

**The South-East Asian planthopper genus *Lanaphora*,
with description of a new species
(Hemiptera: Fulgoroidea: Delphacidae: Tropidocephalini)**

MANFRED ASCHE, FlS

*Museum für Naturkunde, Leibniz Institute for Research on Evolution and Biodiversity at the Humboldt
University Berlin, Hemiptera Research Group, Invalidenstraße 43, 10115 Berlin, Germany and
Research Associate, Department of Entomology, Bishop Museum, P.O. Box 19000-A, Honolulu,
Hawai'i 96817, U.S.A.; e-mail: manfred.asche@mfn-berlin.de*

ASCHE M. 2013: The South-East Asian planthopper genus *Lanaphora*, with description of a new species (Hemiptera: Fulgoroidea: Delphacidae: Tropidocephalini). In: KMENT P., MALENOVSKÝ I. & KOLIBÁČ J. (eds.): Studies in Hemiptera in honour of Pavel Lauterer and Jaroslav L. Stehlik. *Acta Musei Moraviae, Scientiae biologicae* (Brno) **98(2)**: 163–174. – The hitherto monotypic South-East Asian planthopper genus *Lanaphora* Muir, 1915 is revised. *Lanaphora bakeri* Muir, 1915 from the Philippine Islands is redescribed and a new species from Papua New Guinea, *Lanaphora paveli* sp.nov., is described; both species are illustrated including details of the male genitalia. A third species is reported from the Solomon Islands but not formally described here. All *Lanaphora* species are bamboo-feeders and may be potential pests.

Keywords. Auchenorrhyncha, Fulgoromorpha, Delphacinae, taxonomy, excessive female wax production, bamboo-feeder, Philippine Islands, Papua New Guinea, Solomon Islands

Introduction

The Delphacidae of South East Asia must still be regarded as insufficiently known. Despite recent monographies from Taiwan (YANG & YANG 1986, YANG 1989) and China (DING 2006), vast areas of this immense land and island realm remain virtually untouched by contemporary faunistic and taxonomic studies. Concerning the Tropidocephalini of this area only a few taxonomists have contributed, mostly in the early 20th century. Tropidocephaline taxa were predominantly reported from the Philippine Islands, e.g. by MUIR (1913, 1915, 1916, 1919), from Malaysia, e.g. by MATSUMURA (1907) and MELICHAR (1914), from Indonesia by e.g. by BIERMAN (1908), MUIR (1913) and SCHMIDT (1926), and – more “recently” – from Indonesia: Sunda Archipelago by JACOBI (1941) and New Guinea by FENNAH (1965). Among all South East Asian Tropidocephalini, the genus *Lanaphora* Muir, 1915 is one of the least known. Since its monotypic establishment with *Lanaphora bakeri* Muir, 1915 from the Philippine Islands: Luzon, based on one male and one female (MUIR 1915), it was subsequently listed by MUIR (1916) without providing new data, and mentioned again by MUIR (1917) in a comparison with *Vizcaya* Muir, 1917 (today in the subfamily Vizcayinae, see ASCHE 1990) stating superficial similarity. For further listing see METCALF (1943). *Lanaphora bakeri* has never been illustrated. In the course of studies on Oriental Delphacidae I was able to examine the type material of *L. bakeri* in the collections of the Bishop Museum, Honolulu, and also discovered additional conspecific specimens from the Philippines. *L.*

bakeri is re-described and for the first time genitalia are illustrated here; a lectotype is designated. The collections of Bishop Museum and the Natural History Museum, London, also contained *Lanaphora* specimens from Papua New Guinea and the Solomon Islands which could not be assigned to *L. bakeri*, and apparently represent hitherto undescribed species. The species from Papua New Guinea is described below as *Lanaphora paveli* sp.nov., the specimen from the Solomon Islands, a female, is doubtlessly a congener; however, due to its poor condition it is not described here as a new species. The relationships of *Lanaphora* to other Tropidocephalini are briefly discussed.

Material and methods

Measurements and illustrations (line drawings and photographs) of external body parts were taken from dry specimens. The terminology of bodily structures, including male and female genitalia, follows ASCHE (1985). A Leitz stereomicroscope with *camera lucida* attachment was used for morphological examinations and for producing line drawings. For studying the male genitalia the abdomina were removed from the specimens and macerated in 10% KOH for 24 hours at room temperature, then transferred to glycerin for storage and/or to glycerin-jelly for preparing drawings. Photographs resulted from combined image stacks obtained by a camera (Canon EOS 450 D) attached to a Leica MZ 16 stereo microscope and Combine ZP software; subsequently they were processed with Adobe Photoshop CS 3.

