

A NEW SPECIES OF *SENSORIAPHIS* FROM NEW GUINEA (HOMOPTERA: APHIDIDAE)¹

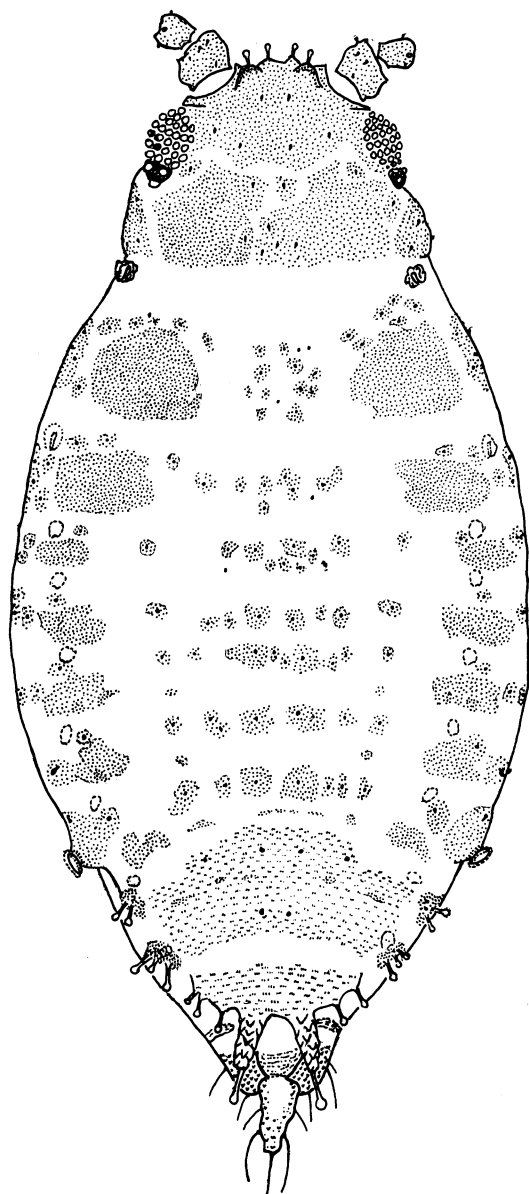
By Mary Carver²

Abstract: The apterae and alatae viviparae of a new species of *Sensoriaphis* are described from *Nothofagus* on Mt Kaindi, Papua New Guinea. Keys are provided to the apterous and alate viviparous morphs of the described species of *Sensoriaphis*.

Sensoriaphis niuginii Carver, new species

Apterous viviparous ♀ (macerated specimens). Body length 1.5-2.2 mm (mean, 1.89 mm), approximately 2 × as long as maximum width. Marginal tubercles on meso-, metathorax and abdominal segments I-IV hardly developed; on abdominal segments I-IV, represented by groups of 1-4 small, capitate hairs on scleroites; 1 of these scleroites in each group may be slightly raised and bear a single, capitate hair that is slightly longer (7-13 μ) than the other hairs. Marginal tubercles on abdominal segments VI and VII very low or almost flat, dark, spinosely imbricated; on segment VI with 2-5 various-sized capitate hairs, the largest being 13-29 μ; on segment VII, with 2-3 hairs, the largest being 21-43 μ long. Abdominal tergite VIII well demarcated; on rounded posterior margin 2 dark, imbricated, fingerlike spinal tubercles, 0.07-0.16 mm long (mean, 0.11 mm), 0.03-0.06 mm wide at base, each bearing at its apex a capitate hair, 29-40 μ long; spinal tubercles flanked on each side by 2-3 large, subequal, capitate hairs, 20-43 μ long. Other dorsal, thoracic and abdominal hairs small, capitate, 3-8 μ long; pronotum with 2 hairs anterospinally, 2-4 hairs posterospinally, 1 hair in each anterolateral margin near eye, and 4-8 irregularly disposed hairs laterally on each side on a dark, somewhat rugose, marginal area; mesonotum with 31-46 and metanotum with 19-22 irregularly disposed hairs; abdominal tergites I-V each with a row of 7-11 spinopleural hairs and 1 submarginal hair on each side; tergite VI with 4-9 spinopleural hairs and 0-1 submarginal hairs on either side; tergite VII with 2 spinal hairs. Ventral abdominal hairs longer, acute. Two small, round, spinosely imbricated areas present, pleurally, on sternite V at bases of a few of the ventral hairs. Pronotum dark, except for median, pale area; mesonotum and metanotum with large, roundish pleural sclerites, dark rugose marginal areas and irregularly shaped scleroites at bases of most of hairs; abdominal tergites I-V with large, irregularly-shaped submarginal sclerites and irregularly-shaped, variously-sized scleroites at bases of hairs; on tergite VI, the scleroites tend to coalesce with one another and with the slightly, spinosely imbricated transverse sclerotic band on tergite VII; tergite VIII wholly dark, distinctly darker than other tergites and spinosely imbricated; intersegmental sclerites most evident between tergites V and VII. Head with frons slightly produced medially and bearing 2 capitate hairs, 21-33 μ long; dorsally, near antennal bases, 2 dark tubercles, each bearing a capitate hair, 21-29 μ long; posterior and median to these tubercles, a pair of small, capitate hairs, 4-7 μ long and, between the eyes, a row of 4 similar, small hairs; head, ventrally with usually 3 pairs of hairs, the anterior pair just posterior to frontal hairs, capitate to blunt, 19-30 μ long, the middle pair medially placed, stout, blunt, 27-37 μ long, the posterior pair similar but more laterally placed and maybe slightly smaller; head dark, often with a faint, reticulated pattern. Eyes compound, each with a dark, conspicuous triommatidium. Antennae 0.71-1.14 mm long (mean, 0.89 mm), 0.43-0.53 × body length, 6-segmented; primary rhinaria nonciliated, secondary rhinaria normally absent (2 rhinaria present in 1 specimen); antennae darker than head; segment III may be paler than other segments; segment I broader than long, segment III often broadened at base; flagellar segments heavily

