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The Leafhopper Genus *Pseupalus* in the Old World Tropics, with a Check-list of the Afrotropical and Oriental Paralimnini (Homoptera: Cicadellidae: Deltocephalinae)

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With 22 figures

Summary

Pseupalus gaiseri, *digitus* and *murtus* from the Ivory Coast, Thailand and the Philippines respectively, are described as **new**, extending the known distribution of this formerly monobasic genus from the southern Palaearctic Region to tropical Africa and the Oriental Region.

Based on its reduced forewing venation, *Pseupalus* is similar to members of the Macrostelini and Doraturini but its genital structures indicate that it belongs in the Paralimnini. The validity of this tribe is discussed and a check-list of the Afrotropical and Oriental Paralimnini is given with two **new** species **synonymies** and five **new combinations**. In addition, new combinations are given for six Oriental species transferred from Paralimnini to Athysanini.

Zusammenfassung

Drei **neue** *Pseupalus*-Arten: *P. gaiseri*, *P. digitus* und *P. murtus* werden von der Elfenbeinküste sowie von Thailand und den Philippinen beschrieben. Die früher monotypische Gattung *Pseupalus* erweitert ihre Verbreitung über die paläarktische Faunenregion hinaus auf die tropisch-afrikanische und die orientalische Faunenregion.

Auf Grund ihres reduzierten Vorderflügelgeäders ähnelt *Pseupalus* Vertretern der Triben Macrostelini und Doraturini. Die Struktur ihrer Genitalarmaturen zeigt aber deutlich die Zugehörigkeit zu den Paralimnini. Die Gültigkeit dieser Tribus wird diskutiert und eine Check-list der tropisch-afrikanischen und der orientalischen Paralimnini mit zwei **neuen** **Synonymen** und fünf **neuen Kombinationen** gegeben. Außerdem werden sechs weitere orientalische Arten neu kombiniert und von den Paralimnini zu den Athysanini gestellt.

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1. Introduction

The Paralimnini is a large tribe of mainly grass-feeding cicadellids. Sixty four genera are listed in NAST's (1972) Palaearctic catalogue but only 22 genera are known from the Afrotropical region (11 known only from South Africa) and 11 genera from the Oriental region (see chapter 5.). Although the tribe is not recorded from Australia (FLETCHER & STEVENS, 1988) or the New World, some Australian, North American and S. American genera, placed in Deltocephalini by EVANS (1966), OMAN (1949) and LINNAVUORI (1959) respectively, probably belong in the tribe as defined by EMELJANOV (1962).

Pseupalus Remane & Asche was erected in Paralimnini for a single new species, *P. graecanarus* from the Canary Islands and Greece, where it lives on *Imperata cylindrica* (Gramineae), a notorious weed in the tropics and sub-tropics. The discovery of three new species, described below, from Ivory Coast, Thailand and the Philippines, together with some female and parasitized specimens (BMNH), which cannot be identified, from Sierra Leone, Mali and Java, indicate that the genus has a wide, primarily tropical distribution. This unusually wide distribution, for members of the tribe, matches that of *Imperata cylindrica*, the host plant of *P. graecanarus* and the specimens from Java (noted above).

2. Relationship of *Pseupalus*

Pseupalus belongs to a group of genera which includes *Afrosus* Linnavuori (Afrotropical), *Bubulcus* Dlabola and *Changwhania* Kwon (Oriental and S. Palaearctic) and *Pteropyx* Haupt (S.E. Palaearctic). These genera all have a reduced forewing venation (Fig. 4), as in members of the tribes Macrostelini and Doraturini, but their distinctive male genitalia, with a dorsal toothed area on the subgenital plate, arms of the connective forming a loop and the apical process of the style elaborate, indicate that they belong in the Paralimnini (sensu EMELJANOV, 1962) or Deltocephalina (=Deltocephalini + Paralimnini) (sensu HAMILTON, 1975).

3. Validity of tribe Paralimnini

The Paralimnini was redefined by EMELJANOV (1962) to include several genera previously included in the Deltocephalini, but of the distinguishing characters he listed, only the apically converging arms of the connective, forming a loop, is diagnostic. This loop, however, varies considerably in shape from being broad to narrow, and almost linear and having the arms either joined or separated basally. In two genera, *Ragia* Theron and *Mongolojassus* Zachvatkin, the connective is fused to the aedeagus. The similar condition found in the Deltocephalini, with the connective linear and fused to the aedeagus, prompted HAMILTON to synonymize the two tribes, but his action has not been generally accepted (REMANE & ASCHE, 1980; OSSIANNILSSON, 1983) and the common possession of this character is believed by EMELJANOV (pers. comm.) to result from convergence. A more distant relationship

between the two tribes has been suggested by EMELJANOV & KIRILLOVA (1989), who noted that the second valvulae bear apical teeth in Deltocephalini but not in Paralimnini.