Specimens examined are deposited in the following collections:

BMNH The Natural History Museum, London, UK
BPBM Bernice P. Bishop Museum, Honolulu, Hawai'i, USA

Taxonomy

Lanaphora Muir, 1915

Lanaphora Muir, 1915: 317. Type species: *Lanaphora bakeri* Muir, 1915, by original designation and monotypy.

Supplementary description. Small-sized tropidocephaline delphacids with delicate appearance; tegmina steeply tectiform, antennal joints (especially scape) elongate and slightly compressed, lateral margins of frons foliately ridged. Body colouration generally whitish or light yellow to brownish; head, antennae and tegmina with distinct brown or orange spots or markings. Head including compound eyes distinctly narrower than pronotum; vertex subtriangular, strongly narrowing towards apex, lateral carinae foliately ridged, median carina weak, surface of vertex deeply concave, transition of vertex to frons limited by a ridged transverse carina. Frons elongate and narrow, slightly widening towards frontoclypeal suture; lateral carina foliately ridged; median carina distinctly present in lower two thirds, then vanishing towards apex. Postclypeus short with ridged

lateral and median carina, anteclypeus devoid of carinae. Rostrum attaining posterior margin of middle coxae. Antennal joints subequal in shape, scape elongate, slightly compressed, pedicel terete and distinctly shorter than scape; pedicel with numerous sensory plaques. Pro- and mesonotal carinae straight, attaining posterior margin, lateral carinae slightly diverging; pronotal carinae strongly ridged. Tegmina elongate, widest distally of nodal line, surpassing the tip of abdomen by about half their length; apical margin slightly undulate and tapering. Hind wings distinctly shorter than tegmina, like in tropidocephaline delphacids with anastomosis of M and Cu. Post-tibial spur slender, posterior margin smooth, devoid of teeth, two thirds as long as postbasitarsus, inner margin with very fine setae; postbasitarsus distally with 6–7 teeth in a slightly angulate row, second posttarsal joint distally with 4 teeth in a closed row. Male genitalia with genital segment laterocaudally broadly or bulbously rounded; ventrocaudal margin of genital segment medially with a bifid process. Aedeagal complex basally embraced by a relatively short, hood-shaped anal segment (lacking processes); aedeagus in basal third or at midlength subrectangularly bent ventrally, with a single spinose process on the right side. Parameres slender, elongate, erect dorsally, in repose parallel to diaphragm, attaining or surpassing anal segment. Female genitalia with relatively short and sturdy ovipositor which does not attain the tip of abdomen; lateral gonapophyses IX strongly compressed and dilated, with excessive wax-production.

Differential diagnosis. *Lanaphora* can readily be distinguished from other tropidocephaline genera which display undulate and pointed tips of the tegmina like *Arcofacies* Muir, 1915 and *Arcofaciella* Fennah, 1956 by the foliately ridged lateral frontal carinae (versus not foliate), by the shape and proportions of the antennal joints (scape longer than pedicel and compressed versus shorter and terete). *Lanaphora* differs from *Purohita* Distant, 1906 especially by the shape of the scape (elongate and slightly compressed in *Lanaphora*, strongly dilated and foliately compressed in *Purohita*). From the Chinese genus *Neocarinodelphax* Chen & Tsai, 2009 which also displays a frons with strongly ridged lateral carinae, it differs by the shape of the antennae (scape and pedicel shorter and terete in *Neocarinodelphax*) and by the shape of the genital segment (laterally on each side with a strongly projected process in *Neocarinodelphax* versus no such process in *Lanaphora*).

Distribution. Only known from South East Asia: Philippine Islands, New Guinea, and the Solomon Islands: Bougainville. A wider distribution in this region is assumed.

Remarks. Within the Tropidocephalini, *Lanaphora* remains isolated. In the key for the Chinese Tropidocephalini provided by QIN & ZHANG (2010) *Lanaphora* would belong to a small group with a subtriangular vertex like *Conocraera* Muir, 1916 and *Tropidocephala* Stål, 1853; however, the unique bodily features including those of the male and female genitalia do currently not suggest a closer relationship to any of these or other genera. Muir's generic name "*Lanaphora*" may be a bit misleading as the Latin "*lana*" means wool. It is very likely that Muir referred to the woolly appearance of excessive wax-production of the females.

***Lanaphora bakeri* Muir, 1915**

(Figs 1–5, 11–14)

Lanaphora bakeri Muir, 1915: 317.

Type material. Lectotype ♂ (macropterous), here designated, Philippine Islands: Luzon, pinned together with a ♀ on the same block, with labels [white] “Maquilin, Luzon” [handwritten], “*Lanaphora bakeri* Muir” [handwritten by Muir], “930”, [red] “Type of [printed] *Lanaphora* Muir [handwritten by Muir]”, “Type of [printed] *L. bakeri* Muir [handwritten by Muir]”, “lectotype = ♂, det. Asche, 1984” (deposited in BPBM, # 4855). Paralectotypes: 1 ♀, on the same mount as lectotype, “paralectotype = ♀, det. Asche, 1984”; 1 ♀, same data as lectotype. Both in BPBM.

