

**A new subfamily, genus and species of Delphacidae
from South America: Plesiodelphacinae
subfam. nov., Plesiodelphax guayanus
gen. et spec. nov. (Homoptera Fulgoroidea)**

With 14 figs.

by

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Key-words: Homoptera, Auchenorrhyncha (Cicadina), Fulgoroidea, Delphacidae, Plesiodelphacinae, Plesiodelphax guayanus, Burnilia, systematics, taxonomy, phylogeny, Neotropis, South-America: French Guayana, Brazil

Abstract:

Plesiodelphax guayanus, a new delphacid-species from South America, is described. The examination of the δ -genitalia (central-part of aedeagus conspicuously sclerotized), of the drumming organ (long vertically erected apodemes of the 2. abdominal sternite), of the vertex-carination (inverted Y) of the hind-basitarsus (apical spinulation similar like in Ugyopini, but convergently evolved) and of the hind-wing-venation (M + Cu partly fused) revealed a certain conformity with the neotropical genus Burnilia MUIR & GIFFARD, 1924, but remarkable differences in the detailed shape of the δ -genitalia

and the proportions of the frons, thus a new genus is established: Plesiodelphax gen. nov. assumed to be sister-group of Burnilia, both together forming a monophyletic unit by means of apparently synapomorphic characters such as spinulation of hind-basitarsus, hind-wing venation and shape of the vertex. The special combination of plesiomorphic and commonly derived characters does not allow to place these two genera into one of the known suprageneric groups within Delphacidae in the new definition by ASCHE & REMANE 1982. As they mediate between two different evolutionary platforms - the level of Kelisiinae/Stenocraninae and the level of Delphacinae - it seems advisable to establish a new subfamily Plesiodelphacinae subfam. nov. (type-genus: Plesiodelphax gen. nov.)

INTRODUCTION:

Checking non-identified delphacid-material from South America kindly lent to me by Drs. R. Cobben, Wageningen, The Netherlands, and R. Poggi, Genova Museum (Nat. Hist.) Italy, two males of a slender, light brownish species - in body-shape slightly resembling Saccharosydne - could be found: the one from French Guayana, the other from the southwestern border between Brazil and Bolivia. Studying the morphological organisation of this species it turned out that there are obviously no closer relations to Saccharosydne, but remarkable conformities with species out of the neotropical genus Burnilia MUIR & GIFFARD, 1924, for instance in the shape of the hindlegs including posttibial-spur, wings, genital structures in general construction and drumming organ. However, according to literature (e.g. MUIR 1926, FENNAH 1945, 1959, CRAWFORD 1914, CALDWELL & MARTORELL, 1951) and own investigations this species could not be ascertained to be identical with one of the Burnilia-species described. Moreover it does not entirely perform the criterion published for Burnilia by MUIR & GIFFARD 1924, it differs from the type-species Burnilia pictifrons (STÅL, 1864)¹ in several relevant structures and proportions (for instance proportion of

1) Burnilia pictifrons (STÅL) has been wrongly interpreted in literature: a revisional survey of the whole genus is on work by the author.

frons, special shape of pygofer, shape and direction of aedeagus), thus doubts concerning its placement into Burnilia seem to be appropriate.

Unfortunately the delphacid-fauna of the neotropical region is only roughly investigated. Considering that reliable information published about neotropical delphacids is still very limited and that our knowledge about a pile of "old" species (e.g. described by BERG, STÅL etc. and never figured) is insufficient till nowadays, authors - of course - should be warned to be very careful and reserved in establishing new taxa from this region without clearing up the situation before. Nevertheless, in this case the special characters of this delphacid are that unique and important for phylogenetic conclusions within the whole family that I do not hesitate to describe it as a new species, and furthermore to erect a new genus for it in order to make it available. Most probably the new genus and Burnilia form together a monophyletic group by means of synapomorphic characters (see discussion on page 226), but by its special combination of characters in comparison with the characteristics of the suprageneric groups of Delphacidae as phylogenetically redefined by ASCHE & REMANE 1982 no placement is permitted by the lack of commonly derived characters, thus it seems to be required to establish even a new subfamily for this group as discussed below.

Plesiodelphax gen. nov.

Diagnosis

Moderate sized, very slender, ± uniformly brownish or testaceous, rather long-legged delphacids with narrow head and frons, and conspicuously protruded vertex. Width of head incl. eyes same as length of vertex in middle line. Vertex (fig. 1) about 1/3 of its total length projecting beyond the anterior margins of eyes, very narrow:

length about 3,5 times the width at base; carinae on vertex prominent, shaped like in Burnilia: inverted Y; only at base of vertex a very weak, almost extinct median carina; area of vertex concave; stem of Y-carina leading across a bulging part at apex into a simple, non-furcated, sharp-edged median carina of frons. Frons (fig. 2) like a slender trapezoid, with \pm straight side-margins, base 2,5 times the width at apex, height 3 times the width at base and 7,6 times the width at apex; areas of frons slightly concave or almost plain. Suture between frons and postclypeus deeply notched. Median carina of postclypeus at base prominent like a nose. Anteclypeus rounded, median carina almost extinct. Rostrum reaching behind the middle coxae.

