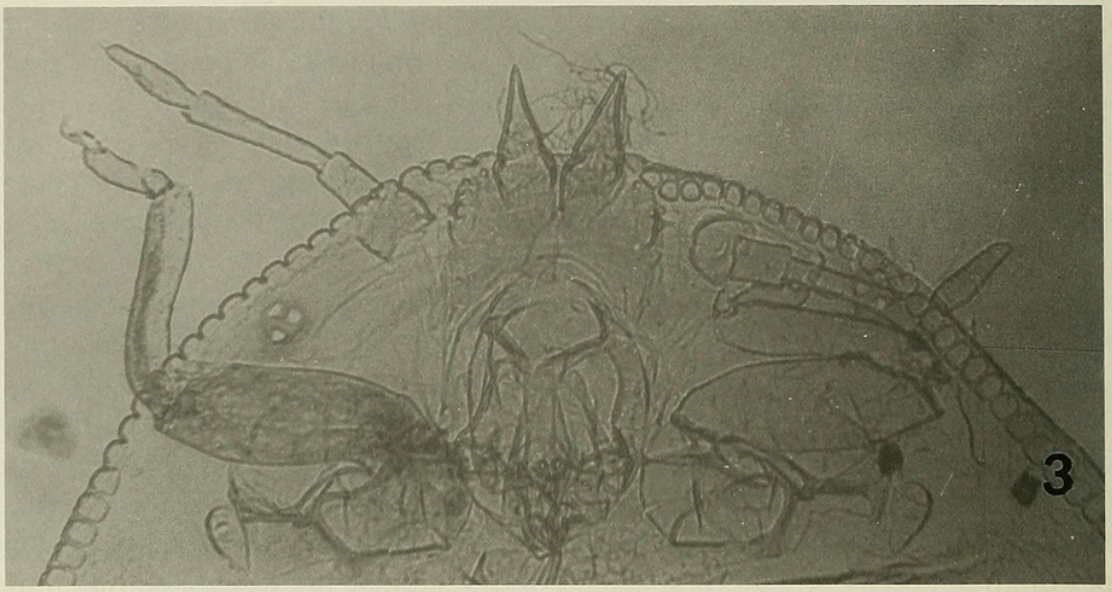
In the two specimens with four segmented antennae, the posterior spines proximad of the antennae in each and the middle spines in one are short and stout with strongly tuberculate bases, and the anterior setae in each and the middle setae in one are long and slender with weakly tuberculate bases. These specimens, especially the one with middle and anterior elongate setae and posterior spines are characteristic of *C. palmae.*

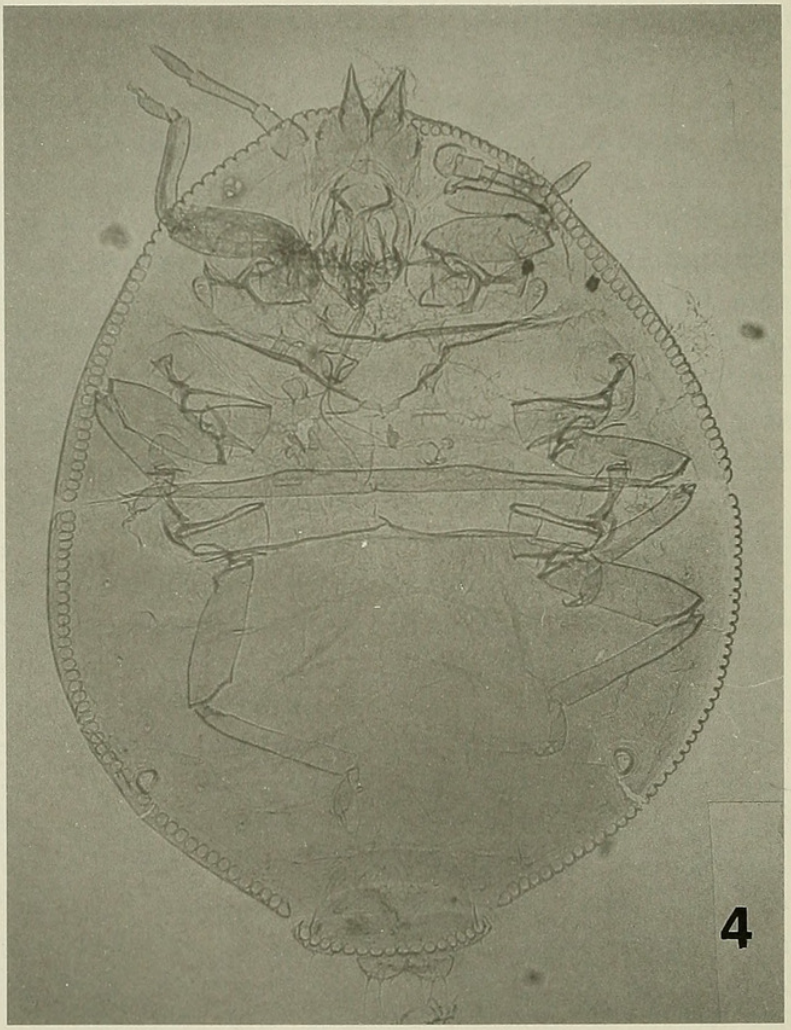
In the two specimens with five segmented antennae the posterior and middle spines are short and stout with strongly tuberculate bases while the anterior setae are longer and more slender but also have tuberculate bases as is the condition in some syntypes of *C. variabilis.* The distal rostral segment is five-seventh the length of second hind tarsus. The cauda has six setae. These specimens are similar to syntypes of *C. palmae* but vary from most syntypes of *C. variabilis* that I have seen.