Additional material examined. 1 ♂, Philippine Islands: Luzon, Camarines Sur, Mt. Isarog, Pili, 800–900 m, 12.iv.1965; 1 ♀, *ibid.*, 500 m, 4.iv.1963; both: H. M. Torrevillas leg. 2 ♂♂, 1 ♀, *ibid.*, Los Baños, Baker leg. 1 ♀, Negros, Negros Or., Mt. Talinas, 900 m, in rainforest, 29.vi.1958, H. E. Milliron leg.. All in BPBM.

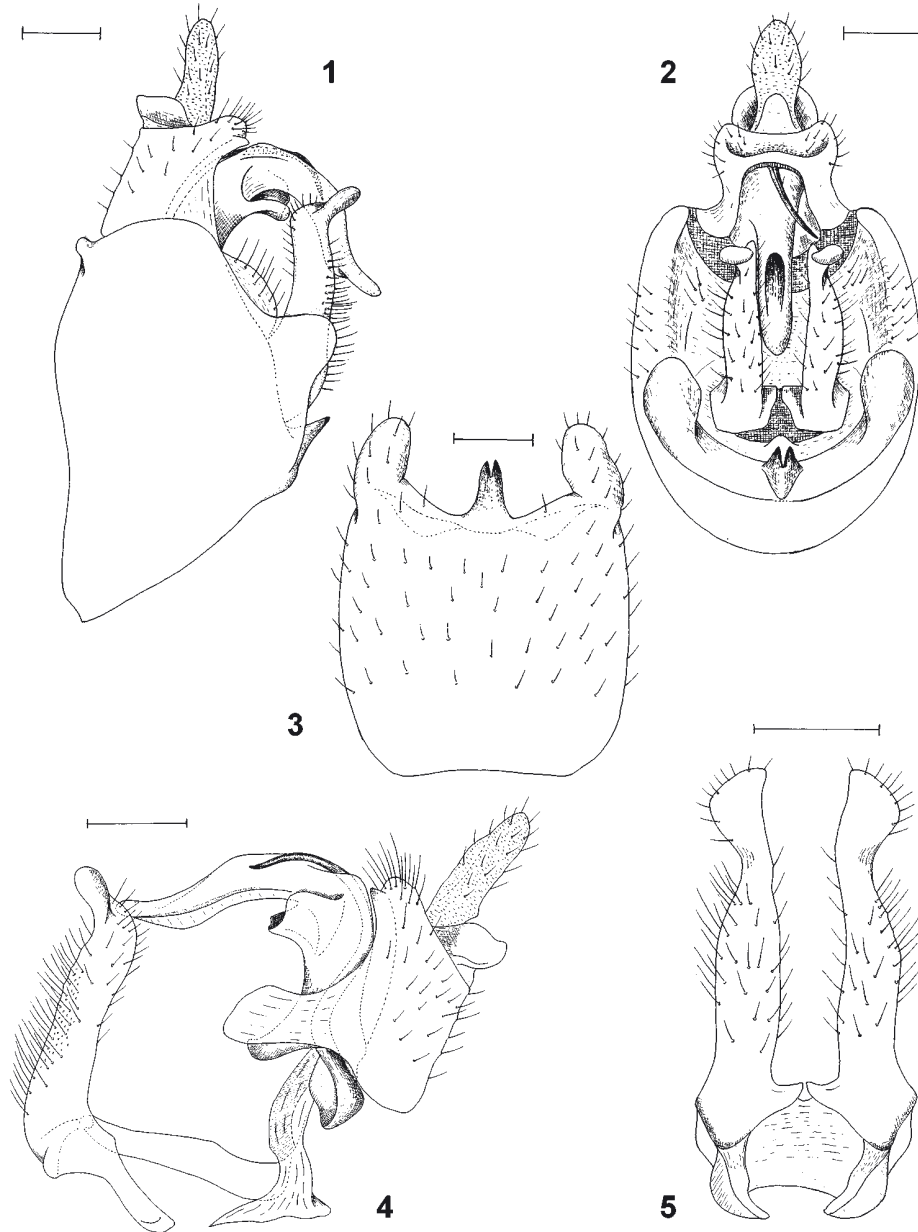
Supplementary description. The colouration of body and tegmina has been excellently documented by MUIR (1915: 317–318). For structure and proportions of head and thorax including antennae, tegmina, wings and legs see the generic diagnosis.