Antennae terete; 2. segment slightly conical at apex, 3 times the length of 1. segment; 1. segment double as long as broad; numerous antennal sensorial pits \pm irregularly arranged. Genae (fig.3) with sharp-edged transverse carina ending in a swelling beneath the antenna base. Eyes in lateral view kidney-shaped, relatively small; lateral ocellus distinct. Pronotum (fig.4) almost same length in middle as vertex, conspicuously broader than head; posterior margin slightly emarginated; tricarinate; carinae sharp-edged, dorsal area between carinae \pm plain; lateral carinae \pm arcuate, reaching the hind margin; sides of pronotum with 4-5 cross-ribs. Scutellum (fig.4) in middle as long as vertex, tricarinate, carinae distinct, almost straight, the lateral ones slightly diverging to posterior margin, reaching the margin; median carina shortly before reaching the apex of scutellum extinct; areas lateral of carinae trough-shaped concave. Laterotergites 4-6 rectangular, outer margin straight, sharp-edged, sternal sensorial bristles located ventrally on corresponding sternites. Legs long and slender; hind legs (fig.5) outer edge of tibia with 2 short stiff spines, the one almost at base, the other in middle of its length; tibia distally with 5 stiff spines (grouped: 2 inner side, 3 outer side); basitarsus distally 5 spines, the median

one not in row, but located a little bit basad (similar to the configuration found in Ugyopini); 2. segment of tarsus with 4 spines at apex: 3 inner side, 1 outer side; basitarsus about 1,8 times the length of 2 and 3. tarsal-segments together, and about 1,7 times the length of posttibial-spur. Posttibial-spur (fig. 5) alike those of Alohini MUIR: \pm circular in cross-section, bearing a median row of 12-13 distinctly inserting conical teeth incl. distal tooth. Tegmina (fig. 4a) hyalin or semihyalin, rather long and slender: length 4,9 times the width, surpassing the distal end of abdomen about half of their total length; proximal part till node-line about 1,6 times the length of distal part; clavus-suture leading acute-angled into inner margin. Wings (fig. 4b) hyalin, media and cubitus approached at base and then distally fused (like in Burnilia, most of the Tropidocephalini and Saccharosydniini), the first anal vein is present.

Drumming-organ (fig. 6) like in higher derived delphacids with elongated vertically erected apodemes of abdominal sternite 2. δ -genitalia (fig. 7-13): pygofer in lateral view irregularly trapezoid-shaped, in caudal view longish compress, oval; rather high and especially dorsally long; height about double the length of ventral side; dorsal edges of pygofer shortly protruded, latero-dorsal angles (fig. 10) beneath of them each conspicuously produced caudad, distally bended mediad. Diaphragm remarkably extended, covering almost entirely the caudal area of genital segment, reaching till the laterodorsal angles of pygofer, against the side margins of pygofer a little caudad protruded, slightly convex. Opening for aedeagus directly beneath the anal segment. Anal segment subcylindrical, about twice as long as broad, without appendages; anal-style rather long: as long or longer than anal segment. Genital styles simple, \pm straight in caudal view, parallel to diaphragm dorsocaudad erected. Aedeagus (fig. 11-13) rather long, cylindrical, distally directed ventrad; central part still well developed: con-

spicuously and entirely sclerotized, bended like an irregular S.; distal half completely covered by a \pm voluminous periandrium (theca); periandrium at base like a bowl-shaped ring connected \pm immediately with the ventral margin of the anal segment, no distinct suspensorium; at inner flanks each a wing-like apodeme directed cephalad. "Chamber" and "wings" at base of aedeagus (for terminology see MUIR 1926 g) rather voluminous; connective short, at middle bended rectangularly caudad.

Type-species: Plesiodelphax guayanus nov. spec.

Plesiodelphax guayanus nov. spec.

Body-shape and -proportions, characters of head, pronotum, scutellum, laterotergites, legs and pøsttibial-spur, tegmina and wings and general features of δ -genitalia like indicated in genus diagnosis.

Male, macropterous, length: 5,6 mm, tegmen: 4,6 mm: Female unknown.

δ -genitalia (figs. 7-13): Genital segment in caudal view 1,0 times higher than broad, in lateral view: height about 1,9 times the ventral length, about same distance of height and dorsal (maximal) length; dorsal side high-semicircularly emarginated: ventral margin of pygofer flat quarter circularly emarginated, at base of emargination two very short edges; the dorsolateral angles of pygofer each form a very short stout pin, mesoventrally of these the pygofer is remarkably produced caudad into a long, slender, finger-like process on each side, which is bended medioventrad. at apex \pm touching each other.

Diaphragm very extensive, covering almost completely the caudal area

of genital segment, slightly convex with longitudinal media carina; in ventral quarter above the cross-oval opening for the styles along the middle line on each side two short protuberances; dorsal margin of diaphragm beneath the opening for the aedeagus strongly developed; beneath the dorsolateral finger-like processes of pygofer a tongue-like process of diaphragm is expanded dorsad, at apex deeply semi-circularly emarginated; at base of the tongue on each side a flat sickle-shaped protuberance. Anal segment about the same length as ventral side of pygofer, apex medioventrally slightly bill-shaped produced; ventral side concave, $\frac{1}{2}$ membranous except apical portion of distal ring. Genital styles in lateral view slightly curved, in caudal view $\frac{1}{2}$ straight, apical portion somewhat broadened at apex leading to the middle obliquely truncate, oblique margin on inner side ending in a short pointed edge. Aedeagus slender, cylindrical; central part fully chitinized; phallosome apical; aedeagus shortly before apex $\frac{1}{2}$ rectangularly bended ventrad; central part at periandrium - base abruptly rectangularly bended ventrad, then - about $\frac{1}{3}$ before reaching its base - again rectangularly bended cephalad. Periandrium relatively voluminous, slightly compress; ventrally stronger chitinized, dorsally $\frac{1}{2}$ membranous, basally changing into a large bowl-shaped ring, which is more or less attached to the ventral base of the anal segment. Periandrium on ventral side from middle to its length basad with two longitudinal keels. Central part of aedeagus between median and basal bend on both sides enlarged. Connective broadly fused with chamber, short, in middle rectangularly bended caudad.

