

*COSMOPSALTRIA HALMAHERAE* N. SP. ENDEMIC TO HALMAHERA,  
MALUKU, INDONESIA (HOMOPTERA, CICADIDAE)

The relationship of cicadas of Maluku Utara and Maluku Selatan

by

J. P. DUFFELS

*Institute of Taxonomic Zoology, University of Amsterdam, Plantage Middenlaan 64, 1018 DH Amsterdam,  
The Netherlands*

ABSTRACT

*Cosmopsaltria halmaherae* n. sp. is described from Halmahera, Maluku and placed in the *C. doryca* group. The characters of this group are reconsidered and the relationships of its members are discussed. The *C. doryca* group and two other monophyletic groups of cicadas demonstrate a vicariant distribution in Maluku Utara (= North Moluccas) and Maluku Selatan (= South Moluccas).

RÉSUMÉ

On décrit *Cosmopsaltria halmaherae* n. sp. de Halmahera, Maluku (Moluques), cette espèce étant placée dans le groupe *C. doryca*. Les caractères de ce groupe sont reconsidérés et les relations entre ses membres sont discutées. Le groupe *doryca*, ainsi que deux autres groupes monophylétiques de Cicades, montrent une distribution vicariante à Maluku Utara (= Moluques du Nord) et à Maluku Selatan (= Moluques du Sud).

INTRODUCTION

Study of the interesting cicada collections of the Museum Zoologicum Bogoriense, Bogor, Indonesia and the Senckenberg Museum, Frankfurt am Main, revealed an undescribed *Cosmopsaltria* species from the island of Halmahera.

*Cosmopsaltria halmaherae*, which is described as new to science in the present paper, must be attributed to the *Cosmopsaltria doryca* group, which was erected (Duffels, 1983: 47) for two species, *C. doryca* (Boisduval, 1835) the type-species of the genus, and *C. lata* (Walker, 1868). *C. doryca* is a lowland species with a wide distribution in Ternate, Waigeo, Tjendrawasih (= Vogelkop of New Guinea), Japen Island and West New Guinea. *C. lata* is an endemic of

Buru and Ambon, Maluku Selatan (= South Moluccas).

The characters of the *C. doryca* group are reconsidered and a comparison of the species of the group makes plausible that *C. halmaherae* and *C. lata* must be regarded as sister-species. Their vicariant distribution in Maluku Utara (= North Moluccas) and Maluku Selatan is interesting from a biogeographic point of view, since a similar pattern is found in two other groups of cicadas.

TAXONOMY

*Cosmopsaltria halmaherae* n. sp.  
(Figs. 1-4)

Distinction. — *C. halmaherae* is distinguished from *C. lata* by the fusion of the spots at the bases of the 2nd, 3rd, and 5th apical areas, as well as those at the bases of the 6th and 7th apical areas, which are separated in *C. lata*. *C. doryca* has only two spots at the bases of the 2nd and 3rd apical areas, and no marginal spots as found in the other two species.

Material examined. — Holotype: "Goa Plains / 20.Sep.1951" (handwritten), "20.sept.1951 / Goa Plains" (print), ♂, Museum Zoologicum Bogoriense (= MZB). Paratypes: Biaur, 600 m, 7-12.x.1951, 1 ♂, MZB; Mt. Sembilan, 600 m, 27.ix-6.x.1951, 1 ♀, MZB; "Halmahera / Galela, [18]94 / Kükenthal", "219", "*Cosmopsaltria / capitata / Dist.*" (Distant's handwriting), 1 ♂, Senckenberg Museum, Frankfurt am Main (= SMF); "Halmahera / Galela, [18]94 / Kükenthal", "Hochgebirg / 2200 Fuss / entsetzlich laute Stimme", "*capitata / Distant*", 1 ♂, SMF. The two paratypes of the Senckenberg Museum have a shriveled thorax due to preservation in alcohol and are also otherwise in a poor condition.

The type-localities Goa Plains, Biaur and Mt. Sembilan could not be traced until consultation of publications of the Dutch odonatologist M. A. Liefstinck (e.g. Liefstinck, 1953: 180) revealed that these localities (and others) were visited by the Sundanese collectors Amsari and Manis during an expedition in the island of Halmahera in September and October 1951. Localities, altitudes and dates of the types of *C. halmaherae* correspond with the data of Odonata studied by Liefstinck. This means that the cicadas were collected during the same expedition of Amsari and Manis in Halmahera. Some expedition localities which could be traced on topographic maps of Halmahera (1:500.000 and 1:100.000) indicate that the expedition crossed the northern arm of Halmahera from the west to the east coast, north of the line Sahu-Kau and south of Ibu.

**Description.** — Head slightly narrower than pronotum. Ground colour of head and thorax brownish, mesonotum darker than head and pronotum. Marking dark brown to black-brown. Abdomen dark brown to black.