In the present paper the Paralimnini are kept separate from Deltocephalini pending further studies on their relationship. As large numbers of genera and species from the Old World tropics have been placed in the tribe since EMELJANOV's work (1962), a check-list to the Afrotropical and Oriental Paralimnini is given (see chapter 5.) No species is found in both regions but six Oriental species occur also in the southern Palaearctic Region.

The material examined during the course of the present study is deposited in The Natural History Museum, London (*BMNH*), Staatliches Museum für Naturkunde Stuttgart (*SMNS*) and Department of Agriculture, Bangkok, Bangkok, Thailand (*DAB*).

4. *Pseupalus* Remane & Asche with key to species

Pseupalus Remane & Asche, 1980: 88. Type species: *Pseupalus graecanarus* Remane & Asche, 1980: 90.

Description

Small species (3.0-3.8mm).

Pale yellow to stramineous; head and thorax with pair of longitudinal stramineous to brown bands dorsally; pregenital sternite with a small brown spot posteriorly on each side. Apex of forewing brown with outer apical cell with a white spot on each costal vein.

Head slightly wider than pronotum; vertex produced medially and slightly concave, shagreen anteriorly, smooth posteriorly. Clypellus similar in width throughout length. Ocelli separated from corresponding eye by approximately their own diameter. Antennae arising near lower corner of eye. Pronotum with sides short, carina absent. Forewing with outer subapical cell absent.

Male genitalia with posterior pygophore lobes elongate. Subgenital plate short and broad; a dentate heavily sclerotized area dorsoapically. Style apical process elongate, serrate medially; lateral lobe well developed. Connective with stem reduced; arms divergent apically. Aedeagus with shaft short to elongate, cylindrical, gonopore apical, a flange or short process arising at or near apex on each side; preatrium elongate with a pair of long processes arising from ventral margin, directed dorsoposteriorly.

Female pregenital sternite tapered posteriorly with posterior margin slightly concave.

Key to *Pseupalus* males

- 1 Subgenital plate with dorsal toothed area elongate (Fig. 18). Aedeagal shaft with a pair of processes apically; anterior margin with a process on each side subapically or near mid-length and a single medial more ventral process. (Oriental Region) 2
- Subgenital plate with dorsal toothed area short and broad (Fig. 3). Aedeagal shaft either without processes or with a single pair of processes subapically, without more ventral processes. (southern Palaearctic and Ethiopian Region) 3

- 2 Subgenital plate with posterior margin concave (Fig. 18). Aedeagal shaft with lateral processes on anterior margin distant from single more ventral medial process (Figs 14-15). (Thailand) *digitus* spec. nov.
- Subgenital plate with posterior margin convex. Aedeagal shaft with lateral processes on anterior margin near to single more ventral medial process (Figs 19-20). (Philippines) *murtus* spec. nov.
- 3 Aedeagal shaft short with a subapical flange on each side. (Greece, Canary Is.) *graecanarus*
- Aedeagal shaft elongate with a subapical process on each side (Figs 5-6). (Ivory Coast) *gaiseri* spec. nov.

4.1. *Pseupalus graecanarus* Remane & Asche (Fig. 13)

Pseupalus graecanarus Remane & Asche, 1980: 90. Holotype ♂, Canary Is, REMANE coll. [not examined].

Material examined: 1 ♂, 1 ♀ (paratypes); Greece, Nomos Arta, südl. Kato Despotiko, 10.VIII. 1979, M. ASCHÉ (BMNH).

Remarks: This species differs from other species of the genus in having the aedeagal shaft shorter without processes but with a subapical flange on each side.

4.2. *Pseupalus gaiseri* spec. nov. (Figs 1-12)

Material examined: Holotype ♂, Ivory Coast, Vavoua, on grass, 8.I.1984, D. & S. GAISER (SMNS). – Paratypes: 5 ♂ ♂, 4 ♀ ♀, same data as holotype (SMNS and BMNH).

Length: ♂, 3.3-3.8 mm (mean 3.5 mm); ♀, 3.4-3.8 mm (mean 3.6 mm).

Colour and external characters as in generic description.