Coloration δ : body and wings $\frac{1}{2}$ stramineous; postclypeus light yellowish; angle between transverse carina of genae and lateral keels of frons vermilion, in front of eyes following the outline a narrow redish stripe; swelling beneath the antennal base whitish. Antennae stramineous, both segments distally brownish. Flanks of pronotum between yellowish ribs brownish. Legs yellowish with brownish spots.

at distal end of femora and tibiae. Pro- and mesotarsi: 1. and 2. segment brown, 3. segment stramineous, but distally darkened. Hind-tarsi and spur stramineous, spines incl. those of posttibial-spur black-tipped. Tegmina uniformly stramineous, \pm semihyalin, veins concolorous; wings \pm hyalin, veins brownish, δ genitalia brownish-yellow, analstyle pale yellow.

Type-Material

Holotype: δ macropterous; Brazil, southwestern border to Bolivia; Porto 14 de Mayo; G. Boggiani X. 1896; in coll. Museo Civico di Storia Naturale, Genova, Italy.

Paratype: 1 δ macropterous; French Guayana, Cayenne, Lamp. V. 1960. R.A.A. Oldeman; in coll. R. Cobben, Landbouwhogeschool Wageningen, The Netherlands.

In this specimen the hindlegs are missing, tegmina and wings are badly damaged.

Discussion

As mentioned introductory *Plesiodelphax* gen. nov. and *Burnilia* MUIR & GIFFARD 1924 show certain similarities in some characters. Conformities can be found in the shape of vertex (carinae forming an inverted Y), in the spinulation of hind-basitarsi, in the form of posttibial-spur, in the venation of the wings, in the shape of drumming organ and in the δ -genitalia in general construction (central part of aedeagus entirely sclerotized, genital segment caudally covered with rather high diaphragm). Main differences between the two genera could be ascertained

1.) in proportions of frons: in *Burnilia* the height (measured in middleline) is about 3 times the width at apex and about 1,5 times the width at base while in *Plesiodelphax* the corresponding proportions are 7,6:1 resp. 3:1. - 2.) in the special shape of the δ -genitalia: the genital segment in *Burnilia* is more complicated than in *Plesiodelphax*: in *Burnilia* the ventral margin of pygofer is caudally pro-

duced into at least one, in some species two long spine-like processes; additional caudodorsad directed spines originating in diaphragm and in some species remarkably long developed are found in all Burnilia-species known so far. In Plesiodelphax no corresponding spines are developed: the ventral margin is not protruded caudally like in Burnilia, but \pm semicircularly emarginated; in diaphragm only very weak protuberances can be seen. In Burnilia the dorsal side of pygofer is almost completely semicircularly emarginated: the dorsal wall is reduced to a very small ring; the whole area is covered by a rather large and elongated anal segment (about 3 times as long as broad). In Plesiodelphax the dorsal side is not that deeply emarginated, the anal-segment is only about double as long as broad. In Burnilia a well chitinized spatula-like plate is leading as a prolongation of the diaphragm internally of pygofer cephalad possibly functioning as a guidance for the aedeagus. In Plesiodelphax such a structure could not be found. In Burnilia the aedeagus is very slender and simply bended dorsad, phallotrema - as far as examined - located subapical on the left side; the periandrium is very thin-walled, membraneous and \pm attached to the chitinized central-part.

In Plesiodelphax the aedeagus is more voluminous, especially the periandrium, which is partly well sclerotized, distally bended ventrad, phallotrema located apical and directed ventrad; base of periandrium strongly developed (bowl-shaped ring) with wing-like appendages leading cephalad (not present in Burnilia).-

Now how to interpret the phenetic similarities between Burnilia and Plesiodelphax gen. nov., and where to place them into the phylogenetic system of Delphacidae as developed by ASCHE & REMANE 1982 by cladistic analysis? In order to verify any phylogenetic relationship between the two genera it was necessary to value their characters (used hitherto only for diagnostic purposes) in comparison with the morphological organisation of other delphacids. First has to be mentioned that both genera still possess an aedeagus with an entirely chitinized, till apex rather thick-walled central-part as can be found principally in the same way of organisation in Cixiidae and the phylogenetically lower groups of Delphacidae,

i.e. Asiracinae, Kelisiinae and Stenocraninae. Within all higher derived Delphacidae comprising more than 80 % of all species the central part consists of a non -sclerotized thin-walled tube. That means concerning this character Burnilia and Plesiodelphax gen. nov. both still show the plesiomorphic configuration, thus this character cannot be used for proving closer relations between them.

Different conclusions could be settled in valuing the shape of vertex, spinulation of hind-basitarsus and wing-venation. The special configuration of carinae on vertex forming an inverted Y could be found in other delphacids similar to a certain extent in the genus Saccharosydne KIRK., 1907. However, as Saccharosydne belongs to a completely different morphological group representing a higher evolutionary level than Burnilia and Plesiodelphax gen. nov., and, moreover, as the two other genera of Saccharosydniini, Neomalaxa MUIR, 1918, and Pseudomacrocorupha MUIR, 1930, show a quite "normal" carination of vertex, it seems more probable that Saccharosydne has developed this type of carination convergently.

However, for Burnilia and Plesiodelphax gen. nov. this special shape of vertex could be considered as commonly derived, i.e. synapomorphous. The same valuation can be assumed for the spinulation of the distal end of hind-basitarsus, similar shaped only in the Ugyopini, but by means of other characters (e.g. drumming organ and wings) certainly convergently evolved. It must be considered probable that also the wing-venation (fusion of media and cubitus) is commonly derived in Burnilia and Plesiodelphax gen. nov..