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0·5mm

FIG. 1. *Sensoriaphis niuginii*,
n. sp., apterous viviparous ♀,
dorsal view of body.

imbricated; antennal hairs small, capitate; longest hairs on segment III, 7–8 μ ; segment III, 1.54–1.78 \times segment IV; segments IV, V and VI base subequal and a little longer than processus terminalis; processus terminalis=0.69–0.9 \times VI base. Lengths of flagellar segments: III, 0.17–0.31 mm (mean, 0.23 mm); IV, 0.10–0.19 mm (mean, 0.14 mm); V, 0.11–0.19 mm (mean, 0.14 mm); VI base, 0.11–0.2 mm (mean, 0.14 mm); VI processus terminalis, 0.10–0.14 mm (mean, 0.11 mm). Rostrum may reach to hind coxae; ultimate rostral segment, 0.09–0.10 mm long, 1.6–2.3 \times basal width, 0.83–0.89 \times hind tarsus II; dark, black at apex and extreme base; without accessory hairs; 1 specimen arostrate. Mesosternal furca separate. Legs brown; femora spinosely imbricated ventromarginally or ventroapically; tibiae with some small spines among the hairs near apex, most numerous on hind tibia; 2nd tarsal segments imbricated; femoral hairs short, blunt to apically dilated; tibial hairs proximally short, blunt or apically dilated, distally becoming longer and acute; apical tibial hairs undifferentiated; 1st tarsal segments with 4 long, acute hairs and 1 shorter, stouter, central hair; 1 or both of dorsoapical hairs of hind tarsus II apically dilated; empodial hairs expanded; 2–5 pseudosensoria present on 1 or both hind tibiae in 3 specimens. Lengths of hind segments: femur, 0.34–0.53 mm; tibia, 0.55–0.89 mm; tarsus I, 0.04 mm; tarsus II, 0.10–0.12 mm. Thoracic stigmal plates large, slightly protuberant, dusky, with rugose-imbricate sculpturing; abdominal stigmal plates smaller, paler and more faintly sculptured. Siphunculi situated on abdominal segment V, cone-shaped, with broad flange, brown; apex of siphunculus and flange itself closely transversely reticulated, almost annulated, with, anterodorsally, 1 capitate hair, 11–13 μ long and, ventrally, 0–2 small capitate hairs, 4–8 μ long; basal diameter of siphunculus, 0.09–0.16 mm; height, 0.06–0.08 mm. Cauda constricted to form a pear-shaped knob; knob 1.5–2.2 \times greatest width (near base); ventrally dark, spinosely imbricated; dorsally dark and sparsely spinosely imbricated, except for a pale, smooth area basally; with 9–12 (usually 11) long, acute, lateral to ventral hairs, the 3 (rarely 4) hairs nearest the apex being longer and stouter than the rest. Length cauda, 0.16–0.20 mm (mean, 0.18 mm); length caudal knob, 0.1–0.13 mm (mean, 0.12 mm). Subanal plate for the most part dark, spinosely imbricated, indented to form 2 well-defined lobes, each lobe with 5–8 long, acute hairs; transverse sclerotized area at base of each lobe. Subgenital plate mostly rounded, 0.14–0.20 mm wide, dark, spinosely imbricated; with 5–8 hairs anteriorly and 8–14 hairs posteriorly. Gonapophyses 4; inner gonapophyses each with 1–2 hairs, outer with 2–3.

