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## Madagascan Caliscelidae (Hemiptera, Fulgoroidea): current knowledge and description of a new genus and species

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### ABSTRACT

A checklist of Caliscelidae known from Madagascar is provided. *Campures pallens* gen. n. et sp. n. is described from Toliara Province. Notes on the evolution and biogeography of the family Caliscelidae are given. KEY WORDS: Madagascar, Toliara Province, Augilini, Caliscelini, new genus, new species, dry habitats, evolution, biogeography.

### INTRODUCTION

If one includes the genus and species described below, the Madagascan fauna of the family Caliscelidae currently comprises ten species in nine genera (Gnezdilov 2014; Bourgoin 2015) known only from the south of the island — Antananarivo, Fianarantsoa, and Toliara provinces. The main number of taxa (five monotypical genera) are found in Toliara Province. Three genera with three species are recorded from Fianarantsoa Province, and two genera with two species from Antananarivo Province. Nothing is known from the north of Madagascar. Six species are known only from females and one species only from a male.

Many Madagascan Caliscelidae species are known from dry habitats with spiny vegetation. For example, *Madaceratops adelinae* Gnezdilov, 2011 is distinguished by the presence of a spine on the metope (Gnezdilov 2011b, fig. 2) which looks like spines on the plants of the endemic Madagascan family Didiereaceae Radlk., and may represent a special mimicry for spines of this group of plants. The new species described below was collected in a spiny forest as well.

Tropical Caliscelidae are not an easy group to collect if the host plants are unknown. Thus the species described below, as well as the previously described *Calampocus sphaeroides* Gnezdilov & Bourgoin, 2009, were collected in a pitfall trap. My own field experience in Toliara Province in January 2011 with sweeping vegetation gave no results for the Caliscelidae although I did collect some other brachypterous planthoppers, for example, peculiar Ricaniidae and Fulgoridae (Gnezdilov 2015). It is hoped that further field surveys in other parts of the island and in different seasons will discover more caliscelid taxa to describe, and will thus increase our knowledge of the number of Madagascan endemics.

### MATERIAL AND METHODS

Morphological terminology follows Gnezdilov *et al.* (2014). The holotype of the species described below is deposited in the California Academy of Sciences, San Francisco, USA. The photos were taken using a Leica MZ95 stereomicroscope with a Leica DFC 290 digital camera, and then assembled with Helicon Focus 5.3 and Adobe Photoshop CS6. The drawings were made using a Leica MZ95 stereomicroscope.

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List of Madagascan Caliscelidae  
Family Caliscelidae Amyot & Serville, 1843  
Subfamily Ommatidiotinae Fieber, 1875  
Tribe Augilini Backer, 1915

*Cano merinus* Gnezdilov, 2011

Distribution: Toliara Province.

Note: Known from the female only. Illustrations are published by Gnezdilov (2011a).

*Signoreta victorina* Gnezdilov & Bourgoin, 2009

Distribution: Antananarivo Province.

Note: Known from the female only. Illustrations are published by Gnezdilov and Bourgoin (2009).

Subfamily Caliscelinae Amyot & Serville, 1843  
Tribe Caliscelini Amyot & Serville, 1843

*Afronaso gryphus* Gnezdilov & Bourgoin, 2009

Distribution: Fianarantsoa Province.

Note: Known from males and one female. Illustrations are published by Gnezdilov and Bourgoin (2009).

*Afronaso malagasicus* Gnezdilov & Bourgoin, 2009

Distribution: Antananarivo Province.

Note: Known from the male only. Illustrations are published by Gnezdilov and Bourgoin (2009).

*Calampocus sphaeroides* Gnezdilov & Bourgoin, 2009

Distribution: Fianarantsoa Province.

Note: Known from the male and one female. Illustrations are published by Gnezdilov and Bourgoin (2009).

*Campures pallens* gen. n. et sp. n.

Distribution: Toliara Province.

*Issopulex gloriosus* China & Fennah, 1960

Distribution: Madagascar (Toliara Province); Glorioso Islands.