Similar, but not entirely identical configurations could be found in Tropidocephalini (partim), Saccharosydniini and the genus Litemixia ASCHE, 1980, the latter belonging to the large "modern" group of Delphacini having evolved "oviduct-glands" (for morphology and function see STRÜBING 1956). In consideration of their morphological differences in other characters and of the simplicity of the wing-character it is assumed that almost the same type of venation is developed independently in all those groups maybe by means of reductive tendencies. - Even more difficult to judge are the shape of the posttibial-spur and the special configuration

of the δ -genitalia in Burnilia and Plesiodelphax gen. nov.. Similarly built posttibial-spurs can be found for instance in the pacific Alohini MUIR, a most likely artificial group, and in the New World-genera Stobaera STAL, 1859, Sparnia STAL, 1862 and Synpteron MUIR, 1926.¹⁾ All those groups cannot be assessed to be closer related to Burnilia and Plesiodelphax gen. nov. by means of differences in several characters, especially of the genitalia. Maybe that the "alohinoid" type of posttibial-spur was evolved several times convergently, possibly in correlation with special substrates on which those species live, e.g. shrubs and trees. On the other hand cannot be excluded that Burnilia and Plesiodelphax gen. nov. have developed their type of spur on the basis of a "kelisoid" spur which is similar, but not identical. Difficult to state are also decisions concerning the evolutionary line of genital structures within the two genera. The relatively long anal segment may be interpreted as symplesiomorphous, as this is basically found in lower derived delphacids. The very highly dorsad reaching diaphragm and by this the position of the aedeagus dorsally next to the anal segment is also developed in a similar way in Tropidocephalini and Saccharosydmini, but not to that extent in the other higher derived delphacids. As the more primitive groups of delphacids (Asiracinae, Kelisiinae and Stenocraninae) show indeed a rather close connection of aedeagus and anal segment, but no development of a high reaching and entirely well chitinised diaphragm, it may be allowed with all reservations to take the dorsal position of aedeagus in Burnilia and Plesiodelphax gen. nov. as symplesiomorphous, but the strong development of diaphragm as apomorphous; the question must be left

1) Synpteron MUIR, 1926 was erected after a parasitized δ .

The genitalia have never been described and figured, thus the genus and its position is unclear till nowadays.

open, whether the latter character is evolved in at least three groups convergently or not. The laterodorsal angles of the pygofer in both genera distinctly produced caudad may be considered to be a further, although weak synapomorphic character for the two genera. However, due to the characters interpreted above as synapomorphous the monophyly of this group seems very probable: Burnilia and Plesiodelphax gen.nov. form a sister-group showing autapomorphic characters each as demonstrated in a cladogram (fig.14).

Last the dorsally erected and prolonged apodemes of the abdominal sternite-2 of the δ -drumming organ unite Burnilia and Plesiodelphax gen. nov. with all the rest of higher derived delphacids to a large monophyletic group, but as the two genera still possess the plesiomorphic type of aedeagus organized for instance like in Kelisia they fill as "missing link" exactly the gap between two evolutionary platforms manifesting the sequence of phylogenetic changes from Kelisia-Stenocranus-level to the level of higher derived Delphacidae. As conclusion of this it seems advisable to treat the monophyletic group comprising Burnilia and Plesiodelphax gen. nov. as a subfamily of its own: Plesiodelphacinae subfam. nov. (type-genus: Plesiodelphax gen. nov.). As we still know nothing about their biology, symbiont-configuration, mode(s) of oviposition etc. further investigations - especially on South American delphacids - must show, whether this opinion can be confirmed, or modifications concerning status and phylogenetic position of this subgroup have to take place.

Acknowledgments

I am grateful to Prof. Dr. R. Cobben, Agricultural University Wageningen, The Netherlands, Dr. W.C. Gagné, B.P.Bishop Museum, Honolulu, Dr. A.Kaltenbach, Naturhistorisches Museum Wien, Dr. W.J.Knight, British Museum (Nat.Hist.) London, Dr. J.P. Kramer, U.S.Nat.Museum, Washington, Prof.Dr.L.O'Brien, Florida Agric.Mech.University, Tallahassee and Dr. R. Poggi, Museo Civ.Stor.Nat., Genova, for providing South American delphacids. Special thanks to Dipl.-Biol. Hoch and Prof. Dr.R. Remane, both Marburg, for discussions and critical comments.

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Figures

Figs. 1-13: Plesiodelphax guayanus gen. et spec. nov.