Alate viviparous ♀ (macerated specimens). Body length, 2.04–2.44 mm (mean, 2.27 mm). Dark, marginal sclerites present on abdominal segments I–IV, VI and VII; small on segment I, large on segments II–IV and extending to ventrum; each sclerite bears 3–6 stout, acute hairs of maximum length, 24–36 μ , though these may be shorter and fewer in number on segment I. Abdominal spinopleural hairs stout, acute, in transverse rows and arising from dark, conspicuous sclerites; maximum length of spinopleural hairs on each tergite, 19–28 μ , usually a little shorter on tergite I; number of hairs on tergite I, 7–12; tergites II–VI, 4–9; tergite VII, 2 (rarely 3); tergite VIII for the most part dark, spinosely imbricated; with, on posterior margin and forming a row, 2 stout, acute spinal hairs, 18–27 μ long, each borne on a small, dark, tubercle, and flanked on each side by 2 (rarely 1) similar hairs, 27–32 μ long. Ventral abdominal hairs acute; 2 small, dark, spinulose patches often present pleurally on sternite V. A low, inconspicuous tubercle sometimes evident anterolaterally on pronotum, each bearing 2 hairs. Eyes compound, triommatidia not conspicuously dark. Head without frontal tubercles; indications of a longitudinal suture anterior to median ocellus; dorsum of head dark, often with a faint pattern of reticulation, lateral ocelli darker; ventrally, head is dark anteriorly, pale posteriorly; cephalic hairs acute; a pair of frontal hairs, 19–27 μ ; dorsally, a pair of anterolateral hairs (17–23 μ long) borne on low tubercles, a pair of interocellar hairs (19–27 μ long) and a row of 4 (rarely 6) interocular hairs (15–21 μ long); ventrally, a pair of hairs similar to and posterior to frontal hairs; a long, fine hair on each side of median ocellus (27–35 μ long) and 2 hairs posterolateral to these (27–40 μ long). Antennae 6-segmented, 1.31–1.78 mm long (mean, 1.6 mm), 0.64–0.78 \times body length; primary rhinaria ciliated; an almost single row of 15–20 transversely oval, nonciliated, secondary rhinaria distributed over whole of ventral surface of segment III, except extreme base; secondary rhinaria not present on other segments; segments I–III brown to blackish, paler at extreme base on III, the rest of the flagellum gradually becoming paler; all flagellar segments heavily imbricated; antennal hairs acute, 13–16 μ long on segment III; segment III=1.46–1.62 \times segment IV; VI processus terminalis=0.58–0.66 \times VI base. Lengths of flagellar segments: III, 0.41–0.55 mm (mean, 0.5 mm); IV, 0.26–0.38 mm (mean, 0.32 mm); V, 0.19–0.31 mm (mean, 0.25 mm); VI

