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## ON THE GENUS *NEOPHYLLAPHIS* TAKAHASHI, 1920 (HOMOPTERA, APHIDIDAE) WITH DESCRIPTIONS OF TWO NEW SPECIES

by

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### INTRODUCTION

Of this genus, originally described from Japan, but apparently widely spread in the tropical and temperate parts of the southern hemisphere, only seven species are known. However, since the four species on *Podocarpus* all seem to infest only one or two species of their host plant genus, many more *Neophyllaphis* may exist, for there are about 50 more species of *Podocarpus* that have to be searched for aphids. The genus *Chileaphis* Essig, 1953 from Chile differs from *Neophyllaphis* almost only by the apterae viviparae having compound eyes, but because compound eyes are also present in apterous oviparae of *Neophyllaphis*, I consider *Chileaphis* at most a subgenus of *Neophyllaphis*.

### Key to subgenera of *Neophyllaphis* Takahashi

- 1 (2) Cauda in viviparae with the knob round or elongate, not nearly as thick as the length of the second joint of the hind tarsi. Apterae viviparae only with triommatidia. Oviparae with pseudosensoria only on hind tibiae(?) . . . . .  
. . . . . *Neophyllaphis* Takahashi
- 2 (1) Cauda in viviparae with an extremely thick knob, which is thicker than the length of the second joint of the hind tarsi. Apterae viviparae with multicorreal eyes besides the triommatidia. Oviparae with pseudosensoria on all tibiae . . .  
. . . . . *Chileaphis* Essig

### Subgenus **Neophyllaphis** Takahashi, 1920

#### Key to species

#### A. Alate viviparous females.

- 1 (2) Cauda with the knob round, or wider than long, with 10 or more hairs. The

- part of IIIrd antennal segment opposite the rhinaria quite smooth. On *Podocarpus gracilior*, *P. milanjanus*. Southern half of Africa . . . *N. grobleri* Eastop.
- 2 (1) Cauda with the knob acorn-shaped, much longer than wide, with 5-7 hairs. The side of IIIrd antennal segment opposite the rhinaria mostly imbricated, reticulated or spinulose.
- 3 (4) IIIrd antennal segment  $1\frac{1}{2}$  or more times as long as segments IV + V + VI. On *Podocarpus* sp. Java . . . . . *N. fransseni* spec. nov.
- 4 (3) IIIrd antennal segment up to  $1\frac{1}{5}$  times as long as segments IV + V + VI, but usually much shorter.
- 5 (6) IVth antennal segment at most  $\frac{2}{3}$  of the length of Vth segment, or antennae of 5 segments. Siphunculi not or hardly pigmented. IIIrd antennal segment with rhinaria to its apex. On *Araucaria* spp. Mauritius, Java, Australia, Hawaii, Mexico, Florida (?), California (? introduced) . . . *N. araucariae* Takahashi
- 6 (5) IVth antennal segment as long as, or longer than Vth antennal segment. Siphunculi either distinctly pigmented, or IIIrd antennal segment on apical  $\frac{1}{4}$ - $\frac{2}{7}$  part without rhinaria.
- 7 (8) Siphunculi quite colourless, very small and difficult to detect. Distal  $\frac{1}{3}$ - $\frac{2}{7}$  part of IIIrd antennal segment without rhinaria. IVth antennal segment  $1\frac{2}{3}$ -2 times as long as Vth segment. On *Agathis labillardieri*. Western New Guinea . . . . . *N. rappardi* spec. nov.
- 8 (7) Siphunculi distinctly pigmented, very distinct. Mostly IIIrd antennal segment covered with rhinaria, rarely with bare apex. IVth antennal segment  $1$ - $1\frac{1}{3}$  times as long as Vth segment. On *Podocarpus* spp.
- 9 (10) IIIrd antennal segment  $\frac{7}{8}$ - $1\frac{1}{10}$  times as long as segments IV + V + VI, about as long as the fore tibiae. On *Podocarpus macrophylla*. Japan, California (introduced). (? *Podocarpus elata*, Australia?) . . . . . *N. podocarpi* Takahashi
- 10 (9) IIIrd antennal segment much less than  $\frac{7}{8}$  times as long as segment IV + V + VI, shorter than the fore tibiae.
- 11 (12) Rhinaria on IIIrd antennal segment 10-22 in number, usually not extending to the tip of the segment. IVth antennal segment without rhinaria. On *Podocarpus totara*. New Zealand . . . . . *N. totarae* Cottier
- 12 (11) Rhinaria on IIIrd antennal segment 20-25 in number, over the whole length of the segment, and also IVth segment often with a few rhinaria. On *Podocarpus alpina*. Australia . . . . . *N. gingerensis* Carver