Male genitalia as in generic description with lateral margin of subgenital plate evenly curved and tapered posteriorly; dorsal toothed area short and broad. Style apical process with medial margin concave subapically, tapered to acute apex. Aedeagal shaft elongate, curved anterodorsally with a short subapical process on each side against anterior margin.

Remarks: This species is similar to *graecanarus* but differs by its more elongate aedeagal shaft with a pair of subapical process rather than a short subapical lateral flange. Both species differ from the Oriental species of the genus in lacking the short, more ventral processes on the aedeagal shaft. The outer apical cell of the hindwing is either complete or stalked.

A topotypic specimen (SMNS), which is externally identical to the type series, may be this species but has a different aedeagus and style. These structures may be malformed as the connective is Y-shaped, which is not characteristic of the tribe, and poorly developed. A specimen from Sierra Leone (BMNH) may also be this species but has more triangular subapical aedeagal processes.

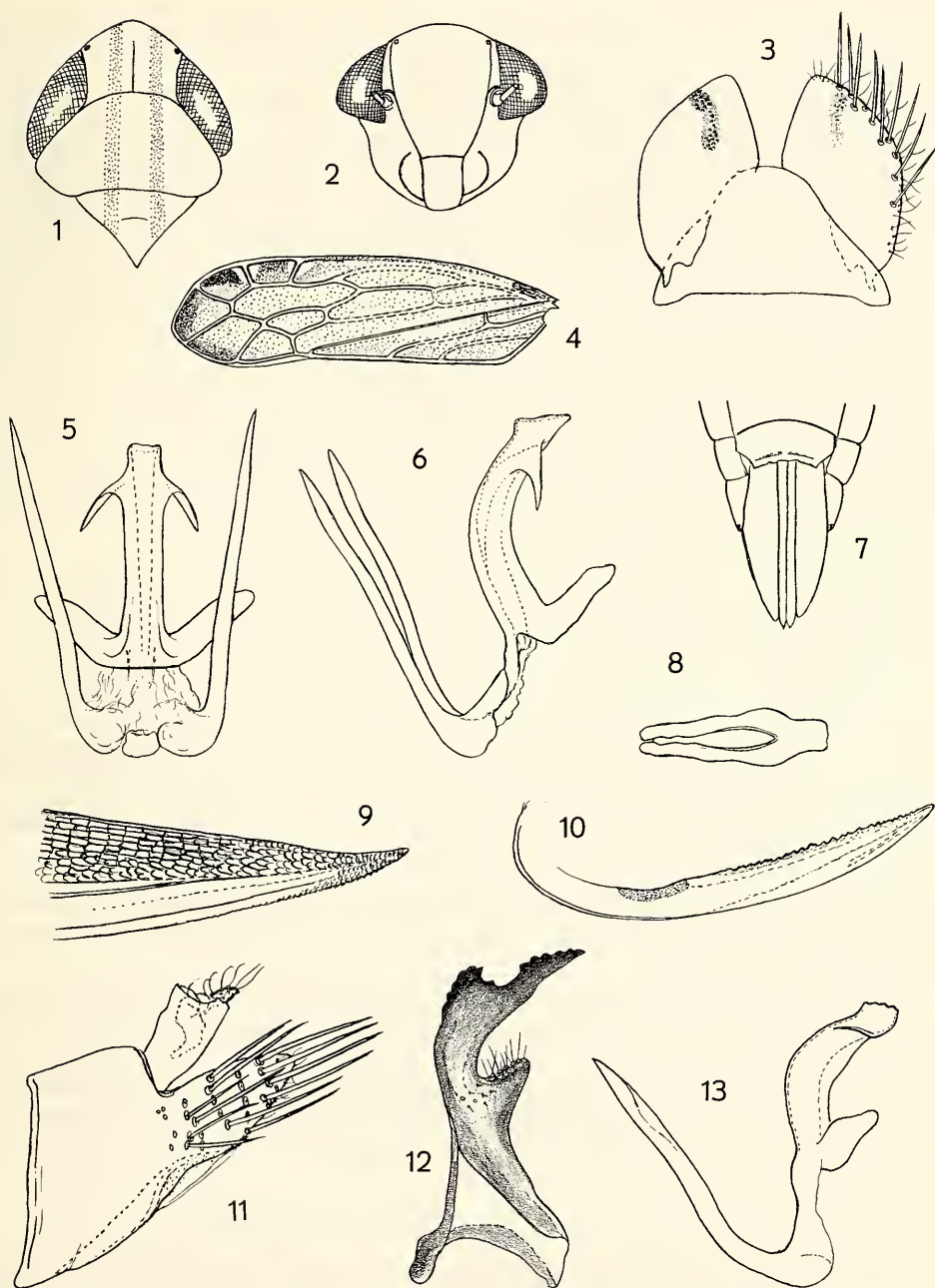
4.3. *Pseupalus digitus* spec. nov. (Figs 14-18)