Male genitalia. Genital segment in lateral aspect trapezoidal, ventrally about 2.4 times longer than dorsally; laterodorsal margin evenly convex, lateroventral margin on each side projected into a distinct bulbus; medioventral margin with a slender, apically bifid process; lateral margins rounded towards diaphragm, the latter covering more than two thirds of the caudal surface; dorsal margin of diaphragm concave, foramen for parameres broadly oval with a small triangular median projection at the ventral margin; laterocaudal margin of genital segment and dorsolateral part of diaphragm with distinct setae. Anal segment relatively short, about 1.5 times longer than wide, subcylindrical with ventral surface membranous and concave, ventrocaudally on each side slightly projected, ventrobasally on each side arm-like expanded and ventrally embracing the aedeagal base; anal segment furnished with numerous strong setae, especially at ventrocaudal margin; anal style slightly shorter than anal segment. Shaft of aedeagus slightly twisted at base, at about mid-length subrectangularly bent ventrally; basal part strongly sclerotized and voluminous, on inner ventral side a sturdy, concave socket; distal part slender, in lateral aspect slightly sinuate, phallosome subapically on caudal side; in right lateral aspect a slender, terete spine dorsally emerging from a deep furrow and curved ventrally to the right side of aedeagus, not surpassing half the length of the bent distal part. Parameres elongate, distally attaining base of anal segment; in ventrocaudal aspect inner margin straight, outer margin slightly convex, distally produced into a short lobe-like projection which is directed laterocaudally.

Female genitalia. Ovipositor short and sturdy, not reaching the base of the anal segment; gonapophyses IX strongly dilated, dorsoventrally flattened at base, at about midlength narrowing and sides bent dorsally causing a distinct edge, distal sides of gonapophyses IX laterally compressed with excessive wax production. Valvifers VIII slender, widening at base, inner basal margins touching each other. Anal segment very short, about 3 times wider than long, slightly depressed; anal style little longer than anal segment, lanceolate with ventral surface slightly concave.

Measurements. Body length: males (n=3): 3.8–4.4 mm, females (n=3): 4.7–5.0 mm.

Differential diagnosis. *Lanaphora bakeri* is similar in most characters to *L. paveli* sp.nov. from New Guinea described below but differs considerably in the following



Figs 1–5. *Lanaphora bakeri* Muir. 1 – male genitalia, left lateral aspect; 2 – male genitalia, ventrocaudal aspect; 3 – male genital segment, ventral aspect; 4 – male anal segment, aedeagus complex and parameres, right lateral aspect; 5 – parameres, ventrocaudal aspect. Scale bar 0.1 mm.

details: Colouration of *L. paveli* predominantly orange to light brown, scape anteriorly nearly entirely orange. Male genital segment ventrally with distinct laterocaudal bulbous projections, medioventral process rather slender and only terminally bifid. Parameres attaining lower margin of the anal segment. Aedeagus at level of bending ventrally with a sturdy concave socket, aedeagal spine not surpassing mid-length of distal part.

Distribution. Philippine Islands: Luzon (MUIR 1915, 1916), Negros (new record).

Host plant and ecology. In the original description MUIR (1915: 318) reports that the specimens he examined were “living at base of leaf-sheath of bamboos among a white, flocculent secretion”. According to label information of additional specimens examined here they were collected in elevations between 500 and 900 m, the female from Negros in a rainforest.

Remarks. This species was named by Muir in honour of the American botanist and entomologist Charles Fuller Baker (1872–1927) who that time was employed at the College of Agriculture of the University of the Philippines in Los Baños, Luzon. Baker himself worked mainly on Cicadelloidea, but in his later years also on Fulgoroidea. Baker did extensive field work in the Philippines and other parts of South East Asia, and generously provided colleague specialists like Frederick Muir with valuable specimens. Baker had observed and collected the first *Lanaphora* specimens in the Mount Maquilang area and shared this information with Muir (see MUIR 1915: 318).

***Lanaphora paveli* sp.nov.**

(Figs 6–10, 15–17)

Type material. Holotype ♂ (macropterous), Papua New Guinea, Simbu P. Karimui, 1100 m, on young shoots of *Bambusa* sp., heavy infestation, 10.v.1984, I.W. Ismay leg. (deposited in BMNH). Paratypes: 1 ♂, 3 ♀♀, same data as holotype (BMNH); 2 ♂♂, 3 ♀♀, Papua New Guinea, NE, Tapo (= Tapu), 3 km NW of Kainatu, 1650 m, 22.x.1959, T. C. Maa leg. (BPBM).