**Head:** Dark brown rings encircle each of the ocelli. Broad undep grooves on postclypeus underside sometimes darker than ridges and remaining surface of postclypeus. Black apex of rostrum reaching beyond hind coxae.

**Thorax:** Anterior and posterior oblique fissures and ambient fissure on pronotum dark brown. Mesonotum with dark brown to black-brown marking which is fairly inconspicuous on the dark ground colour. Median fascia very narrow anteriorly, gradually widens to the posterior, where it attains greatest width at 1/2 to 2/3 the mesonotum length. Beyond its widest part, which is many times as wide as anterior width, the fascia either continues as a vague line to cruciform elevation or makes a vague connection with paramedian fasciae. Paramedian fasciae are as wide as anterior width of median fascia and converge slightly from anterior mesonotum margin to halfway the mesonotum disk. A pair of more or less round spots situated in front of cruciform elevation. Lateral fasciae very broad and vaguely dark brown clouded.

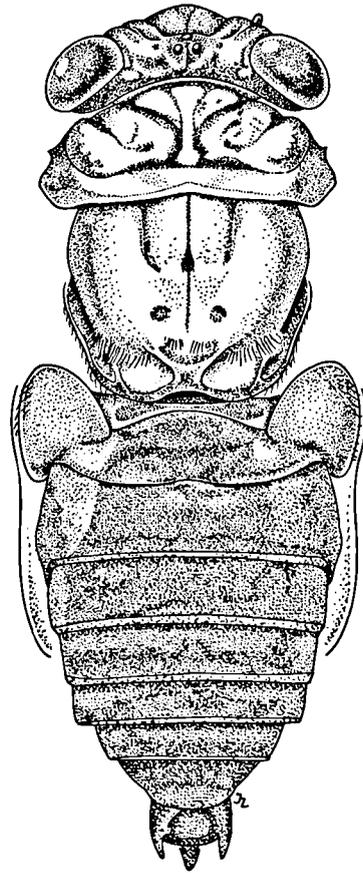
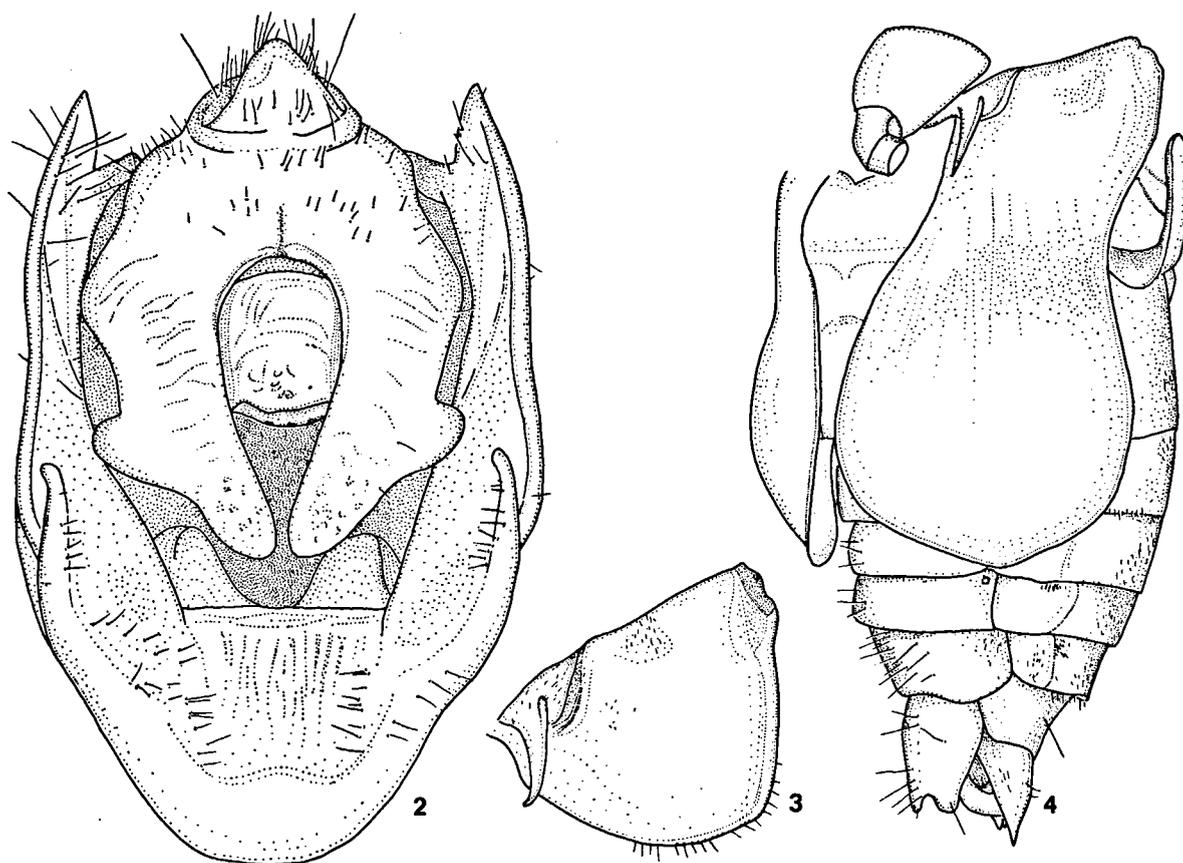