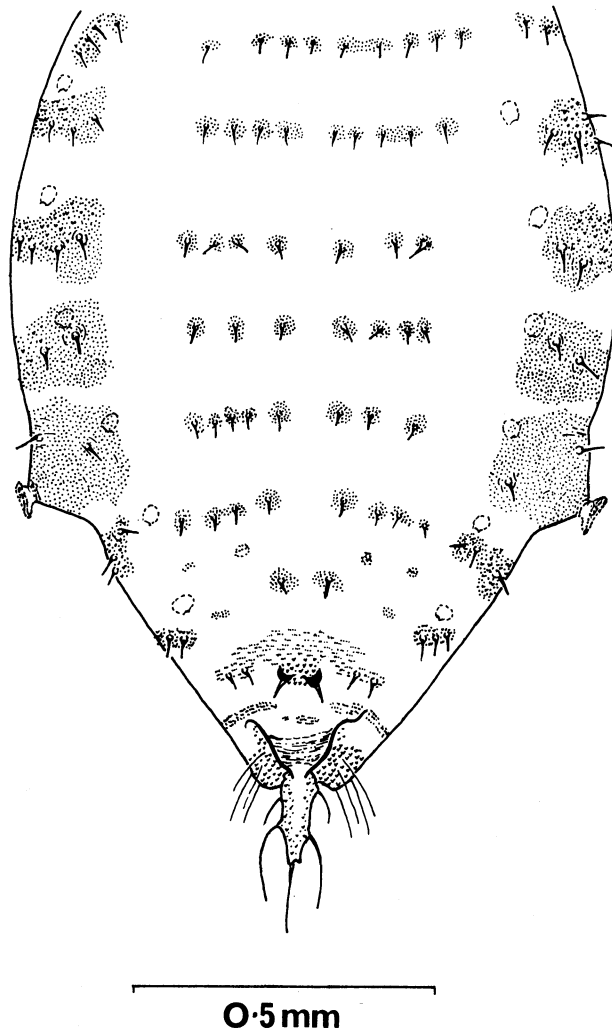
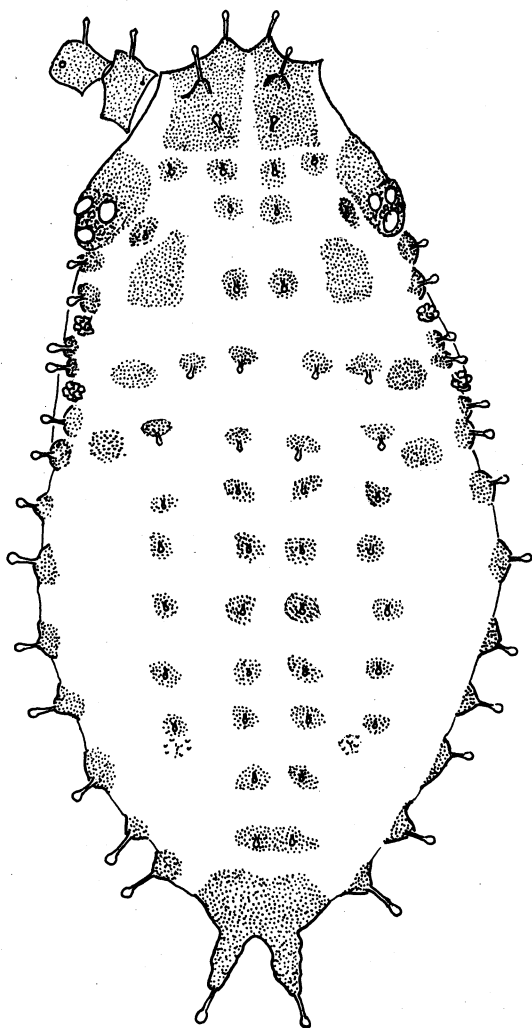


FIG. 2. *Sensoriaphis niuginii*, n. sp., alate viviparous ♀, dorsum of abdomen.

base, 0.18-0.25 mm (mean, 0.22 mm); VI processus terminalis, 0.12-0.16 mm (mean, 0.14 mm). Rostrum most commonly reaches midcoxae; ultimate rostral segment, 0.1-0.11 mm long, brown, black at tip, without accessory hairs, $1.95-2.1 \times$ basal width, $0.84-0.95 \times$ hind tarsus II. Forewing: media $2 \times$ branched; anal vein slightly clouded; hind wing with 2 oblique veins. Legs brown; fore femora not modified; femora spinosely imbricated ventrally and apically; femoral hairs acute; the faint imbrications basally on tibiae are gradually replaced by small spinules which become larger and densely distributed towards apex; tibial hairs stiff, acute; usually 2 apical tibial hairs dagger-shaped, stouter and shorter than the others; 1st tarsal segments with 5 ventral hairs; 2nd tarsal segments imbricated, with some spinules on plantar surface, especially on hind segments; all hairs acute, the 2 ventroapical hairs stouter than the other hairs; empodial hairs expanded. Lengths of hind segments: femur, 0.46-0.6 mm; tibia, 0.85-1.2 mm; tarsus I, 0.04 mm; tarsus II, 0.1-0.12 mm. Stigmal plates brown. Siphunculi cone-shaped, brown,