#### B. Apterous viviparous females.

- 1 (2) Cauda with the knob round or transverse, with 10 or more hairs. On *Podocarpus gracilior*, *P. milanjanus*. Southern half of Africa . . . *N. grobleri* Eastop
- 2 (1) Cauda with the knob much longer than wide, with 5 or more rarely 6-7 hairs.
- 3 (4) Antennae always of 5 segments with penultimate segment at most half as long as last segment. Second tarsal joint ventrally without hairs on proximal half. On *Araucaria* spp. Mauritius, Java, Australia, Hawaii, Mexico, Florida (?), California (? introduced) . . . . . *N. araucariae* Takahashi
- 4 (3) Antennae at least on one side of 6 segments, with penultimate segment not or little shorter than last segment. Second tarsal joints ventrally with a few hairs on proximal half.
- 5 (6) IIIrd antennal segment 0.9 times as long as to longer than segments IV + V + VI. On *Podocarpus* sp. Java . . . . . *N. fransseni* spec. nov.

- 6 (5) IIIrd antennal segment less than 0.8 times as long as segments IV + V + VI.
- 7 (8) Siphunculi colourless and hardly visible. Vth antennal segment about  $1\frac{1}{3}$  times as long as VIth. On *Agathis labillardieri*. Western New Guinea . . . . .  
 . . . . . *N. rappardi* spec. nov..
- 8 (7) Siphunculi brown pigmented, elevated, distinct. Vth antennal segment as long as or shorter than VIth.
- 9 (10) Dorsal hairs on head between the eyes about 0.030 mm long, and IIIrd antennal segments with several erect hairs of about 0.020-0.025 mm. On *Podocarpus macrophylla*. Japan, California (introduced). (? *Podocarpus elata*, Australia?)  
 . . . . . *N. podocarpi* Takahashi
- 10 (9) Dorsal hairs on head between the eyes very short, only about 0.009 mm long.
- 11 (12) Hairs on abdominal dorsum all, or nearly all, placed singly on very small, irregularly shaped sclerites pigmented about like the siphunculi. Tibiae rather evenly black, or darker near base. On *Podocarpus alpina*, Australia. . . . .  
 . . . . . *N. gingerensis* Carver
- 12 (11) Hairs on abdominal dorsum apparently not placed on little sclerites, or these not pigmented. Tibiae rather pale with the very base and the apex dark. On *Podocarpus totara*. New Zealand . . . . . *N. totarae* Cottier

### **Neophyllaphis podocarpi** Takahashi, 1920

Since this aphid, the type-species of *Neophyllaphis*, was described from Japan, it has been recorded as occurring in China, Formosa, Australia and New Zealand, but the last two of these records probably relate to other species of the genus. The species has been described as *Mindarus podocarpi* Shinji, 1922 and redescribed as *Neophyllaphis podocarpi* Tak. by Shinji (1941), both times in Japanese. Takahashi (1921) described the alate viviparous female of *N. podocarpi* Tak. from Formosa, from *Podocarpus chinensis*, which is a subspecies or synonym of *P. macrophylla*. He stated in that paper that the alate female he described in 1920 really was the alate male. This is almost impossible because the latter description states that no rhinaria are present on antennal segments IV and V, whereas the male described on the same page is said to have rhinaria on segments IV-VI. Some supplementary notes on the morphology of *N. podocarpi* from Japan are given here.

Apterous viviparous female.

Dorsal hairs not placed on pigmented sclerotic plates, rather fine, variable in length, on abdominal tergite III about 0.020-0.030 mm long. Head especially on the sclerotic parts faintly reticulated. Antennae slightly less than half as long as body, with scattered erect hairs similar to those on dorsum, gradually more distinctly spinulosely imbricated from the middle of segment III towards apex, on segment VI more or less distinctly

reticulated. Rostrum strongly retractile and therefore seemingly greatly variable in length; last segment obtuse, only with the 3 subapical pairs of hairs. Siphunculi dark, sclerotic, wrinkled, elevated, not bearing a hair. Cauda with 5-6, rarely 7 hairs. Legs with hairs as on dorsum or slightly longer; first tarsal joints with 6-7 hairs on the underside; second tarsal joints with 6-8 hairs on the underside.