Fig. 1. *Cosmopsaltria halmaherae*, ♂ paratype, Halmahera, Biaur.

**Legs:** Fore femora with some dark brown, longitudinal lines. Other femora and tibiae unmarked. Tarsi of fore and middle legs light brown, tarsi of hind legs yellowish.

**Tegmina and wings:** Tegmen long and slender, 3.1-3.2 times as long as high; 8th apical area fairly long, length : width ♂ 3.0-3.3 ( $n = 2$ ), ♀ 3.1 ( $n = 1$ ). Venation of tegmen and wing light brown, variegated with dark brown in apical half of tegmen. Basal veins of all apical areas broadly infuscated. Infuscations at bases of 2nd, 3rd, 4th and 5th apical areas and those at bases of 6th and 7th apical areas more or less confluent. The latter infuscation is in most specimens connected with infuscation along apical part of posterior vein of 7th apical area. Marginal infuscations at apices of longitudinal veins very vague in tegmen apex but more well-defined posteriorly.



Figs. 2-4. *Cosmopsaltria halmaherae*: 2, pygofer in ventral view, holotype; 3, female operculum in ventrolateral view, paratype, Halmahera, Mt. Sembilan; 4, male abdomen with operculum in ventrolateral view, paratype, Halmahera, Biaur.

Male. — Operculum (fig. 4) broad, reaching to 2/3 of the length of abdominal segment 5 or to anterior margin of segment 6, apical part broadly rounded. Lateral margin concavely sinuate at 2/5 of its length and convexly curved in apical part. Operculum light brown; one paratype has a transverse dark-coloured fascia just behind the lateral incurvation; basal half of lateral margin dark brown. Abdomen dark castaneous, timbal coverings and sublateral parts of segment 3 light brown.

Genitalia (fig. 2): Pygofer slightly longer than broad. Lateral processes of pygofer short with sharply pointed apices, which reach as far distad as apices of anal valves. Uncus lobes are very broad at bases but gradually narrow to apices. Lateral margin of uncus lobe with very characteristic rounded protuberance. Median

margin weakly concave. Apex of uncus lobe narrowly rounded. Clasper with short ligulate, basal part bearing a slightly curved, fairly strong, lateral spine and a curved medial spine, which is narrower and longer than the lateral one.

Female. — Operculum (fig. 3) brownish reaching to half length of segment 3. Lateral margin nearly straight, basally very weakly sinuate and with a narrow, dark brown line. Laterodistal corner obtuse. Hind margin convex. Abdomen dark castaneous dorsally.

Measurements (in mm; based on 4 ♂♂ and 1 ♀). — Body length: ♂, 35.8-40.5; ♀, 37.2. Tegmen length: ♂, 51.0-53.0; ♀, 55.0. Head width: ♂, 13.0-13.2; ♀, 13.0. Pronotum width: ♂, 13.6-14.2, ♀, 14.7. Mesonotum width: ♂, 11.6-12.3; ♀, 12.8. Head width : pronotum

width, ♂ 0.92-0.96, ♀ 0.88. Head width : mesonotum width, ♂ 1.07-1.12, ♀ 1.02. Pronotum width : mesonotum width, ♂ 1.15-1.17, ♀ 1.15.

## PHYLOGENY

### *The Cosmopsaltria doryca group*

*C. halmaherae* has several features characteristic of the *doryca* group: the head is broad and slightly narrower than the pronotum, the uncus has a fairly small basal part and broad lobes and the inner ridges of the basal pygofer lobes are lacking. These features, however, have been regarded as synplesiomorphies for the *doryca* group; the multi-coloured male operculum was indicated as the only apomorphy for the species group (Duffels, 1983: fig. 8).

The discovery of the new species has led to re-consideration of the characters of the *doryca* group. *C. doryca* and *C. lata* have a multi-coloured male operculum, but the operculum of *C. halmaherae* is brownish with, in one paratype, a darker coloured transverse fascia. The fairly uniform colour of the operculum of *C. halmaherae* might be due to discoloration, but the opercula of living specimens of this species are probably not so brightly multi-coloured as in the other two species of the group.