0.2 mm

FIG. 3. *Sensoriaphis niuginii*, n. sp., 1st-instar nymph, dorsal view of body.

striated and often with a faint reticulated pattern; with a broad flange; apex of siphunculus and flange closely transversely reticulated, almost annulated; with 1 acute, stout hair anterodorsally, $24-32\mu$ long, 1 similar but usually smaller hair basodorsally and 1 (rarely 2) hairs ventrally, $21-32\mu$ long; basal diameter siphunculus, $0.16-0.2$ mm. Caudal knob often nearly parallel-sided, $2.4-2.88 \times$ maximum width (near base); ventrally brown, spinosely imbricated; dorsally, pale brown and sparsely spinulose except for a smooth, pale area basally; knob with

11-12 ventral to lateral hairs, the 3 (rarely 4) hairs nearest the apex being longer and stouter than the others; length cauda, 0.19-0.23 mm (mean, 0.21 mm); length caudal knob, 0.12-0.16 mm (mean, 0.15 mm). Subanal lobes dark, spinosely imbricated, each with 6-8 long, acute hairs; 2 broad, sclerotic imbricated areas laterally near bases of subanal lobes and cauda. Subgenital plate transversely oval, 0.23-0.28 mm wide, spinosely imbricated, dusky, with 6-12 anterior hairs and 11-17 posterior hairs. Gonapophyses 4; inner gonapophyses with 1-2 hairs, outer with 2-3.

Nymph. *1st instar*. Eyes are triommatidia. Antennae 4-segmented; segments I and II each with 2 hairs, segment III with 2 preapical hairs, segment IV with 1 hair, near rhinarium. All dorsal body hairs capitate and with dark scleroites at their bases. Head bears a pair of large, frontal hairs and, dorsally, a pair of large hairs on low tubercles between the antennal bases; more posteriorly, 6 smaller hairs are arranged in a median pair and a transverse row of 4. Pronotum with 2 pairs of spinal hairs, 1 pair of anterior pleural hairs and 2 pairs of marginal hairs, the anterior spinal and pleural hairs lying between the eyes and seeming to belong to the head. Meso- and metanotum each with a pair of anterior spinal, a pair of anterior pleural hairs and 2 pairs of marginal hairs. Abdominal tergites I-V each with a pair of spinal, a pair of pleural and a pair of marginal hairs; tergites VI and VII each with a pair of spinal and a pair of marginal hairs; tergite VIII with only a pair of spinal hairs (lateral hairs are not present), each hair borne on a fingerlike process. All marginal hairs borne on low, conical tubercles. Thoracic stigmal plates conspicuous, rugose; abdominal stigmal plates not evident. Tarsus I with 2 hairs and some spinules; the 2 dorsoapical hairs of tarsus II apically expanded but not truly capitate. Siphunculi absent or indicated by a clear area behind hair on marginal tubercle V. Cauda with 2 hairs. *2nd instar*. Some facets of a compound eye present; antennae 4-segmented; a pair of lateral hairs present on abdominal tergite VIII; siphunculi present, adult-like; abdominal stigmal plates present; dorsoapical hairs of tarsus II sometimes apically expanded, especially on hind segments. *3rd instar*. Eyes compound; antennae 4-5-segmented. *4th instar*. Antennae 5-6-segmented.

All instars with scleroites at bases of principal hairs and with 2 pleural, spinulose patches on sternite V.

TYPES. Holotype ♀ (aptera vivipara) (BISHOP 10,757), ex *Nothofagus carrii*, PNG: New Guinea (NE): Mt Kaindi, 2250 m, 24.I.1972, Tawi; 40 ♀♀ paratypes (20 apterae viviparae, 20 alatae viviparae), ex *Nothofagus carrii*, same locality as holotype, 30.IX.1970, 12-28.I.1971, 4-25.II.1971, T. Tigner, 24.I.1972, Tawi. Holotype and some paratypes in the Bishop Museum, Honolulu (BISHOP); paratypes also in the Department of Agriculture, Stock and Fisheries, Port Moresby; Australian National Insect Collection, C.S.I.R.O., Canberra; British Museum (Natural History), London; United States National Museum, Washington, D.C.; and the collection of Dr D. Hille Ris Lambers, Bennekom, Nederland.