Measurements in mm.

No.	Length of body	Ant.	Ant. segments				Cauda
			III	IV	V	VI	
1.	2.02	0.91	0.33	0.13	0.15	(0.13 + 0.03)	0.15
2.	2.00	0.86	0.30	0.12	0.15	(0.13 + 0.03)	0.16
3.	1.96	0.82	0.28	0.11	0.14	(0.13 + 0.03)	0.16
4.	1.64	0.77	0.26	0.11	0.13	(0.12 + 0.03)	0.15
5.	2.13	0.91	0.34	0.14	0.14	(0.12 + 0.03)	0.16
6.	2.00	0.96	0.35	0.15	0.16	(0.13 + 0.02)	0.18

(1-6, from *Podocarpus macrophylla*, Fukuoka, Japan, 8.VI.1964, leg. R. van den Bosch).

Alate viviparous female.

Apart from an indistinct sclerite on tergite VIII, abdomen without sclerotisation. Hairs as in apterae. Head with two rather large, poorly bordered, wax glands of the stippled variety around each of the hairs of the innermost pair on vertex. Antennae up to  $\frac{5}{8}$  of length of body; segment III over its whole length with about 30-45 rhinaria, of which up to 37 may be complete, while the rest is broken or incomplete; for interrelation of segments, vide measurements. Hind tibiae mostly with a few pseudosensoria on inner side on basal half.

Measurements in mm.

No.	Length of body	Ant.	Ant. segments				Rhin. on III	Cauda
			III	IV	V	VI		
1.	1.70	1.00	0.43	0.14	0.16	(0.12 + 0.02)	31 & 41	0.15
2.	1.77	1.01	0.42	0.17	0.16	(0.12 + 0.02)	37 & 38	0.16
3.	?	1.08	0.45	0.16	0.17	(0.13 + 0.02)	40 & 41	0.16
4.	1.77	1.03	0.43	0.17	0.16	(0.12 + 0.02)	38 & 39	0.13

(1-4, from *Podocarpus macrophylla*, Fukuoka, Japan, 8.VI.1964, leg. R. van den Bosch).

Discussion. — Takahashi (1920) gave the number of rhinaria in alatae as about 60, but this clearly relates to males. In 1921, when he had found the aphid on Formosa, the number was given as 40-45. Shinji (1941)

figured 31 rhinaria, which agrees better with my data. The wax glands on the head in alatae have not been mentioned before, though they are quite conspicuous. In other species of the genus, except in *N. fransseni*, I did not find them. The hairs in this species are much longer than in any other member of the genus.

Records of this species from Australia from *Podocarpus elata* probably all relate to another taxon. Through the kindness of Dr. V. F. Eastop of the British Museum (Natural History), London, I could examine a few alate oviparae, males, apterae viviparae, and one alate vivipara without antennae, from Queensland. In all of these the dorsal hairs are just over half as long as they are in Japanese specimens, the dorsal wax glands on the heads of alatae are not developed, and the third antennal segment is comparatively longer than it is in *N. podocarpi* proper, though still much shorter than in *N. fransseni* nov. spec.

#### **Neophyllaphis araucariae** Takahashi, 1937

A few notes should be added to the original description. In cleared apterae the body and appendages are not pigmented. Dorsal hairs on abdominal tergite III are very short, only 0.004-0.006 mm, and those on the antennae are not much longer. The antennae are always of 5 segments, and the last segment is comparatively very long. The second tarsal joint ventrally has no hairs basad of the long hair that is placed halfway. In the alate viviparous female the head, thorax, antennae and legs are dark, but the siphunculi are not pigmented. The antennae usually have 6 segments, but sometimes segments IV + V are coalescent; the rhinaria, some 16-25 in number, cover one side of segment III over its whole length. The hairs on the tarsi are as in apterae.

The species is now known from Mauritius (original description), Hawaii (Zimmerman, 1948), Australia (Jarvis, 1944; Carver, 1959), Java, California, Florida and Mexico. The host plants, *Araucaria cunninghamii* in Mauritius and Australia, *A. excelsa* in Hawaii, Florida, California and Mexico, suggest that the species originally came from Australia from where *A. cunninghamii* originated, or Norfolk Island, home of *A. excelsa* (Carver, 1959). On Java it was collected by Dr. C. J. H. Franssen near Buitenzorg (Bogor) from *Araucaria bidwilli*, native of Queensland, and this supports the theory that the aphid came from Australia or Norfolk Island, from where it has been shipped with its host plants to other parts of the world. It has not been found in Europe where *Araucaria excelsa* has widely been planted around the Mediterranean.