Cerataphis palmae (Ghesquière)
(Figs. 3, 4)

Ghesquière (1934) described the wingless forms of *C. palmae* as follows (translation): "The larvae and the nymphs are black, surrounded by a white fringe, the nymphs measure 1.5 mm long by 1 mm wide." Ghesquière (1947) stated that he had described *Cerataphis lataniae* as *Aleurocanthus palmae* and that Risbec (1942) had described *lataniae* as *Aleurocanthus* sp.

Cerataphis palmae was disregarded until Eastop and Hille Ris Lambers (1976) listed it as a valid species and synonymized *C. variabilis* with it. Thereafter it was treated as a valid species by Blackman and Eastop (1985), Enobakhare (1986), Enobakhare and Osisanya (1986) and Noordam (1991). Remaudière and Autrique (1985), and Remaudière, Martin and Eastop (1987) noted that *palmae* cannot be identified from its description and that the name is a *nomen dubium.* Syntypes of *palmae* are available, however, and its identity can be determined.





Figs. 3, 4. *Cerataphis palmae,* lectotype. 3, Head and prothorax: antennae 4 segmented; 1 pair of spines each with tuberculate base, 2 pairs of setae each with slightly tuberculate base, proximad of antennae. 4, Body outline.

Many years ago I received *Aleurocanthus palmae* for identification in a parcel of aleyrodids collected in Congo belge. I recognized *palmae* as an aphid and was given permission to retain specimens for study. I corresponded with Hille Ris Lambers about the species and expected to publish on it at that time but did not do so.

Ghesquière (1934) stated that *Aleurocanthus palmae* was widespread at Kasai and Sankuru [Congo belge] on *Raphia vinifera* and that it had been observed on *Elaeis* growing near *Raphia.* Syntypes of *Cerataphis palmae* are labeled "on *Raphia vinifera,* Kole (Sankuru), II 1928, J. Ghesquière" or "Kole (Sankuru) or Kasai." No material is labeled as being on *Elaeis.* I have studied this material and have concluded that the specimens are conspecific with *C. brasiliensis* and that *palmae* is a synonym of *brasiliensis.*

Syntypes of *C. palmae* are ovoid, 1.10–1.50 mm long by 0.95–1.25 wide and are nearly uniform in structure. The cephalic horns are large and protrude from the ventral margin; wax glands may extend around the entire body margin or may be absent at the cephalic horns; antennae are four segmented; of the three pairs of spines or setae proximad of the antennae, the posterior ones are stout and short or slightly longer, the middle and anterior setae usually are elongate and rather slender or the middle pair may be short but more slender than the posterior pair. The distal rostral segment is two-thirds the length of second hind tarsus.

I have labeled a mounted adult aptera as lectotype of *Cerataphis palmae* (Ghesquière) and the remaining mounted and unmounted specimens paralectotpes. The slides are labelled "on *Raphia vinifera,* Kole (Sankuru), Congo belge, II-1928, J. Ghesquière." Three paralectotype slides are being kept for the US National Museum of Natural History (USNM) Collection, Beltsville, Maryland. The lectotype slide, 21 paralectotype slides and all unmounted material will be returned to Musée Royal de l'Afrique Centrale, Tervuren, Belgium.