Material examined: Holotype ♂, Thailand, Bangkok, IX .1965, at light, (BMNH). – Paratypes. 1 ♂, Bangkok, at light, IV. 1980, W. HONGSAPRUG (BMNH); 1 ♂, 2 ♀ ♀, Thailand, VI. 1974 W. HONGSAPRUG (BMNH and DAB).

Length: ♂, 3.0-3.3 mm (mean 3.1 mm); ♀, 3.5-3.8 mm.

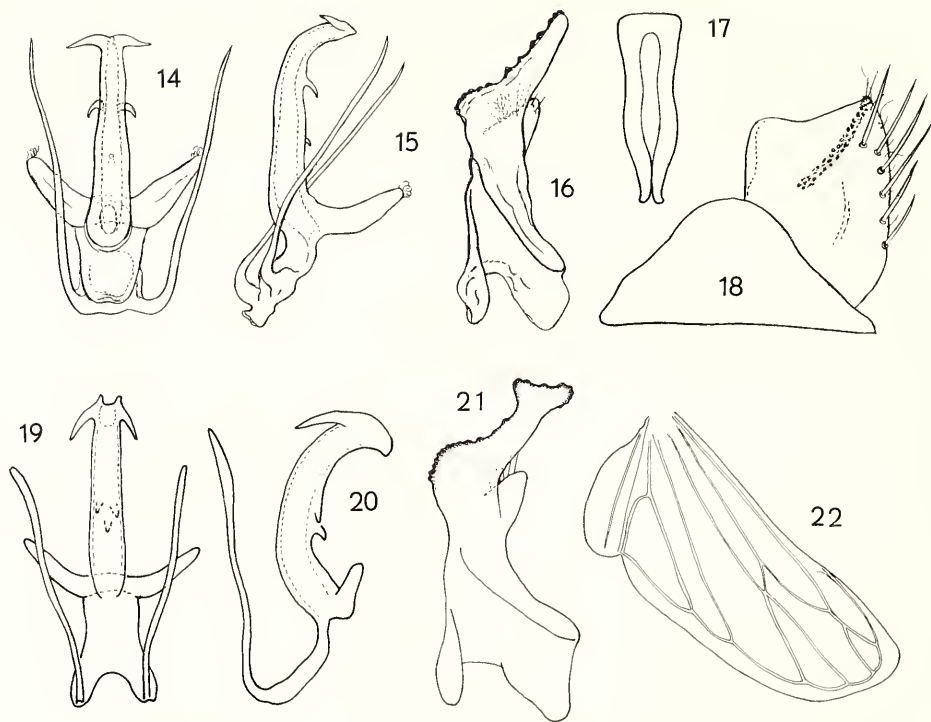
Colour and external characters as in generic description.

Male genitalia as in *gaiseri* spec. nov. but posterior margin of subgenital plate concave and dorsal toothed area more elongate. Style apical process more evenly tapered to apex. Aedeagal shaft more elongate with a pair of short apical processes, a



Figs 1–12. *Pseupalus gaiseri* spec. nov. – 1. head and thorax, dorsal view; – 2. face; – 3. male valve and subgenital plates, dorsal and ventral view; – 4. left forewing; – 5. aedeagus, posterior view; – 6. aedeagus, right lateral view; – 7. apex of female abdomen, ventral view; – 8. connective; – 9. apex of first valvulae, lateral view; – 10. third valvulae, lateral view; – 11. male pygophore, left lateral view; – 12. left style, dorsal view.

Fig. 13. *P. graecanarus*; aedeagus, right lateral view.



Figs 14–18. *Pseupalus digitus* spec. nov. – 14. aedeagus, posterior view; – 15. aedeagus, right lateral view; – 16. left style, dorsal view; – 17. connective; – 18. male valve and left subgenital plate, ventral view.

Figs 19–22. *P. murtus* spec. nov. – 19. aedeagus, posterior view; – 20. aedeagus, right lateral view; – 21. left style, dorsal view; – 22. right hind wing.

pair of short subapical processes medially on anterior margin and a single very short process medially just basad of midlength on anterior margin; preatrial processes more slender.