**Neophyllaphis fransseni** spec. nov.

This aphid was collected by Dr. C. J. H. Franssen who sent the material in alcohol to me. But if large numbers of members of this genus are heated in KOH as I use to do with aphids, they usually adhere so strongly to one another that they are more easily torn to pieces than separated. Only one alata escaped more or less in one piece, and one loose head of another one was saved. From these and the clusters and fragments of apterae the following description was made.

## Apterous viviparous female.

Tergum membranous with on tergite VIII a small brownish sclerite, not with small sclerites at the bases of the dorsal hairs. The latter on abdominal tergite III rather thorny, 0.008-0.013 mm long, but on head and antennae to twice as long. Antennae rather pale with dark apices to segments III and IV, and with dark apical part; segment III often as long as segments IV, V and VI combined, 3 or more times as long as segment IV, with basal half nearly smooth, distal half imbricated with bluntish spinules on the imbrications. Rostrum moderately long, apparently not reaching the hind coxae when fully extended; last segment short and blunt, with only the 3 subapical pairs of hairs. Siphunculi brown sclerotic, rather elevated, more or less cylindrical, nearly smooth, without hairs. Cauda with elongated knob, with 5 hairs. Second tarsal joints with 2-3 hairs ventrally on proximal half.

## Measurements in mm.

No.	Length of body	Ant.	Ant. segments				Cauda
			III	IV	V	VI	
1.	?	0.86	0.36	0.12	0.14	(0.11 + 0.03)	0.15
2.	?	0.84	0.34	0.12	0.13	(0.11 + 0.03)	0.15
3.	?	0.78	0.32	0.10	0.12	(0.10 + 0.02)	0.15

(1-3, from *Podocarpus* sp., Buitenzorg, Java, VIII.1933, leg. C. J. H. Franssen).

## Alate viviparous female.

Head and thorax sclerotic and dark, abdomen membranous as in apterae. Indistinct stippled wax glands present around the hairs on front and vertex. Hairs as in apterae. Antennae probably about  $\frac{3}{4}$  of length of body, very long for the genus; segment III about  $1\frac{1}{2}$  times as long as segments IV, V and VI combined, with some 45-50 rhinaria over its whole length over about half of its circumference. Siphunculi and cauda as in apterae viviparae. One hind tibia probably with a pseudosensorium. Wing venation normal.

## Measurements in mm.

No.	Length of body	Ant.	Ant. segments				Rhin. on III	Cauda
			III	IV	V	VI		
1.	$\pm 1.70$	1.25	0.69	0.13	0.15	(0.12 + 0.03)	46 & 46	0.15
2.	?	1.27	0.68	0.15	0.16	(0.12 + 0.03)	48 & 48	0.15

(1-2, from *Podocarpus* sp., Buitenzorg, Java, VIII.1933, leg. C. J. H. Franssen).

Discussion. — Not much detail can be studied on the fragmentary material, but it is clear that as to antennae of the alatae the species differs considerably from all the others. Apteræ resemble those of *N. podocarpi*, but differ in the relative lengths of antennal segments III and IV. Some antennae of what probably were apteræ have not been measured because in front of the triommatidion traces of a multicorneal eye are visible; these specimens have considerably longer antennae but the interrelation between segments III and IV is rather as in true apteræ.

The species is named for Dr. C. J. H. Franssen who collected this and several other undescribed aphids, saved what was left of P. van der Goot's material, and published several very interesting papers on aphids.

Types. — Holotype: alate viviparous female, from *Podocarpus* sp., Buitenzorg, Java, VIII.1933, leg. C. J. H. Franssen. Paratypes: part of an alata vivipara and more or less complete apteræ viviparæ with data as for holotype. In the author's collection.

### ***Neophyllaphis gingerensis* Carver, 1959**

After a study of an apterous viviparous, and an alate paratype kindly donated by Dr. Carver, I found nothing to add to the very careful original description. The species was described from *Podocarpus alpina* from mountain tops in Australia, and it is the only member of the genus known to have apterous oviparous females, whereas in the other species only alate oviparæ are known. In nearly all other aphid genera oviparæ are apterous, and often they are the only apterous morph in the cyclus. However, also in *N. gingerensis* the oviparæ have alatoid traits, for they have compound eyes, and sometimes ocelli, secondary rhinaria, and a V-shaped suture on the ventral side of the head, all typical characters of alatae in this subgenus.