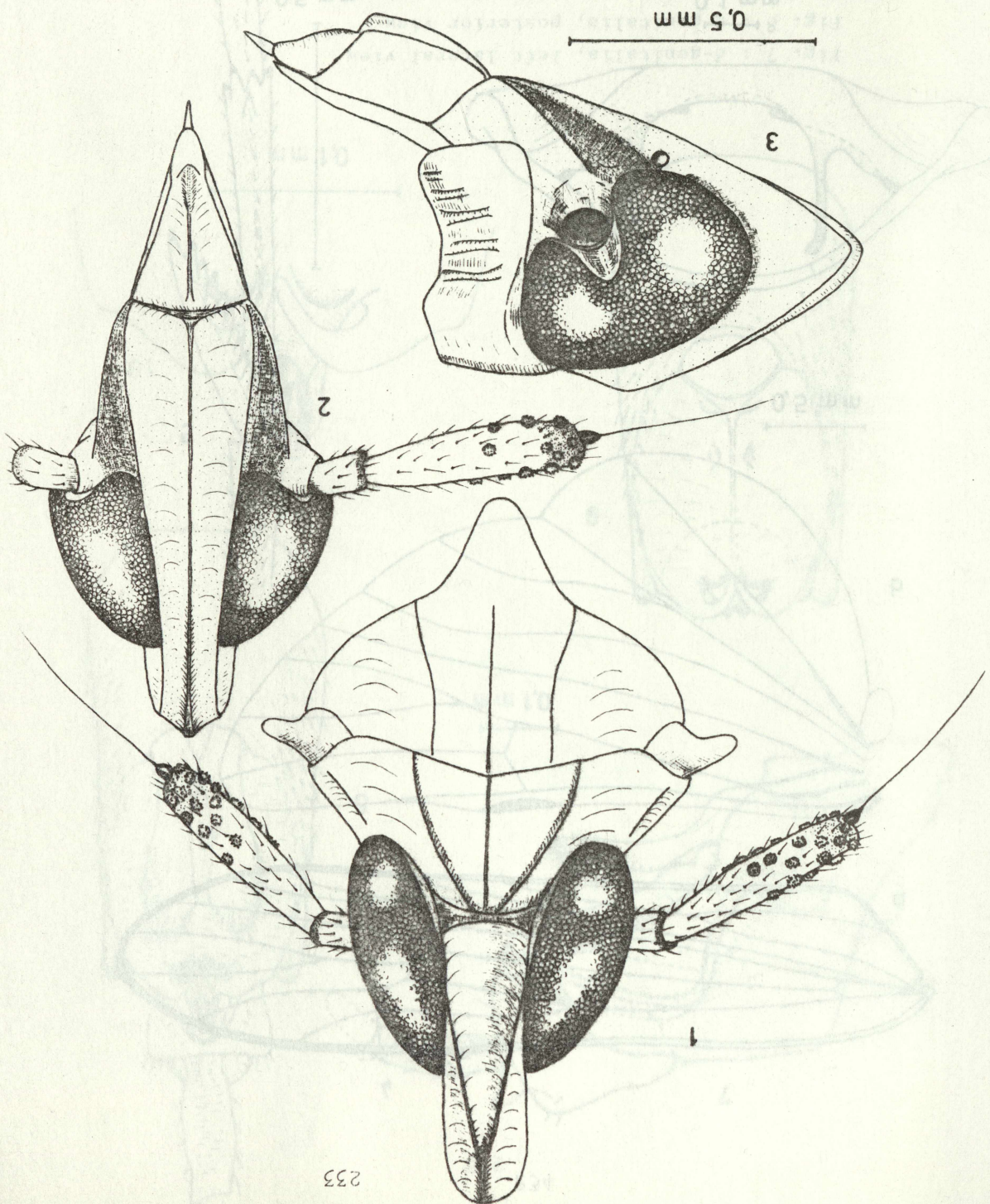
Figs. 1-5 : holotype, figured dried by air

Figs. 6-13: paratype, abdomen macerated in 10 % KOH and transferred into glycerin, reps. glycerin-gelatine.

Fig. 1: head and thorax, dorsal view

Fig. 2: head frontal view (frons and clypeus)

Fig. 3: head in profile (left lateral view)



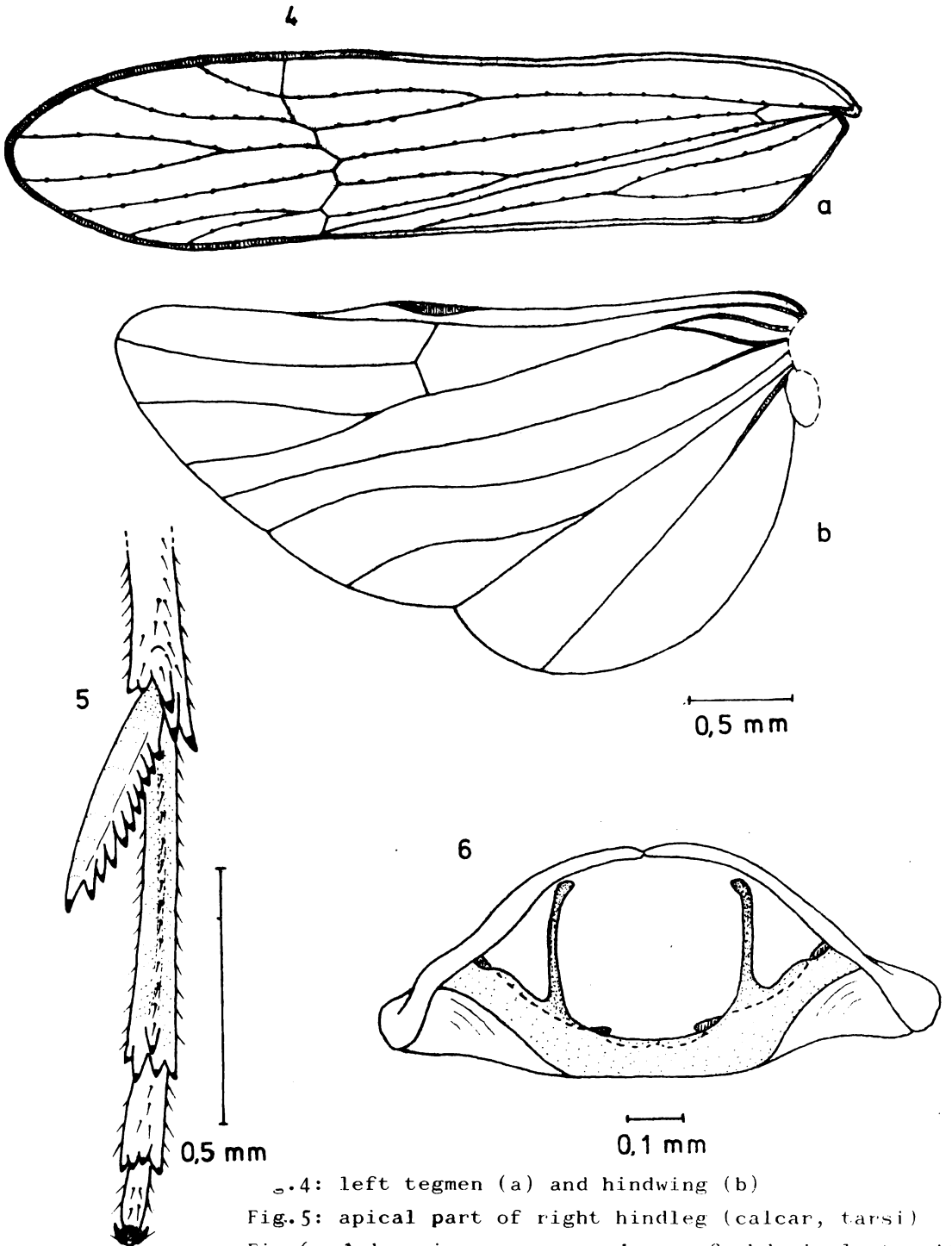


Fig. 4: left tegmen (a) and hindwing (b)