Apterae and alatae viviparae were the only morphs collected. According to Dr T. Tigner (in litt.), *S. niuginii* was not abundant, having been found in small numbers on each occasion. Specimens were from the undersurface of new leaves; searches were made only of foliage accessible from the ground.

Sensoriaphis niuginii, n. sp. differs most noticeably from the other known species of *Sensoriaphis* by the presence, in both morphs, of dark, conspicuous scleroites at the bases of the hairs of the anterior abdominal tergites and, in the apterae viviparae, by the poorly developed marginal tubercles. The following keys to apterous and alate viviparous morphs provide a detailed comparison of the 4 described species of *Sensoriaphis*.

KEY TO APTERAE VIVIPARAE OF *Sensoriaphis* Cottier, 1953

1. Pair of lateral, hair-bearing tubercles present on abdominal tergite VIII, in addition to spinal tubercles; marginal tubercles on abdominal segments I-IV fingerlike, 0.04-0.08 mm long; antennal segment III

- not imbricated; mesosternal furca joined, dark; abdominal stigmal plates pleuroventral; intersegmental sclerites conspicuous, ultimate rostral segment wholly dark, legs dark with black knees. On *Nothofagus cunninghamii*, Tasmania and Otway Range, Victoria, Australia. (Body length, 1.53-2mm; antennal length= $0.34-0.41 \times$ body length; VI p.t.= $0.28-0.42 \times$ VI base; u.r.s. length= $2.28-2.57 \times$ basal width)..... **tasmaniae** Carver & Martyn, 1962
- Lateral tubercles absent from abdominal tergite VIII, represented by 1-4, usually capitate, hairs on each side of spinal tubercles; marginal tubercles on abdominal segments I-IV, mound-like, flat or absent; antennal segment III imbricated; mesosternal furca separated; abdominal stigmal plates lateroventral; pigmentation different from above 2
2. Spinal tubercles of abdominal tergite VIII united at base to form a forked process; marginal tubercles of abdominal segments VI and VII slender, fingerlike (on VII, 0.19-0.26 mm long); marginal tubercles on abdominal segments I-IV mostly mound-like, 0.01-0.06 mm high; pale insect, 2.16-2.64 mm long, with pale, irregular, coalescing scleroites and intersegmental sclerites; legs pale with dark tarsi. On *Nothofagus moorei*, New South Wales, Australia. (Antennal length= $0.37-0.43 \times$ body length; VI p.t.= $0.58-0.78 \times$ VI base; u.r.s. length= $1.31-1.88 \times$ basal width)..... Fundatrix of **furcifera** Carver & Hales, 1974
- Spinal tubercles of abdominal tergite VIII separate; marginal tubercles of abdominal segments VI and VII smaller and stouter, or flat; marginal tubercles on abdominal segments I-IV very low or absent; with pigmentation different from above. 3
3. Marginal tubercles on abdominal segments VI and VII small but well developed and fingerlike (on VII, 0.05-0.06 mm long); antennal length= $0.33-0.41 \times$ body length; processus terminalis= $0.25-0.33 \times$ its base; abdominal tergites I-V with 6 spinopleural hairs per tergite; caudal knob heart-shaped, with typically 9 hairs (6 + 3); body length, 1.34-1.54 mm; transverse sclerotic bands on anterior abdominal tergites. On *N. truncata*, *N. fusca*, New Zealand..... **nothofagi** Cottier, 1953³
- Marginal tubercles flat, hardly developed; antennal length= $0.43-0.53 \times$ body length; processus terminalis= $0.69-0.9 \times$ its base; abdominal tergites I-V with more than 6 spinopleural hairs per tergite; caudal knob pear-shaped, with typically 11 hairs (8 + 3); body length, 1.5-2.2 mm; with numerous dark, conspicuous scleroites on anterior abdominal tergites. On *Nothofagus carrii*, New Guinea..... **niuginii**, n. sp.