Apteræ are very similar to those of *N. totaræ* Cottier and the differences enumerated by Carver (1959) hold only for alatae, such as the sensoriation of the antennae. There is a small difference in the structure of the antennae, but the easiest discriminant is the presence of the small hair-bearing sclerotic plates in *N. gingerensis* Carver.

**Neophyllaphis grobleri** Eastop, 1955

This species was described from South Africa and Kenya, and later it was also found in Tanganyika (Eastop, 1958) and West Africa (Eastop, 1961). It infests various species of *Podocarpus* (*gracilior*, *milanjanus*) and can become a pest in nurseries (Eastop, 1958, 1961). The aphid is only known by viviparous apterous and alate morphs which were well described by Eastop (1955). I could study alate paratypes and some other alatae, and some apterae. They differ from all other members of the subgenus by a globose or even transverse knob to the cauda, with some 10-13 hairs. In these characters, the species resembles *Chileaphis* more than do the other species of *Neophyllaphis*. This resemblance is one reason why I place *Chileaphis* Essig as a subgenus in *Neophyllaphis* Takahashi, but there are more. In both *N. grobleri* and *Chileaphis* the alatae have black sclerotic bars on the abdomen that are not present in other *Neophyllaphis*, the siphunculi have some hairs, a character not found in other *Neophyllaphis*; and as Eastop (1955) wrote, apterae viviparae in his species have a tendency to be somewhat alatiform, and then have elementary multicorneal eyes. Therefore this species almost bridges the gap between *Neophyllaphis* and *Chileaphis*.

**Neophyllaphis rappardi** spec. nov.

Apterous viviparous female (from one specimen).

Body rather elongated oval. Tergum completely membranous and not pigmented. Dorsal hairs quite short, on abdominal tergite III only 0.008-0.010 mm long, on the head a little longer. Antennae about  $\frac{3}{4}$  of length of body, rather dark with the basal half of segment III paler; segment III imbricated or rather with transverse lines of very small blunt spinules from base to apex; segment V very much longer than segment VI. Rostrum when fully extended just reaching the hind coxae; the very short, blunt last segment only with the 3 subapical pairs of hairs. Siphunculi quite colourless, inconspicuous, with the diameter of the porus only 0.016 mm, without hairs. Cauda rather dark, of the usual shape, with elongated egg-shaped knob, with 6 hairs. Subanal and subgenital plates normal. Legs rather dark; first tarsal joints with 7 hairs; second tarsal joints with 1-2 hairs ventrally on basal half.

Measurements in mm.

Length of body	Ant.	Ant. segments				Cauda
		III	IV	V	VI	
1.70	1.33	0.50	0.26	0.25	(0.14 + 0.03)	0.16
(With the alatae).						

## Alate viviparous female.

Head and thorax blackish, sclerotic, but abdomen as in apterae. No visible wax glands around the hairs on vertex and front. Antennae  $\frac{3}{4}$ - $\frac{7}{8}$  of length of body; segment III on basal  $\frac{2}{3}$ - $\frac{3}{4}$  part with rhinaria on a membranous blister-like part, about 32-42 in number; opposite side of segment markedly imbricated to reticulated by coalescent lines of fine, blunt spinules; segment VI very much shorter than segment IV or V. Siphunculi colourless as in apterae, 0.006-0.008 mm high. Cauda with acorn-shaped knob, rather dark, with 5-7 hairs. Legs darkish; hind tibiae irregularly with up to two pseudosensoria, mostly without. Wings normal.

## Measurements in mm.

No.	Length of body	Ant.	Ant. segments				Rhin. on III	Cauda
			III	IV	V	VI		
1.	1.79	1.38	0.49	0.29	0.29	(0.16 + 0.03)	32 & 35	0.15
2.	1.81	1.47	0.50	0.31	0.32	(0.16 + 0.04)	36 & 37	0.16
3.	1.71	1.45	0.47	0.32	0.32	(0.16 + 0.04)	33 & 37	0.15
4.	1.64	1.43	0.48	0.32	0.31	(0.16 + 0.03)	32 & 41	0.15
5.	1.79	1.39	0.48	0.30	0.30	(0.16 + 0.03)	34 & 35	0.16
6.	1.57	1.32	0.49	0.32	0.29	(0.16 + 0.04)	37 & 39	0.15

(1-6, from *Agathis labillardieri*, Biak, Western New Guinea, 14.II.1957, leg. F. W. Rappard).