Remarks: This species together with *murtus* spec. nov. can be recognized by the number and arrangement of processes on the aedeagal shaft, as noted above and the concave posterior margin of the subgenital plate. It differs from *murtus* by the absence of a subapical lobe on the style apical process and the aedeagus with the shaft narrower apically with the subapical pair of processes situated more distad of the single more ventral medial process and the preatrium shorter.

4.4. *Pseupalus murtus* spec. nov. (Figs 19–22)

Material examined: Holotype ♂, Philippines, Luzon, Albay Prov. Guinobatan, VI. 1978 (BMNH). – Paratypes. 3 ♀ ♀, same data as holotype without dates (BMNH).

Length: ♂, 3.3 mm; ♀ 3.4–3.6 mm.

Colour and external characters as in generic description.

Male genitalia with style apical process with a subapical lobe. Subgenital plate and aedeagus as in *digitus* spec. nov. but aedeagal shaft broader apically with paired anterior processes situated more ventrally near medial process and preatrium more elongate.

Remarks: This species is similar to *digitus* but differs in the shape of the style and aedeagus, as noted above.

5. Check-list of Afrotropical and Oriental Paralimnini

In the following check-list the type locality for each species is given first, followed by any additional records.

The following species previously included in *Paralimnus* belong in the tribe Athysanini, based on an examination of their type specimens or for PRUTHI's species based on its description: *Paralimnus exiguus* Melichar, *P. fuscus* Melichar, *P. confusus* Pruthi, *Thamnotettix umbratus* Melichar (all of uncertain generic placement), *Mimotettix albomaculatus* (Distant), **comb. nov.**, *M. lateralis* (Walker), **comb. nov.**, *M. facialis* (Distant), **comb. nov.**, *M. hieroglyphicus* (Distant), **comb. nov.**, *M. lefroyi* (Distant), **comb. nov.** and *Gunghuyana silhouettensis* (Distant), **comb. nov.**

Deltocephalus rufobilineatus Melichar, *D. angustus* Melichar and *D. severus* Melichar, from Java, belong in the Paralimnini but are omitted from the following list (5.2.) as their generic placement is uncertain (types in Brno and specimens in BMNH examined).

5.1. Afrotropical Paralimnini

- Afrosus* LINNAVUORI, 1959: 93
unimaculatus (NAUDÉ, 1926a: 84 — *Cicadula*), S. Africa; throughout Afrotropical Region (BMNH)
- Caloduferna* WEBB, 1980: 855
minuta WEBB, 1980: 855, Aldabra
- Cedarotettix* THERON, 1975: 197
cogani (NAUDÉ, 1926a: 47 — *Deltocephalus*), S. Africa
- Coganus* THERON, 1978: 257
breviatus (COGAN, 1916a: 186 — *Deltocephalus*), S. Africa
- Elginus* THERON, 1975: 202
saltus (NAUDÉ, 1926a: 52 — *Deltocephalus*), S. Africa
- Hiltus* THERON, 1974: 148
africanus (NAUDÉ, 1926a: 76 — *Chlorotettix*), S. Africa
gilvus THERON, 1974: 152, S. Africa
- Jannius* THERON, 1982: 25
mecus THERON, 1982: 25, S. Africa, S.W. Africa
- Jubrinia* LINNAVUORI, 1962: 54
camena LINNAVUORI, 1969: 1184, Zaire
dentata THERON, 1971: 4, S. Africa
distincta LINNAVUORI, 1962: 54, Egypt
gracilis HELLER & LINNAVUORI, 1968: 12, Ethiopia
- Ladya* THERON, 1982: 25
longipennis THERON, 1982: 25, S. Africa
- Lecacis* THERON, 1982: 23
platypennis THERON, 1982: 23 S. Africa
- Megaulon* THERON, 1975: 201
chlorellus (NAUDÉ, 1926a: 51 — *Deltocephalus*), S. Africa
- Naudeus* THERON, 1982: 23
bivittatus (NAUDÉ, 1926a: 44 — *Deltocephalus*), S. Africa; Uganda (BMNH)
- Paralimnus* MATSUMURA, 1902a: 386
taeniatus LINNAVUORI, 1961: 480, S. Africa
- Platentomus* THERON, 1980: 287
caledonia DAVIES, 1988: 79, S. Africa
sobrinus [STAL, 1859b: 294 — *Jassus* (*Deltocephalus*)], S. Africa
stellena DAVIES, 1988: 77, S. Africa