Cerataphis variabilis Hille Ris Lambers
(Figs. 5, 6)

Regarding *C. variabilis,* Hille Ris Lambers (1953) wrote, "This insect would seem to be the common *Cerataphis* on *Cocos* and other Palms with a range extending from Africa to Fiji. The most conspicuous character is the enormous variability of the aleurodiform apterae, first mentioned by Van der Goot.

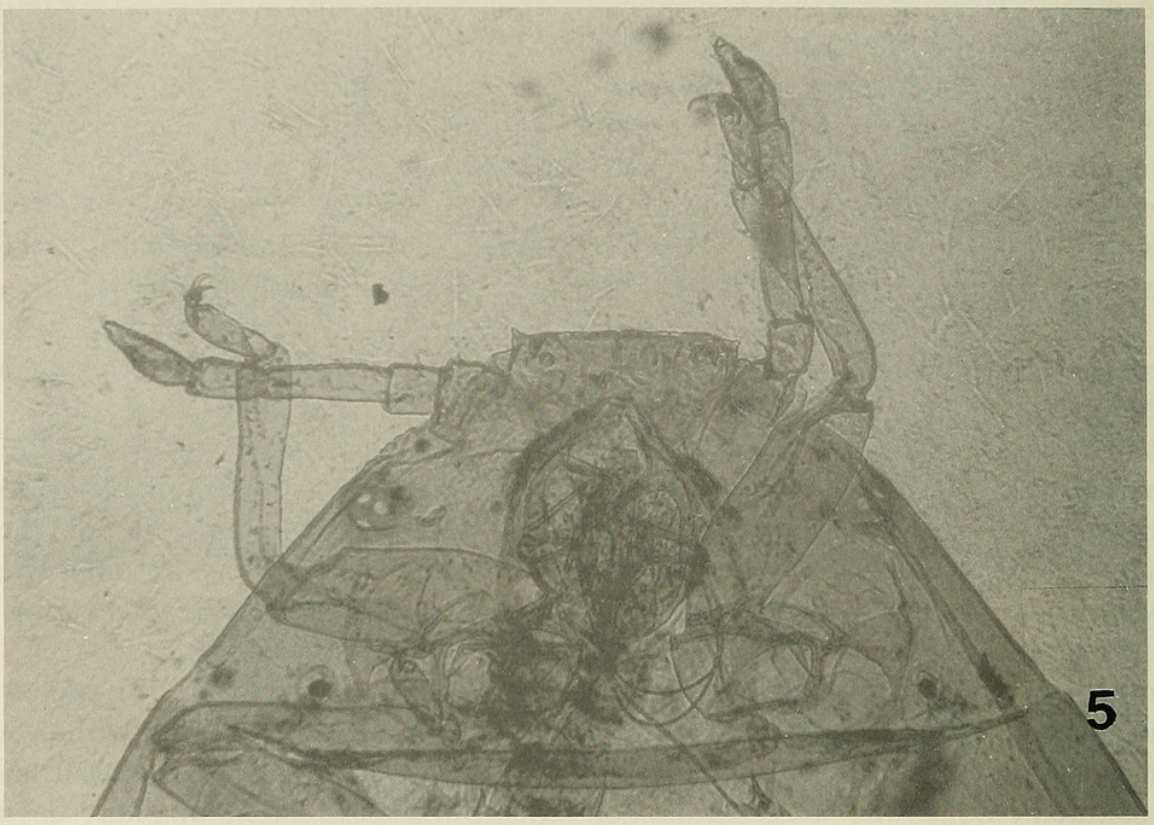
"The species differs from the two preceding ones [*C. lataniae* and *C. orchidearum*] by the presence of dagger-shaped hairs on stout bases on the underside of the head in apterae. Two extreme forms of apterae occur, one much like those of *C. orchidearum* (Westwood), and one more like a normal aphid, with wax-glands present on only the last abdominal tergite, the front with very small horns or only with 2–4 (more lateral) tubercles, each bearing a dagger-shaped, thorny spine."