Discussion. — Dr. F. W. Rappard, who discovered this aphid, made the following notes: „Lives on the underside of tender greenish yellow, recently developed needles in deep shadow in the forest, at the apices of pendulous branches, dispersed in small colonies. No ants. Colour of the insects dark brown purple, often almost black, with the exception of some — not all — of the larvae rather strongly covered with waxy exudate, also the antennae. Alatae idem. Extremities of alatae and old apterae dark, almost black. In the last few years I examined several hundreds of nursery and small trees, but never saw this insect. Perhaps only on older trees and in the forest”.

The alatae and apterae can very easily be recognized by their small pale siphunculi, ratio of antennal segments, and the alatae by the absence of rhinaria from a large part of antennal segment III, and the curious reticulation of that segment. Also *N. araucariae* has pale siphunculi but its apterae have 5-segmented antennae, and its alatae rhinaria over the full length of the IIIrd antennal segment.

Types. — Holotype: alate viviparous female (measurements no. 1), from *Agathis labillardieri*, Bosnik, Biak, Western New Guinea, 14.II.1957, leg. F. W. Rappard, no. 63. Paratypes: alatae viviparae and one aptera vivipara with collecting data as for holotype. In the author's collection.

Subgenus **Chileaphis** Essig, 1953

The description and figures of the subgenus (which by its author was considered a full genus) and its single species, *Chileaphis michelbacheri* Essig, 1953 are so good that very little can be added. The last rostral segment is drawn as having two hairs besides the 3 subapical pairs, but this is not always the case, for some paratypes, like species of *Neophyllaphis* proper, have only the subapical pairs. The apterae viviparae have the dorsal hairs placed on small pigmented sclerites as in *Neophyllaphis gingerensis* Carver, but they are more numerous than in *Neophyllaphis* proper. The apterae have the compound eyes free from the triommatidia. The characteristic sutures in the head of alate *Neophyllaphis* are also present in alate *Chileaphis*.

In virtually all respects, *Chileaphis* agrees with *Neophyllaphis*, excepting the multicorneal eyes in apterae. All the other curious features of *Neophyllaphis* including the alate's secondary rhinaria grouped on a sort of very long blister, the frontal sutures in alate specimens, the structure of the antennae, wings, siphunculi, cauda and subanal plate, the tarsal chaetotaxy, are refound in *Chileaphis*.

## GENERAL DISCUSSION

The genus *Neophyllaphis* has been characterized in an excellent way by Eastop (1966), but he does not refer to the marked V-shaped sutures in the head capsule of alatae first mentioned by Carver (1959). The presence of three-lensed eyes and the complete fusion of head capsule and pronotum in apterae led Börner (1930: 177) to place the genus near *Thelaxes* Westwood, which was followed by Börner & Heinze (1957). Eastop (1958) incorporated *Neophyllaphis* in his Callipterinae, and later (1966) in a special tribe of this subfamily, then called Drepanosiphinae.

Morphologically the African *Paoliella*-like genera (*Paoliella* Theob.; *Unipterus* Hall; *Pterasthenia* Stroyan; and *Antalus* Adams) are the nearest relatives of *Neophyllaphis*. They have as apterae or larvae three-lensed eyes, and the head in their alatae shows the V-shaped sutures as distinctly as in alate *Neophyllaphis*.

The Drepanosiphinae of Eastop (1966) that as larvae or apterae have multicorneal eyes, sometimes have V-shaped ridges in their head capsules. I could not find them in any of the *Drepanosiphum*-like genera (*Drepanosiphum* Kock; *Drepanosiphoniella* Dav., H.R.L. & Rem.; *Drepanaphis* del Guercio; and *Shenahweum* Hottes & Frison). They also appear to be absent in all the genera of Drepanosiphinae associated with *Quercus* (*Hoplocallis* Pintera; *Hoplochaetaphis* Aizenb.; *Hoplochaitophorus* Gran.; *Lach-*