- Pravistylus* THERON, 1975: 196
exquadratus (NAUDÉ, 1929c: 12 – *Deltocephalus*), S. Africa
Pseupalus REMANE & ASCHE, 1980: 88. (see also 5.2.)
gaiseri **spec. nov.**, Ivory Coast
Ragia THERON, 1973: 29
flavoalbida (NAUDÉ, 1926a: 83 – *Cicadula*) S. Africa; Botswana, S.W. Africa, Angola (BMNH)
Restiobia DAVIES, 1988: 74
ormeia DAVIES, 1988: 75, S. Africa
Samuraba LINNAVUORI, 1961: 480
elegans LINNAVUORI, 1961: 481, S. Africa; Nigeria, Zimbabwe (BMNH)
Teyasteles LINNAVUORI, 1969: 1185
montivagus HELLER & LINNAVUORI, 1968: 3, Ethiopia
divisifrons (NAUDÉ, 1926a: 83 – *Cicadula*), S. Africa; Zaire (BMNH)
Vecaulis THERON, 1975: 200
attenuatus (NAUDÉ, 1926a: 49 – *Deltocephalus*), S. Africa; Zimbabwe (BMNH)
Vilargus THERON, 1975: 198
pumilicans (NAUDÉ, 1926a: 49 – *Deltocephalus*), S. Africa.

5.2. Oriental Paralimnini

- Bubulcus* *Dlabola*, 1961: 320
cingulatus (DLABOLA, 1960: 2 – *Paralimnus*), U.S.S.R. Iraq; Iran, Nepal, India, Korea, (BMNH)
Changwhania KWON, 1980: 96
ceylonensis (BAKER, 1925b: 537 – *Deltocephalus*) (nom. nov. pro *Deltocephalus bimaculatus* MELICHAR, 1903b: 204), **comb. nov.**, Sri Lanka; India, Korea, Philippines, Papua New Guinea, New Caledonia (BMNH)
bipunctatus (SINGH-PRUTHI, 1930a: 59 – *Cicadula*), DATTA, 1972: 420 – *Cicadula*, **syn. nov.**
changwhani KWON, 1980: 99, **syn. nov.**
distanti (BAKER, 1925b: 537 – *Deltocephalus*), (nom. nov. pro *Deltocephalus capitatus* Distant, 1918b: 83), **comb. nov.**, India
terauchii (MATSUMURA, 1915a: 163 – *Aconura*), Korea; Japan (NAST, 1972: 355), India, Thailand, Malaysia, Java (BMNH)
Henschia LETHIERRY, 1892a: 69
vittata MATSUMURA 1914a: 228, Formosa, Singapore
Jassargus ZACHVATKIN, 1953: 268
acutus SINGH, 1969: 353, India
cylindrius SINGH, 1969: 352, India; Nepal (BMNH)
Jilinga GHOURI, 1974: 551
darjilingensis (DISTANT, 1918b: 82 – *Deltocephalus*), India
mota (PRUTHI, 1936: 126 – *Deltocephalus*), **comb. nov.**, India
gopii (PRUTHI, 1936: 127 – *Deltocephalus*), **comb. nov.**, India
Maximianus DISTANT, 1918b: 79
cephalicus DISTANT, 1918b: 80, India
notatus DISTANT, 1918b: 79 India
Paralaevicephalus ISHIHARA, 1953b: 14
nigrifemoratus (MATSUMURA 1902a: 399 – *Deltocephalus*), Japan; Formosa (METCALF, 1967: 1308)
Psammotettix HAUPT, 1929c: 262
emarginatus SINGH, 1969: 356, India
regularia SINGH, 1969: 358, India
striatus (LINNAEUS, 1758a: 437 – *Cicada*), Europe; China, Burma, India, Indo-China, Malay Pen., Flores (METCALF, 1967: 1547)

- Pseupalus* REMANE & ASCHE, 1980: 88. (see also chapter 5.1)
digitus spec. nov., Thailand
murtus spec. nov., Philippines
Subhimalus GHAURI, 1971: 113
fuscomelanus RAMAKRISHNAN, 1983: 190, India
fuscus GHAURI, 1971: 115, India
melanus GHAURI, 1971: 115, India
nigrifacialis (DISTANT, 1918b: 81 – *Deltocephalus*), comb. nov., India
Yanocephalus ISHIHARA, 1953b: 48
yanonis (MATSUMURA, 1902a: 400 – *Deltocephalus*), Japan; China, also Korea (METCALF, 1967: 1599).

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¹⁾ For references up to 1955 see METCALF (1964).

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