KEY TO ALATAE VIVIPARAE OF *Sensoriaphis*

1. Antennal segment III= $3.8-4.7 \times$ cauda, and bears 35-57 secondary rhinaria; lateral ocelli situated on dark prominences; these, together with triommatidia and antennae, are conspicuously darker than rest of head. On *Nothofagus moorei*, New South Wales, Australia. (Abdominal dorsum pale, without conspicuous scleroites and intersegmental sclerites; body length, 1.8-2.8 mm; tergites I-V each with 4 spinopleural hairs; antennal length= $0.71-0.89 \times$ body length; ant. sgt. III= $2.06-2.85 \times$ sgt. IV; VI p.t.= $0.5-0.73 \times$ VI base; u.r.s. length= $1.54-2 \times$ its basal width; length caudal knob= $1.8-2.4 \times$ its basal width, with usually 8 fine hairs basally, and 4 stout hairs apically)..... **furcifera**
- Antennal segment III= $1.85-2.9 \times$ cauda, and bears 9-20 secondary rhinaria; lateral ocelli not on very dark prominences; these, together with triommatidia and antennae, are not all conspicuously darker than rest of head. 2
2. Abdominal dorsum with transverse sclerotic bands on tergites II-VI inclusive, which may be indented or even broken on mid-line; and dark marginal sclerites; abdominal tergites I-V each with usually 4 spinopleural hairs; caudal knob heart-shaped, $1.25-1.75 \times$ maximum width, with 3 stout hairs apically and only 5-6 finer hairs basally; antennal segment III= $2.15-2.42 \times$ segment IV and $2.8-2.9 \times$ segment V.....
3. Five apterae viviparae, 3 alatae viviparae, ex *Nothofagus fuscus* (Hook. f.) Oerst, NEW ZEALAND: South I: 47 km N of Te Anau, 10.II.1972, D. F. Hales.

- cauda. On *N. fusca*, New Zealand. (Body length, 1.42-1.75 mm; antennal length=0.52-0.63 × body length; VI p.t.=0.26-0.35 × VI base; no. of secondary rhinaria on antennal segment III=9-12; u.r.s. length=2.14-2.68 × its basal width). **nothofagi**³
- Abdominal dorsum without transverse sclerotic bands. Tergites I-V each with usually more than 4 spinopleural hairs; caudal knob pear-shaped to parallel-sided, 1.82-2.9 × maximum width, and with 2-3 stout hairs apically and 8 finer hairs basally; antennal segment III=1.06-1.63 × segment IV and 1.85-2.45 × cauda 3
3. Abdominal dorsum with conspicuous scleroites at bases of spinal and pleural hairs; intersegmental sclerites not common; marginal sclerites dark; ultimate rostral segment dark at tip, 1.95-2.1 × basal width; caudal knob slender, 2.4-2.88 × maximum width; antennal segment III 1.46-1.63 × segment IV and with 15-20 secondary rhinaria; VI p.t.=0.58-0.66 × VI base. On *Nothofagus carrii*, New Guinea. (Body length, 2.04-2.44 mm; antennal length=0.64-0.78 × body length) **niuginii**, n. sp.
- Dorsal abdominal scleroites and intersegmental sclerites, when present, inconspicuous; marginal sclerites and processi dark; ultimate rostral segment wholly dark, slender, 2.2-2.7 × basal width; caudal knob pear-shaped, 1.82-2 × maximum width; antennal segment III 1.06-1.32 × segment IV and bearing 10-16 secondary rhinaria; VI p.t.= 0.31-0.35 × VI base. On *N. cunninghamii*, Tasmania and presumably Victoria, Australia. (Body length, 1.75-2.28 mm; antennal length=0.58-0.69 × body length). **tasmaniae**

Another species of *Sensoriaphis* is known from New Guinea, represented by a mutilated *alata vivipara* found among a sample of *S. niuginii* ex *Nothofagus carrii*, Mt Kaindi, 25.II.1971, T. Tigner⁴. Schlinger (1974) reports the discovery of a previously unknown *Sensoriaphis* in Chile, South America but, according to Hille Ris Lambers (in litt.), this is not a *Sensoriaphis* but a member of an undescribed genus closely related to *Sensoriaphis* and *Taiwanaphis* Takahashi.

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4. Since going to press, a 6th species of *Sensoriaphis* has been discovered by Dr J. C. Taylor at Jandakot, Western Australia, on *Melaleuca* L. (Myrtaceae). *Nothofagus* Blume is found in Western Australia only in fossil form.