Fig. 5: apical part of right hindleg (calcar, tarsi)

Fig. 6: ♂-drumming organ: apodemes of abdominal sternite seen from caudad

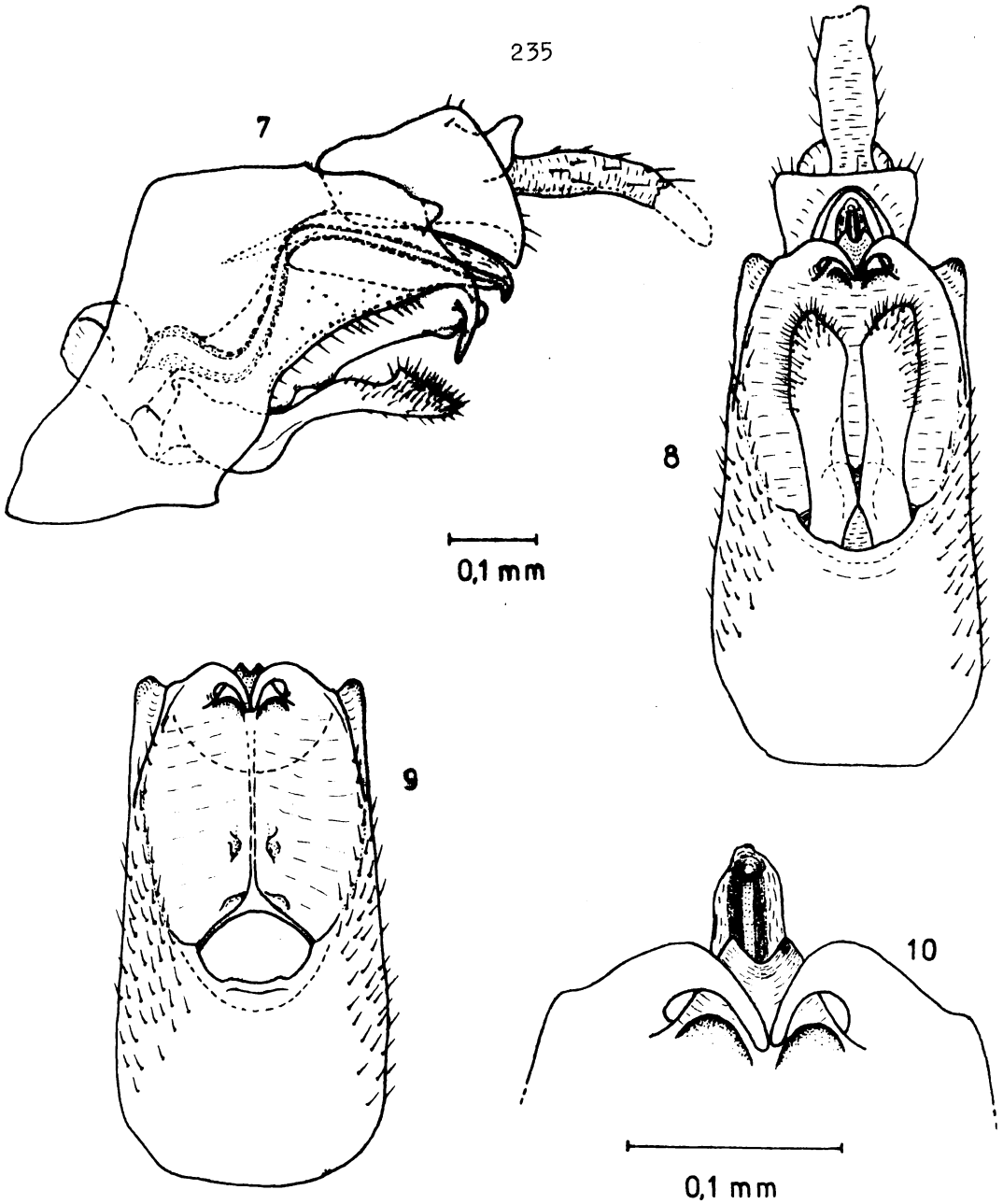


Fig. 7 : δ -genitalia, left lateral view

Fig. 8 : δ -genitalia, posterior view

Fig. 9 : pygofer and diaphragm, posterior view

Fig. 10 : produced laterodorsal angles of pygofer and dorsomedian part of genital phragma