Description. Coloration. Very lightly coloured species, yellow to whitish, with orange to brown sprinkles or marks, especially on head, antennae, tegmina and legs. Vertex including carinae white except for a narrow blackish brown infuscation at the posterior ridges of lateral carinae caused by a dark brown stripe on the sides above compound eyes. Frons white to pale yellow, foliate lateral carinae white with 4 narrow brown stripes on outer sides. Post- and anteclypeus pale yellow. Antennal joints with ground color white; scape anteriorly from upper base to lower middle a narrow oblique dark brown to blackish stripe, distal tip anteriorly orange-brown; pedicel in proximal half white with a narrow oblique dark brown ring, in distal half sordid brown. Rostrum with a brown tip. Genae and head laterally anteriorly and dorsally of compound eyes white. Pronotum white with orange patches behind compound eyes and between lateral and median carinae. Mesonotum orange-white with brown marks at the anterior and posterior end of the lateral carinae; tip of scutellum with a narrow transverse brown band. Tegulae white. Tegmina translucent, slightly opaque; veins and pustules on veins concolorous, between the pustules numerous more or less extended brown spots; in about mid-length of anterior part before nodal line between ScR and Cu1 an extended brown-orange marking which forms a nearly closed circle towards Cu1; at level of nodal line from the outer discoidal

cell towards inner margin an oblique brown-orange stripe; in distal part between M1 and M2 a longitudinal brown mark; all marginal veins from Sc1 towards Cu1a with a brown fringe. Hind wings translucent, veins sordid brown. Legs white to pale yellow, tibiae with 2–3 narrow ring-like brown marks, fore- and middle tarsi brown. Abdominal tergites brown, sternites in males pale brown, in females white. Male genitalia with genital segment yellowish except for a black medioventral process; anal segment and anal style pale yellow; parameres and aedeagus melichrous. Female genitalia with ovipositor and anal segment pale yellow, anal style whitish.

Structure. Head including compound eyes 0.6 times narrower than pronotum. Vertex narrow, subtriangular, posterior margin 1.25 times wider than long in midline and 2.15 times wider than anterior margin; lateral margins strongly ridged, foliate; median carina and limited compartments absent, area of vertex deeply concave, limitation towards frons v-shaped with a ridged transverse carina. Frons slender, very narrow at apex, widening towards frontoclypeal suture, medially about 2.6 times longer than wide at base and about 1.25 times longer than post- and anteclypeus together; lateral frontal carinae strongly foliately ridged, over most of their length slightly convex, almost straight, only in lower part close to frontoclypeal suture distinctly diverging; median frontal carina ridged and weakly forked at apex; frontal surface shallowly concave. Postclypeus vaulted, lateral and median carinae sharply ridged; anteclypeus rounded, devoid of lateral carinae, median carina faintly visible in upper part. Antennal joints elongate, almost equally long; scape compressed, anteriorly and posteriorly slightly concave with upper and lower margin roundly ridged, distally expanding: about twice as wide than at base; pedicel terete, distal half covered with about 25 sensory plaques, irregularly arranged. Genae convex, oblique carina ridged, vanishing towards antennal base. Compound eyes flat kidney-shaped with a deep incision for the upper antennal base; ocelli relatively small. Pronotum about as wide as mesonotum; carinae strongly ridged; lateral carinae straight, diverging, attaining posterior margin; surface of disk concave. Mesonotum in midline about 5 times longer than pronotum, disk only slightly vaulted, almost plain; lateral carinae nearly straight, diverging, at posterior end slightly curved laterally, vanishing in a swelling and not reaching posterior margin; median carina mostly ridged, fading at anterior end of scutellum, then strongly ridged towards posterior tip. Tegulae well developed. Tegmina elongate, narrow at base, widening towards apex, about 3 times as long as maximally wide, widest at level of Cu1a; nodal line in about mid-length of tegmen; inner discoidal cell distinctly larger than outer one; hind margin slightly undulate with a pointed tip at level of M1; inner margin of clavus at level of entry of common branch of claval veins foliately ridged; veins slightly prominent, beset with numerous very fine callous pustules, however devoid of setae or bristles. Legs slender, fore- and middle femora and tibiae slightly compressed; post-tibiae about 1.4 times longer than post-tarsal joints together, subquadrangular in cross-section with strongly developed longitudinal rims, enclosed surface slightly concave; laterally with 2 small spines, distally with 3 sturdy outer and 2 smaller inner teeth; post-basitarsus distally with 6 teeth in an even row, 2nd post-tarsal joint distally with 4 small teeth in a row; post-tibial spur about 0.7 times shorter than post-basitarsus, surface vaulted but slightly flattened, devoid of marginal teeth, numerous fine setae at inner margin.