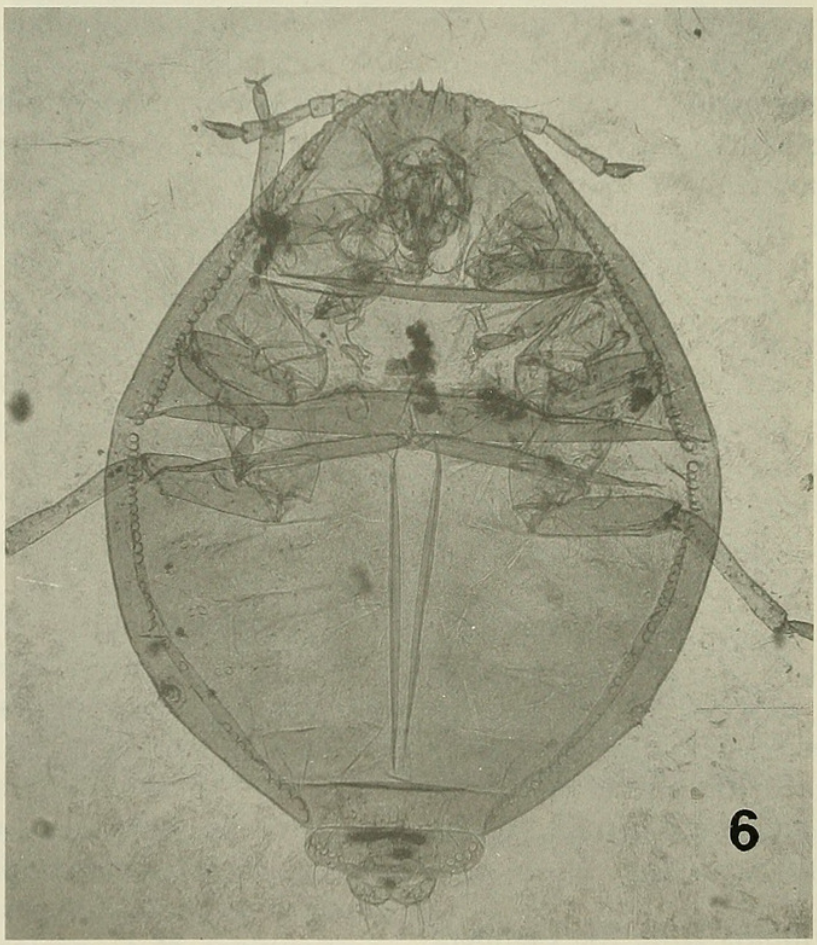
Hille Ris Lambers (1953) added to the description in a key: "Front with or without horns, but, in addition to normal hairs, always with 1–3 pairs of short dagger- or club-shaped hairs on the underside near the antennal bases. At least one pair of these hairs placed on blunt tubercles."

Hille Ris Lambers did not designate a holotype or give detailed collection data but this information is available on slides. I have studied syntypes on two slides labeled "*Cerataphis variabilis* nov. spec. Java, Palmaceae, Bondowoso 300 m., 13-IX-1948, F. W. Rappard 62." One slide has four adult apterae and eight nymphs and is marked "Lectotype" with arrows pointing to a nearly normal specimen. The other slide has six adult apterae and five nymphs and is labeled "Cotypes, Det. D.H.R.L." I have also studied syntypes on a slide with three adult apterae labeled "*Cerataphis variabilis* nov. spec., N.Java, Pl. Palmaceae, Loc. Kalibendo, Date 29-XI-'48, Leg. F. W. Rappard 94." I have designated the specimen selected by Hille Ris Lambers as the lectotype of *C. variabilis* and the other adult apterae as paralectotypes.

Syntypes of *C. variabilis* are extremely variable as indicated by Hille Ris Lambers and by Noordam (1991) who redescribed syntypes as *C. palmae.*

In the lectotype of *C. variabilis* the an-





Figs. 5, 6. *Cerataphis variabilis.* 5, Paralectotype, head and prothorax: antennae 5 segmented; horns near rostrum, very small; a pair of slender setae laterad of horns, a pair of spines near, and a pair on body margin, each with tuberculate base; marginal wax glands absent except on tergum VIII. 6, Lectotype, body outline, structures nearly normal.

tennae are five segmented, the posterior characteristic spines are short and stout with strongly tuberculate bases while the middle and anterior setae are elongate and fairly slender with weakly tuberculate bases; the marginal wax glands are interrupted briefly on the abdomen. In the lectotype and syntypes I have examined, the cephalic horns are much smaller than in topotypes of *C. brasiliensis* and syntypes of *C. palmae*; they range downward in size from moderate to very small, are absent from one syntype, and in another syntype are near the rostrum with both horns small and one slender, curved and barely visible. The marginal wax glands form an almost complete band in some specimens, are interrupted or absent from sections of the margin, especially sections of the abdomen, and are totally lacking except for the eighth tergum in one specimen; the antennae are four segmented in two, and five segmented in 11 apterae; the three pairs of characteristic spines normally present proximad of the antennae exhibit different locations, shapes and sizes, with one pair on the margin of the head and two pairs just posterior to them in one specimen. The distal rostal segment is two-thirds the length of second hind tarsus.