*nochaitophorus* Gran.; *Myzocallis* Pass.; *Tuberculatus* Mordv.; *Tuberculoides* v. d. Goot). But in many of the genera on *Betula* and *Alnus* they were found to be present (*Betacallis* Mats.; *Clethrobium* Mordv.; *Euceraaphis* Wlk.; *Monaphis* Wlk.; *Symydobium* Mordv.), though only in some of the species of the genus *Calaphis* Walsh. In other *Betula*- or *Alnus*-infesting genera (*Betulaphis* Glend.; *Boernerina* Bramstedt; *Boernerinella* H.R.L. & Hottes; *Crypturaphis* Silvestri; *Kallistaphis* Kirk.; and *Pterocallis* Pass.), they are absent, while in *Callipterinella* v. d. Goot only traces are present. *Melanocallis* Oestl. from *Carya* shows them distinctly, but in *Monellia* Oestl. from the same hosts they are indistinct. All *Tinocallis* Mats. from *Ulmus* and *Zelkova* appear to have them and also *Sarucallis* Shinji from *Lagerstroemia*.

In all other genera of this group that I could examine no traces were found (*Bacillaphis* Quednau; *Callaphis* Wlk.; *Chromaphis* Wlk.; *Ctenocallis* Klodn.; *Iziphya* Nevsky; *Neocallaphis* Shinji; *Neochromaphis* Tak.; *Nequenaphis* Blanchard; *Nippocallis* Mats.; *Phyllaphis* Koch; *Pterocallis* Pass.; *Saltusaphis* Theob.; *Sappocallis* Mats.; *Shivaphis* Das; *Sinochaitophorus* Tak.; *Therioaphis* Wlk.; and *Thripsaphis* Gill.).

It would seem that *Neophyllaphis*, associated with Coniferae, are very primitive Drepanosiphines, nearest related to the African *Paoliella*-like genera that infest Combretaceae, Burseraceae, Leguminosae (and perhaps Gramineae). Of the more recent genera of Drepanosiphines that always have multicorneal eyes, there are several that have similar sutures in the head capsule as *Neophyllaphis*. And these sutures are especially found in those genera that have strongly transverse secondary rhinaria in alatae, and that do not cover their eggs with wax.

It should be emphasized that the presence or absence of the multicorneal eye in apterae or larvae cannot be used as a character by which higher categories of aphids, e.g., subfamilies, can be separated. Evidently primitive genera in non-related series may have three-lensed eyes.

From this point of view one could postulate that *Mindarus* Koch from *Abies* and *Picea*, with three-lensed eyes in apterae and larvae, are very primitive Drepanosiphines. They share with a great number of other Drepanosiphine genera, that have only multicorneal eyes, the presence of special wax glands in oviparae with which to cover the eggs, but in this series there are no V-shaped sutures in the head capsules of alatae.

#### REFERENCES

- CARVER, M., 1959. Two new and possibly indigenous aphids from Australia (Homoptera: Aphidoidea). — Proc. R. ent. Soc. Lond. (B) 28: 19-27.

- COTTIER, W., 1953. Aphids of New Zealand. — N.Z. Dept. Sci. Industr. Res. Bull. **106**: 1-382.
- EASTOP, V. F., 1955. New East African aphids (Hem., Aphididae). — Entom. Monthly Mag. **91**: 154-160.
- , 1958. A study of the Aphididae (Homoptera) of East Africa: 1-126.
- , 1961. A study of the Aphididae (Homoptera) of West Africa: 1-93.
- , 1966. A taxonomic study of Australian Aphidoidea (Homoptera). — Australian Jl. Zool. **14**: 399-592.
- ESSIG, E. O., 1953. Some new and noteworthy Aphidae from Western and Southern South America. — Proc. Calif. Ac. Sci. (4) **28**: 59-164.
- JARVIS, H., 1944. Quoted by Carver, 1959. Not seen.
- SHINJI, O., 1922. (Title in Japanese). — Dobutsugaku Zasshi **34**: 532-533.
- , 1941. Monograph of Japanese aphids: 1-1215. [in Japanese].
- TAKAHASHI, R., 1920. A new genus and species of aphid from Japan (Hem.). — Canad. Ent. **52**: 19-20.
- , 1921. Aphididae of Formosa (1): 1-97.
- , 1931. Aphididae of Formosa (6): 1-127.
- ZIMMERMAN, E. C., 1948. Homoptera: Sternorhyncha. Aphidoidea. — Insects of Hawaii **5**: 53-131.