Male genitalia. Genital segment trapezoidal with laterodorsal margin broadly rounded, ventrally about 3.3 times longer than dorsally, lateroventrally on each side a small subtriangular but rounded projection, ventrocaudal margin medially furnished with a broad and sturdy deeply bifurcate process; diaphragm covering about two thirds of the caudal surface, dorsal margin deeply emarginate; foramen for parameres flat ovate; laterocaudal margins of pygofer opening smoothly rounded medially and beset with sturdy bristles, diaphragm only little sunk cephally. Anal segment relatively short, tubular with ventral surface concave and membranous, about 1.4 times longer than wide, ventrocaudally slightly projected, rounded, ventrobasally projected into membranous arms embracing the aedeagal base; anal style lanceolate, about 0.4 times smaller than anal segment. Shaft of aedeagus at one third of its length measured from base abruptly bent ventrally in an almost right angle; on the ventral right side of bend, a small semi-shell-like projection; dorsally on the right side a slender curved spine emerging from a deep furrow which nearly parallels direction of bent aedeagus and reaches to half-length of its distal part; the latter on the right side nearly over the whole length with a narrow, slightly sinuate rim; phallotreme subapically on the caudal side. Parameres slender and extremely elongate, attaining (in repose even surpassing) the ventrocaudal margin of the anal segment, in ventral aspect slightly sinuate, broad at base with a small hook-like process, distally narrowing and converging, apically diverging and dilated with truncate tip pointing laterally.

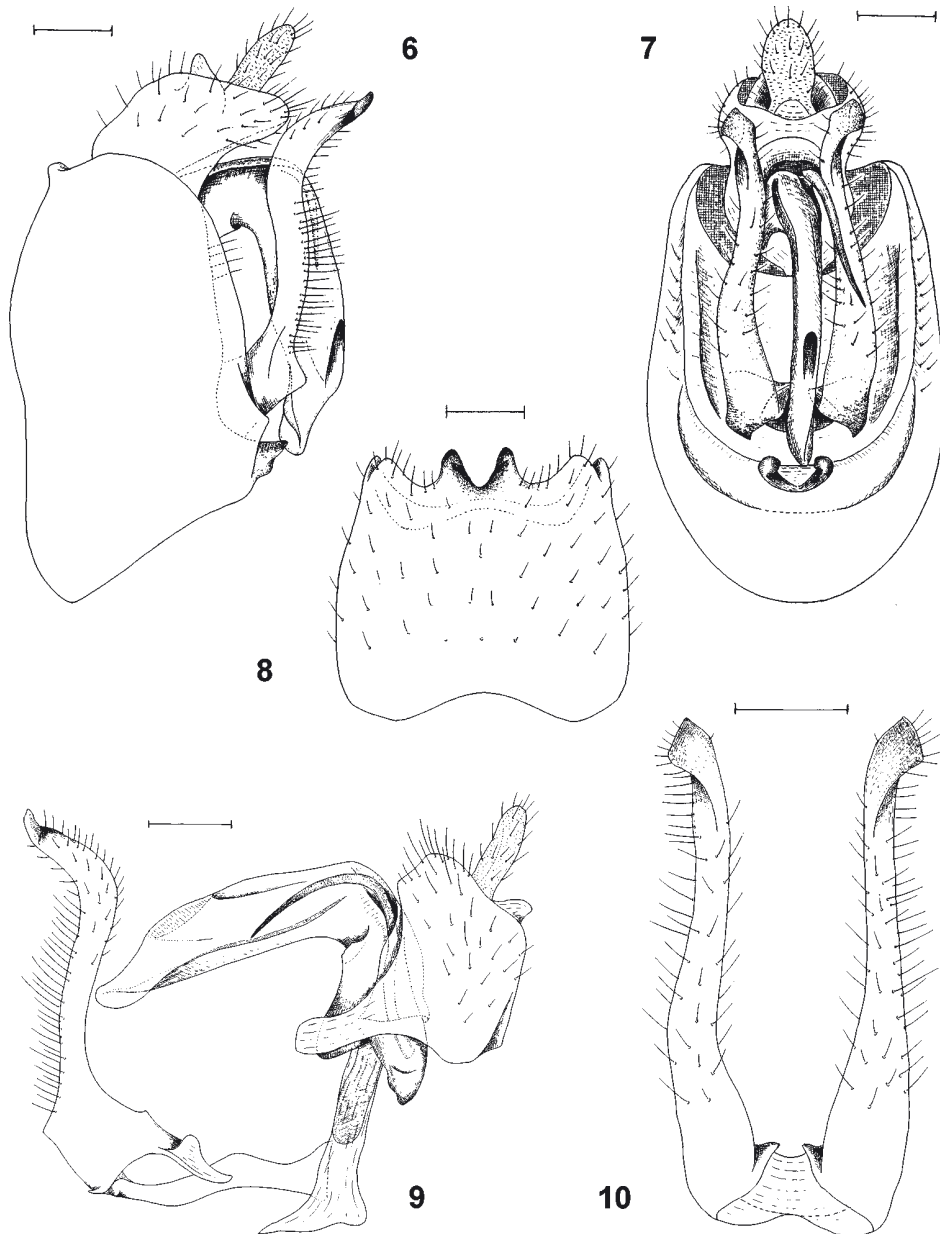
Female genitalia very similar to those of *L. bakeri*. Valvifers VIII relatively broad, dilated at base, base medially with lip-like projection.