These syntypes are diverse but I believe they are within the range of *brasiliensis,* and that *variabilis* is a synonym of the older name. *Cerataphis fransseni* (Hille Ris Lambers)

Hille Ris Lambers (1933) described *Astegopteryx fransseni* from *Styrax benzoin* Dryand, Buitenzorg, Java, indicating that the insects were from "a gall, which occurs in the axil of a leaf." He described alatae, apterae, first and second instars from the galls but wrote that he could not examine the embreyos within the body of the alata. He (1953) placed *fransseni* in *Cerataphis,* stating that living migrants from the gall of *A. fransseni* "showed that they produce typical *Cerataphis* larvae."

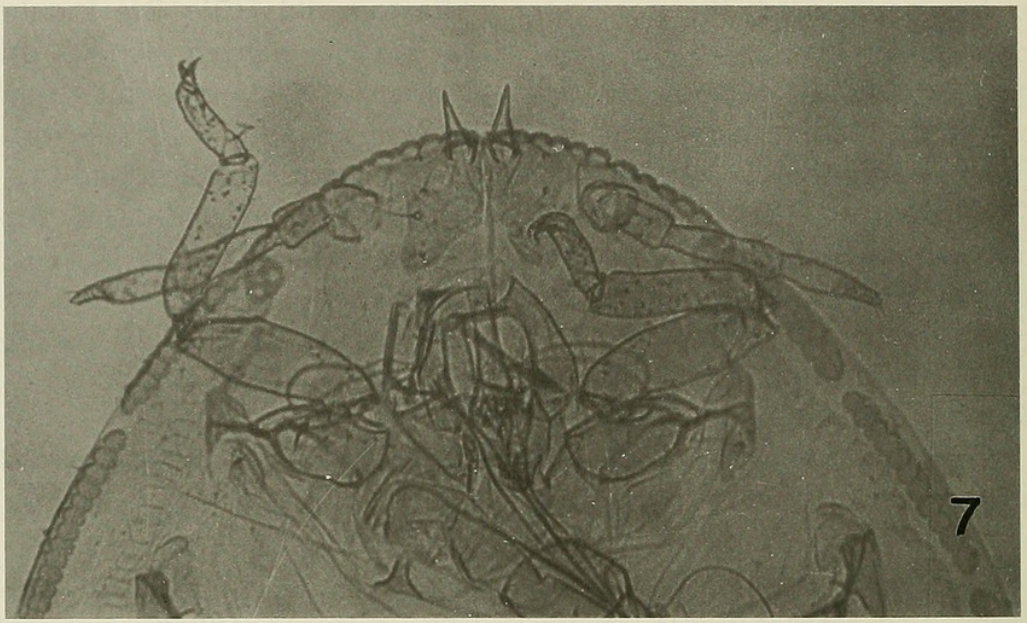
Eastop and Hille Ris Lambers (1976) listed *C. fransseni* as a valid species. Noordam (1991) examined types and additional specimens of *C. fransseni* from *Styrax,* described adult and the first instar larvae of alatae, and adult, first and two forms of second instar larvae of apterae. Although Noordam treated *C. fransseni* as a valid species, after discussing the similarity of nymphs of *fransseni* with those of *C. palmae,* he stated ". . . it is likely that *C. fransseni* is a synonym of *C. palmae.*"