Re-study of the development of the uncus in the genus *Cosmopsaltria* led to the supposition that the broad, well-developed, more or less straight, uncus lobes as found in the three species of the *doryca* group must be regarded as apomorphous. Two more derived character states in the development of the uncus of *Cosmopsaltria* are (1) narrowing of the uncus lobes and elevation of the medial uncus part as found in the *C. gracilis* group, and (2) a very large basal uncus part with medially curved slender lobes as found in the *mimica* complex (Duffels, 1983: fig. 8).

### *Infra-group relationships*

Speculation on the relationship of the three species of the *C. doryca* group is not so easy, the more so as the coloration of the male opercula

of *C. halmaherae* is in fact unknown. *C. lata* and *C. halmaherae* have several characters in common: tegmen with infuscations at the bases of the 2nd, 3rd, 5th and 7th apical areas and a series of marginal spots, hardly recognizable or absent central fasciae on the pronotum, a dark castaneous male abdomen, and a very similar uncus lobe shape. *C. doryca* has only two spots on the tegmen at the bases of the 2nd and 3rd apical areas, very distinct, black central fasciae with a yellow interspace on the pronotum, a light to dark brown male abdomen with black marking and a broader, somewhat differently shaped uncus lobe. On account of this character matrix I regard *C. halmaherae* and *C. lata* as sister-species, although the distribution of the mentioned characters in the genus *Cosmopsaltria* and its sister-genera does not allow conclusions with regard to apomorphy or plesiomorphy of these characters.

## BIOGEOGRAPHY

Sister-group relationships between representatives from Maluku Utara and Maluku Selatan in two monophyletic species groups were shortly mentioned in a previous discussion on the biogeography of the cicadas of Maluku Utara (Duffels, 1988).

The *Diceropyga oblecta* group, which comprises four species, contains three species from Maluku Utara: *D. junctivitta* (Walker, 1868) from Maluku Utara (Morotai, Halmahera, Ternate, Kajoa, Bacan, Obi and Talaud), Waigeo and Weeim Island, *D. ochrothorax* Duffels, 1977 from Gebe Island and *D. bacanensis* Duffels, 1988 from Bacan. These Maluku Utara species form the sister-group of one species, *D. oblecta* (Fabricius, 1803) from Buru, Seram, Ambon and Sula. The sister-group of the whole *oblecta* group is found all over New Guinea and the Solomon Islands (Duffels, 1977, 1986).

The *Baeturia conviva* group, which consists of five species, has two species in Maluku Utara, *B. conviva* Stål, 1861 from Bacan and Obi and *B. laureli* De Boer, 1986 from Halmahera,

which probably form the sister-group of one species, *B. schulzi* Schmidt, 1926 from Buru. The other species of the group are recorded from Tjendrawasih (= Vogelkop of New Guinea), the Aru Islands and Roon Island in the Geelvink Bay (De Boer, 1986).

The *Cosmopsaltria doryca* group shows a similar pattern of vicariance. *C. halmaherae* from Halmahera is supposed to be the sister-species of *C. lata* from Buru and Ambon. The sister-group of these both species is *C. doryca*, which has a wide distribution in West New Guinea (Duffels, 1983).

In all these three species groups there is a sister-group relationship between taxa from Maluku Utara and Maluku Selatan, whereas the sister-groups of the Maluku taxa have a more eastern distribution in either Tjendrawasih or West New Guinea or New Guinea and the Solomon Islands. For some further remarks on the biogeography of cicadas from Maluku Utara the reader is referred to Duffels, 1988.

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#### REFERENCES

- BOER, A. J. DE, 1986. The taxonomy and biogeography of the conviva group of the genus *Baeturia* Stål, 1866 (Homoptera, Tibicinidae). *Beaufortia*, **36**: 167-182.
- DUFFELS, J. P., 1977. A revision of the genus *Diceropyga* Stål, 1870 (Homoptera, Cicadidae). *Monografieën Ned. ent. Vereen.*, **8**: 1-227.
- , 1983. Taxonomy, phylogeny and biogeography of the genus *Cosmopsaltria*, with remarks on the historic biogeography of the subtribe *Cosmopsaltriaria* (Homoptera, Cicadidae). *Pacific Insects Monogr.*, **39**: 1-127.
- , 1986. Biogeography of Indo-Pacific Cicadoidea: a tentative recognition of areas of endemism. *Cladistics*, **2**: 318-336.
- , 1988. Biogeography of the cicadas of the island of Bacan, Maluku, Indonesia with description of *Diceropyga bacanensis* n. sp. *Tijdschr. Ent.*, **131**: 7-12.
- LIEFTINCK, M. A., 1953. Revisional notes on the genera *Diplacina* Brauer and *Huonia* Förster (Odon.). *Treubia*, **22**: 153-216.

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