Measurements. Body length: males (n= 4): 4.4–4.6 mm, females (n=6): 4.9–5.1 mm.

Differential diagnosis. *Lanaphora paveli* sp.nov. can be distinguished from *L. bakeri* by the following external and genitalic characters: scape of antenna anteriorly whitish with a narrow oblique dark brown stripe (versus yellowish with a broad orange-brown band in *L. bakeri*), tegmina in anterior half with an extended dark brown spot almost forming a circle (versus only brown patches without such circle in *L. bakeri*), male genital segment ventrolaterally with a small subtriangular projection (versus a distinct bulbous projection in *L. bakeri*), ventrocaudal margin of genital segment medially with a very broad and deeply bifurcate process (versus a narrow and only apically bifid process in *L. paveli*), anal segment ventrocaudally broadly rounded (versus with small projections on each side in *L. paveli*), aedeagus ventrally on the right side at level of bending with a small husk-like projection (versus a sturdy socket in *L. paveli*), aedeagal spine reaching mid-length of distal part (versus not reaching mid-length in *L. paveli*), parameres in repose attaining or surpassing ventrocaudal margin of anal segment (versus not attaining or surpassing this margin in *L. bakeri*), in ventrocaudal aspect median margin of parameres distinctly concave (versus straight in *L. paveli*).

Etymology. This species is named in honour of the Czech entomologist Pavel Lauterer as an expression of sincere respect for his life-time achievements in taxonomy and faunistics of Auchenorrhyncha as well as of Psylloidea.

Distribution. Papua New Guinea.



Figs 6–10. *Lanaphora paveli* sp.nov. 6 – male genitalia, left lateral aspect; 7 – male genitalia, ventrocaudal aspect; 8 – male genital segment, ventral aspect; 9 – anal segment, aedeagus complex and parameres, right lateral aspect; 10 – parameres, ventrocaudal aspect. Scale bar 0.1 mm.

Hostplants and ecology. Largely unknown. According to label information collected on *Bambusa* sp. (Bambusaceae).

Remarks. The wide overlap in bodily configuration and apparently host plant association (bamboo-feeders) suggests that *L. paveli* and *L. bakeri* are closely related. The geographic range of each of these species, *L. bakeri* occurring in the Philippine islands of Luzon and Negros, *L. paveli* sp.nov. in Papua New Guinea, shows a considerable allopatric distribution. Despite of intensive fieldwork in many regions of South East Asia carried out from the 1960s to date by many entomologists, e.g. of the Bishop Museum Honolulu, no further specimens have become available. This is even more surprising as apparently *Lanaphora* species seem to be locally quite abundant (“heavy infestation” on Bamboo-shoots in New Guinea, according to label information). As *Lanaphora* species appear to cause damage to bamboo, their potential pest status should be assessed. It is expected that in the course of future field-work with focus on bamboo-feeders the geographic range of these two species will expand, and possibly even more *Lanaphora* species will be discovered.