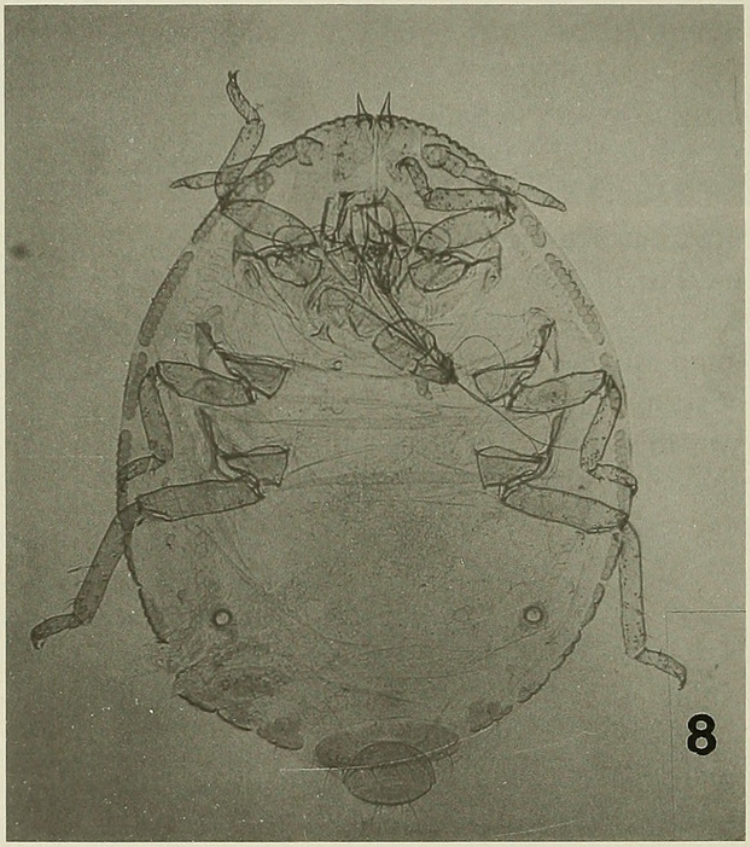
Stern, Aoki and Kurosu (1995) studied the life cycle and general biology of *C. fransseni* and successfully transferred specimens from *Styrax* to palm where "1st instar nymphs were found feeding on the undersides of the leaves. . . . Several of these larvae became apterous adults with a typical *Cerataphis* morphology." These authors identified the specimens as *C. variabilis* and indicated that it and *C. palmae* were synonyms of *C. fransseni.* They examined paratypes of *C. variabilis* and data for some of them are the same as for paratypes I received from Hille Ris Lambers.

From available information it seems certain that *C. palmae, C. variabilis* and *C. fransseni* represent one species whose correct name, I believe, is *C. brasiliensis.* This name predates *fransseni* by 32 years.

Species of *Cerataphis* Found on Palms or Orchids

Cerataphis formosana Takahashi (1924) was described from *Cocos* sp., Kararu, Koshan, Formosa; later he (1931) included the name in a key. The species apparently has not been rediscovered. In 1975 Tao wrote me that he did not find types in collections in Taiwan and had not collected the species. Takahashi (1924, 1931) gave a distinguishing characteristic for the species, stating that the cephalic horns were "nearly fingerlike in shape,





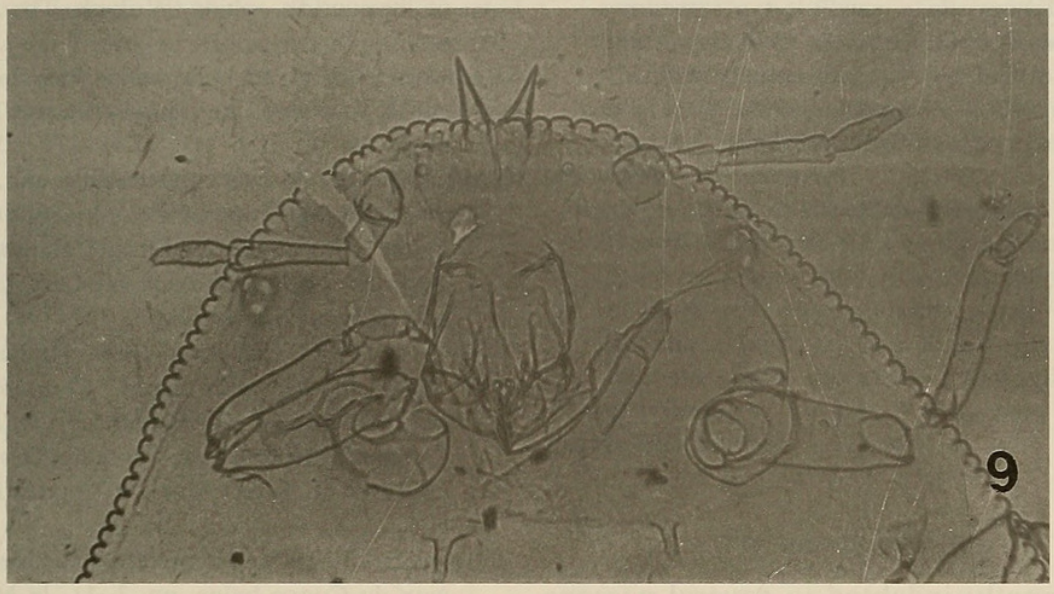
Figs. 7, 8. *Cerataphis orchidearum.* 7, Head and prothorax: antennae 5 segmented; 3 pairs of slender setae proximad of antennae. 8, body outline.