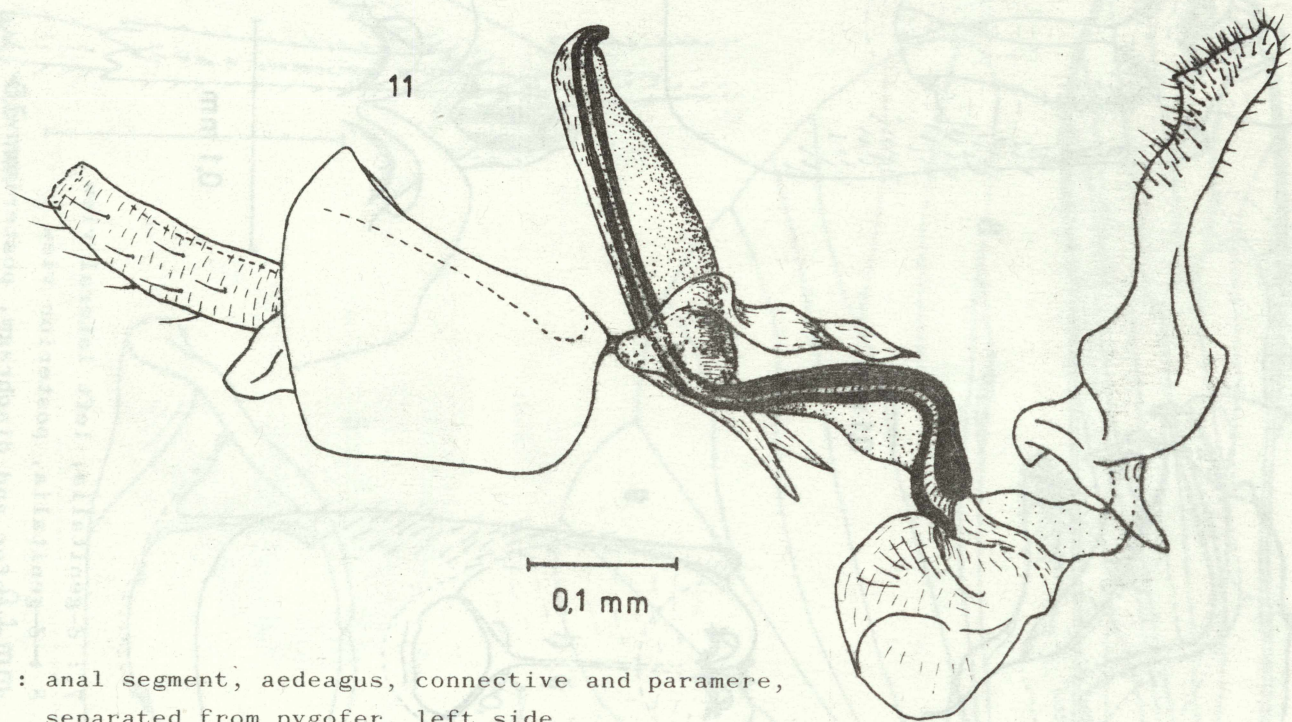


Fig. 11 : anal segment, aedeagus, connective and paramere, separated from pygofer, left side