***Lanaphora* sp.**

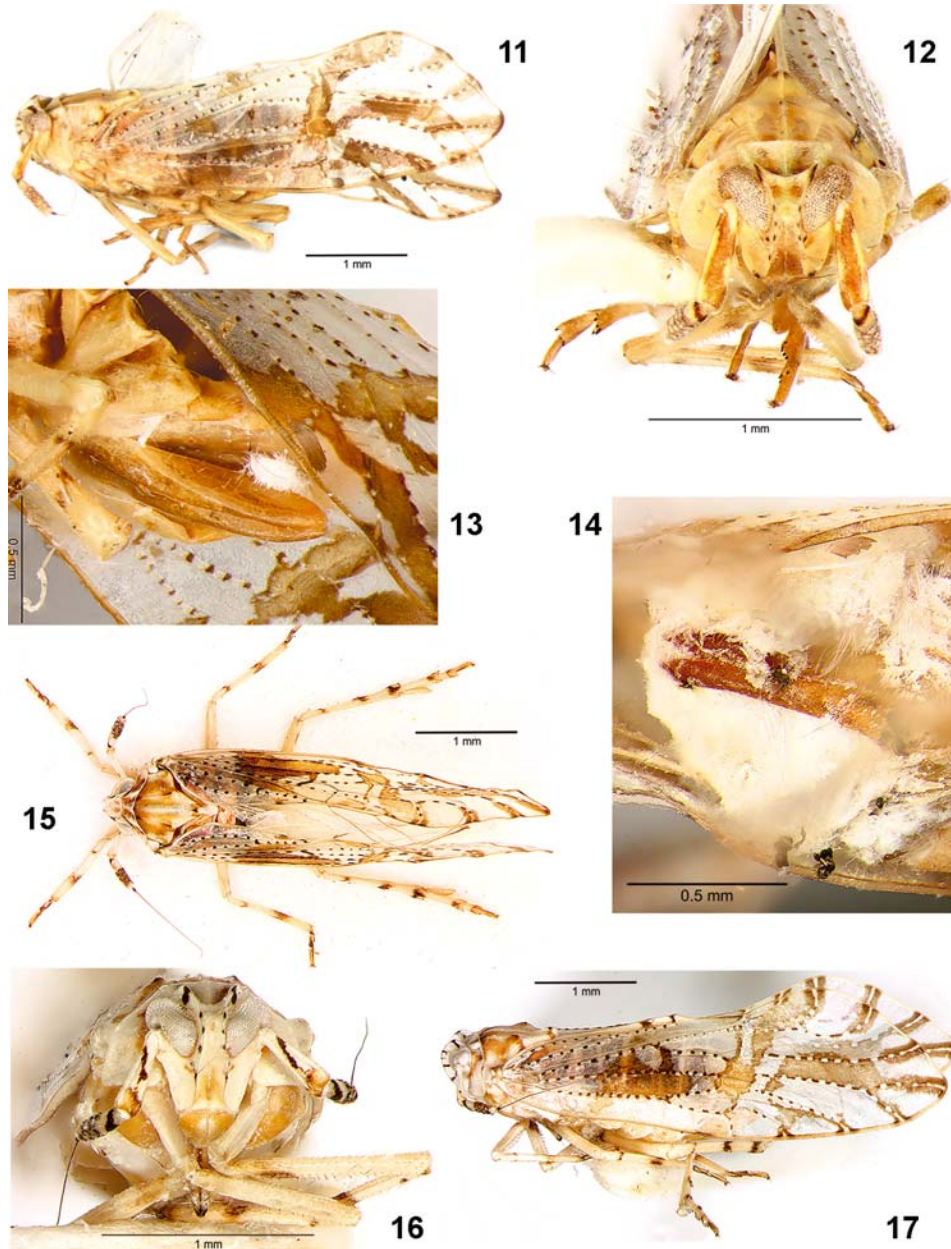
Material examined. 1 ♀, Solomon Islands: Bougainville (S.), Fokure, 680 m, 13.vi.1956, E. J. Ford Jr. leg. (BPBM).

Remarks. A single female specimen from the Solomon Islands: Bougainville was found in the collections of the Bishop Museum, Honolulu which is congeneric with *L. bakeri* and *L. paveli* sp.nov.; however, this individual is partly damaged and therefore not illustrated here. It differs from *L. paveli* sp.nov. by displaying an extended and continuous blackish stripe on the anterior side of the dilated antennal scape (oblique, short and narrow in *L. paveli*). Body length: 4.9 mm. It is very likely a new species; however, I shall refrain from describing it until more material, preferably including males, becomes available.

Acknowledgements

In the first place I wish to thank Igor Malenovsky from the Moravian Museum in Brno for inviting my contribution to this festschrift for Pavel Lauterer and Jaroslav Stehlík. The late Wayne Gagné, Bishop Museum, Honolulu, who made the type material of *Lanaphora bakeri* accessible already in the mid 1980s when I was still working on my PhD thesis on the phylogeny of Delphacidae deserves my sincere thanks and memory. I also thank Gordon M. Nishida, formerly Bishop Museum, Honolulu, Michael D. Webb, the Natural History Museum, London, and Michael R. Wilson, National Museum and Galleries of Wales, Cardiff, for arranging loans of further *Lanaphora* specimens. I am very grateful to Manfred Uhlig, Museum für Naturkunde, Berlin for providing and processing the color images, and to Charles R. Bartlett, University of Delaware, Newark for his constructive comments on the manuscript. Thanks also to my dear wife Hannelore Hoch who accompanied this paper all along its way.

New species of *Lanaphora* Muir



Figs 11–17. 11–14 – *Lanaphora bakeri* Muir. 11 – habitus, left lateral aspect; 12 – frontal aspect; 13 – ovipositor, left lateral aspect; 14 – ovipositor with excessive wax secretion at the gonapophyses IX, left lateral aspect. 15–17 – *Lanaphora paveli* sp.nov. 15 – habitus, dorsal aspect; 16 – frontal aspect; 17 – habitus, left lateral aspect.

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