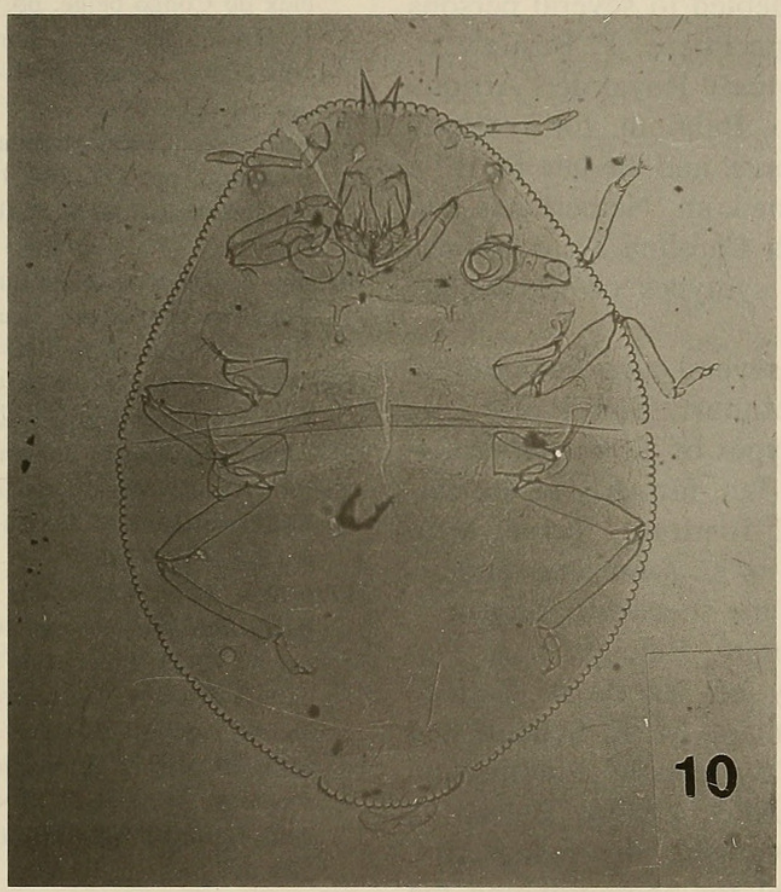
with the apex rounded, almost as long as the 2nd antennal joint."

The other species on palms, *C. brasiliensis* and *C. lataniae,* and *C. orchidearum* on orchids, have a wide distribution on their respective hosts in greenhouses and possibly out-of-doors in tropical and subtropical regions.

Key to Adult Apterae of *Cerataphis* Species Living on Palms and Orchids

1. Cephalic horns finger-shaped, apices rounded. On *Cocos* sp., Taiwan . . . . .*formosana* Takahashi
– Cephalic horns usually somewhat triangular, apices usually pointed but sometimes blunt or rarely absent 2
2. With one, two or three pairs of short, stout





Figs. 9, 10. *Cerataphis lataniae*. 9, Head and prothorax: antennae 4 segmented; 3 pairs of slender setae proximad of antennae. 10, Body outline.

spines with strongly tuberculate bases proximad of antennae; characteristic spines and setae variable in size, shape and location, usually a posterior pair of stout spines on strongly tuberculate bases, a slender anterior pair of setae on flat or weakly tuberculate bases and a middle pair similar to either the posterior or anterior pairs; cephalic horns large, extending well beyond body margin, or small and extending cephalad, laterad or caudad or rarely absent; wax glands present around entire margin, absent at cephalic horns or elsewhere or rarely absent except on tergum VIII . . . . . .*brasiliensis* (Hempel)

– Without stout spines with strongly tuberculate bases but with three pairs of elongate, slender setae with flat or slightly raised bases proximad of antennae 3

3. Usually large, subcircular insects 1.50 mm long by 1.25 wide (range 1–1.75 long by 0.90–