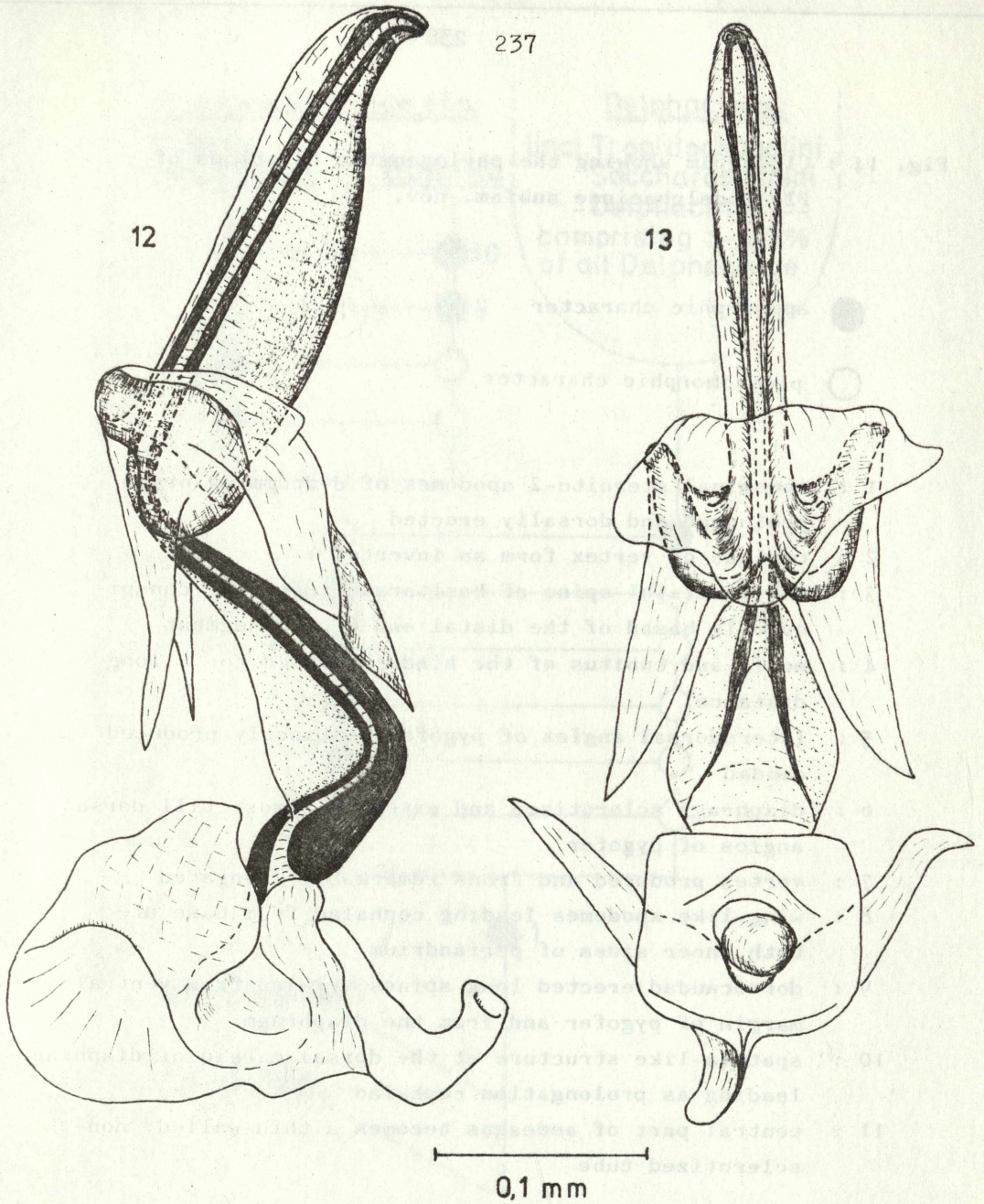


Fig. 12 : aedeagus, right side

Fig. 13 : aedeagus, ventral view

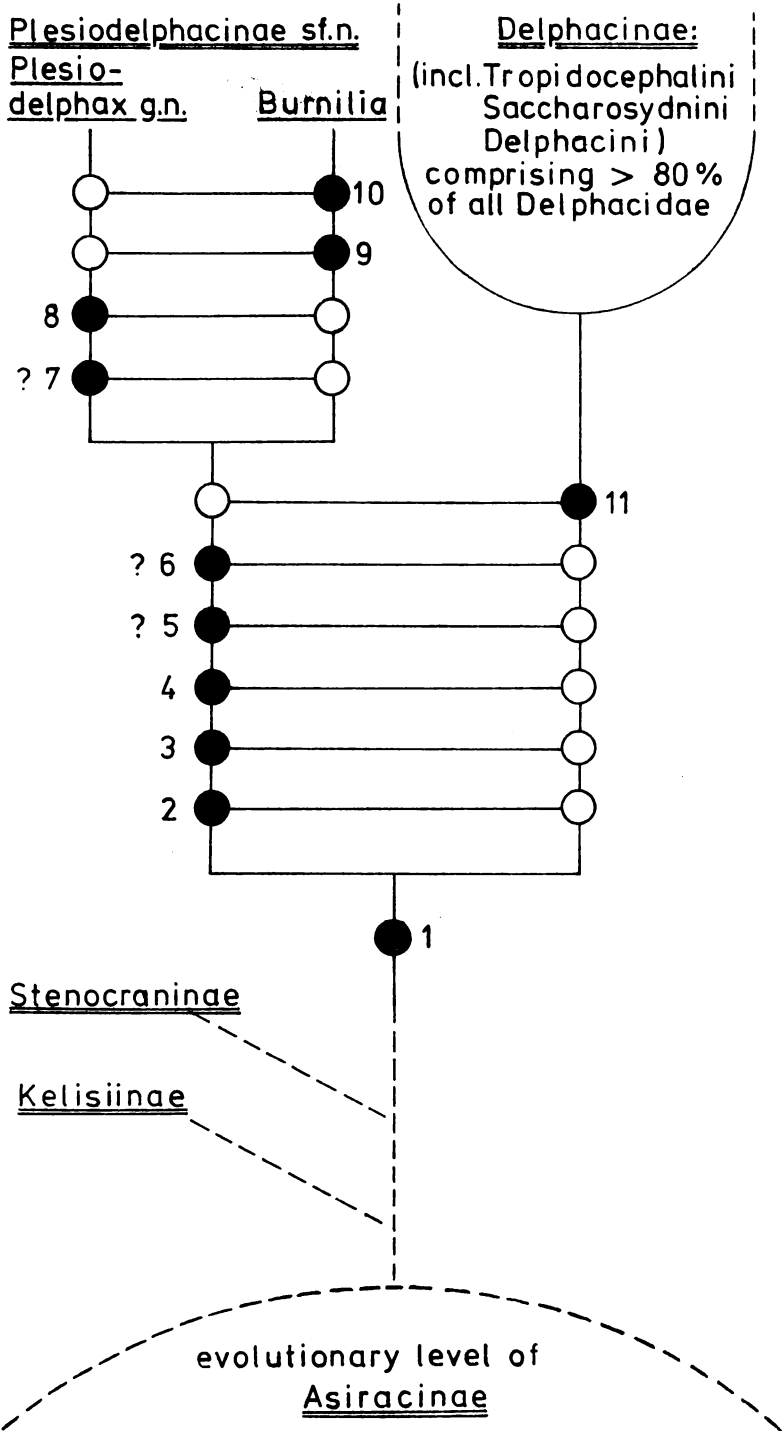
Fig. 14 : Cladogram showing the phylogenetic relations of
Plesiodelphacinae subfam. nov.

● apomorphic character

○ plesiomorphic character

- 1 : abdominal sternite-2 apodemes of δ -drumming organ prolonged and dorsally erected
- 2 : carinae of vertex form an inverted Y
- 3 : median distal spine of basitarsus inserting conspicuously basad of the distal end of the segment
- 4 : media and cubitus of the hindwing fused for a long distance
- 5 : laterodorsal angles of pygofer distinctly produced caudad
- 6 : diaphragm sclerotized and extended almost till dorsal angles of pygofer
- 7 : vertex produced and frons remarkably elongated
- 8 : wing-like apodemes leading cephalad from base of both inner sides of periandrium
- 9 : dorsocaudad erected long spines arising from ventral margin of pygofer and from the diaphragm
- 10 : spatula-like structure at the dorsal margin of diaphragm leading as prolongation cephalad
- 11 : central part of aedeagus becomes a thin-walled, non-sclerotized tube

Fig.14



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Zeitschrift/Journal: [Marburger Entomologische Publikationen](#)

Jahr/Year: 1985

Band/Volume: [1_10](#)

Autor(en)/Author(s): Asche Manfred

Artikel/Article: [A new subfamily, genus and species of Delphacidae from South America: Plesidelphacinae subfam. nov., Plesidelphax guyanus gen. et spec. nov. \(Homoptera, Fulgoroidea\) 219-240](#)