Note: Known from males and females. Illustrations are published by China and Fennah (1960) and Gnezdilov (2014).

*Madaceratops adelinae* Gnezdilov, 2011

Distribution: Toliara Province.

Note: Known from a female only. Illustrations are published by Gnezdilov (2011b).

*Patamadaga pauliani* Gnezdilov & Bourgoin, 2009

Distribution: Fianarantsoa Province.

Note: Known from a female only. Illustrations are published by Gnezdilov and Bourgoïn (2009).

*Sphenax cuneus* Gnezdilov & Bourgoïn, 2009

Distribution: Toliara Province.

Note: Known from a female only. Illustrations are published by Gnezdilov and Bourgoïn (2009).

TAXONOMY

***Campures* gen. n.**

Type species: *Campures pallens* sp. n.

Etymology: The generic name is derived from the Greek καμπούρης (hunchback).  
Gender: masculine.

Diagnosis: Body (thorax + abdomen) curved in lateral view (Fig. 1). Metope with median and sublateral carinae (Figs 2, 6). Postclypeus with relief median carina, visible in lateral view (Fig. 1). Forewings very short, reaching only the middle of 3<sup>rd</sup> abdominal tergite (Fig. 1). First metatarsomere with only latero-apical spines.

Description: Metope wide, upper margin angularly concave, lateral margins convex — roof-shaped above the scapus. Metope with distinct median and sublateral carinae (Fig. 6); latter running obliquely from upper margin of metope to the metopoclypeal suture. Median carina of metope not reaching its upper margin but running across metopoclypeal suture through whole postclypeus. On postclypeus median carina relief, keel-shaped (in lateral view) (Fig. 1). Metopoclypeal suture distinctly visible only laterally. Postclypeus large. Pedicel large with apical process. Basal part of pedicel with 6–7 sensory pits and the apical process with 5 sensory pits (Figs 7, 8). Coryphe transverse, sexangular (in dorsal view) (Fig. 5), posterior margin nearly straight. Pronotum transverse, 0.3× as long as mesonotum, with distinct median carina (Fig. 6). Lateral margins of pronotal disc keel-shaped. Paradiscal fields of pronotum very narrow, almost not visible behind the eyes. Paranotal lobes of pronotum wide, without carinae. Mesonotum with distinct lateral carinae and without median carina. Forewings short, reaching only the middle of 3<sup>rd</sup> abdominal tergite, venation obscure (Fig. 1). Fore and middle femora flattened, slightly foliate (Fig. 9); hind femora flattened, but not foliate. Hind tibia with a single lateral tooth medially and with five apical teeth. First metatarsomere 1.5× as long as second one, both with only latero-apical spines. Ventral surface of first metatarsomere with short and thick setae. Ventral surface of second metatarsomere with long and thin setae. Arolium of pretarsus exceeding claws' apices (in dorsal view).

Female genital block: Sternum VII with concave hind margin (Fig. 11). Pygofer with widely and slightly concave hind margin. Anal tube wide, nearly oval (in dorsal view) (Fig. 10). Anal column (paraproct) short. Each gonoplac with a comb. Endogonocoxal processes large, bilobed apically (Fig. 12).

Comparison: According to the presence of keel-shaped median carina on the postclypeus, and general pale coloration with brown dots, the new genus is similar to the female of *Calampocus sphaeroides* Gnezdilov & Bourgoïn, 2009 (Gnezdilov & Bourgoïn 2009, figs 27–28). However, the latter species is distinguished by a small proboscis formed by the lower part of metope and upper part of the postclypeus, pronotum without carinae,

mesonotum with median carina, and first metatarsomere with one intermediate spine (Gnezdilov & Bourgoïn 2009).

***Campures pallens* sp. n.**

Figs 1–12

Etymology: Species named according to pale general coloration.

Description: Morphology as mentioned for the genus.

Female.

Measurements: Total length: 3.2 mm.

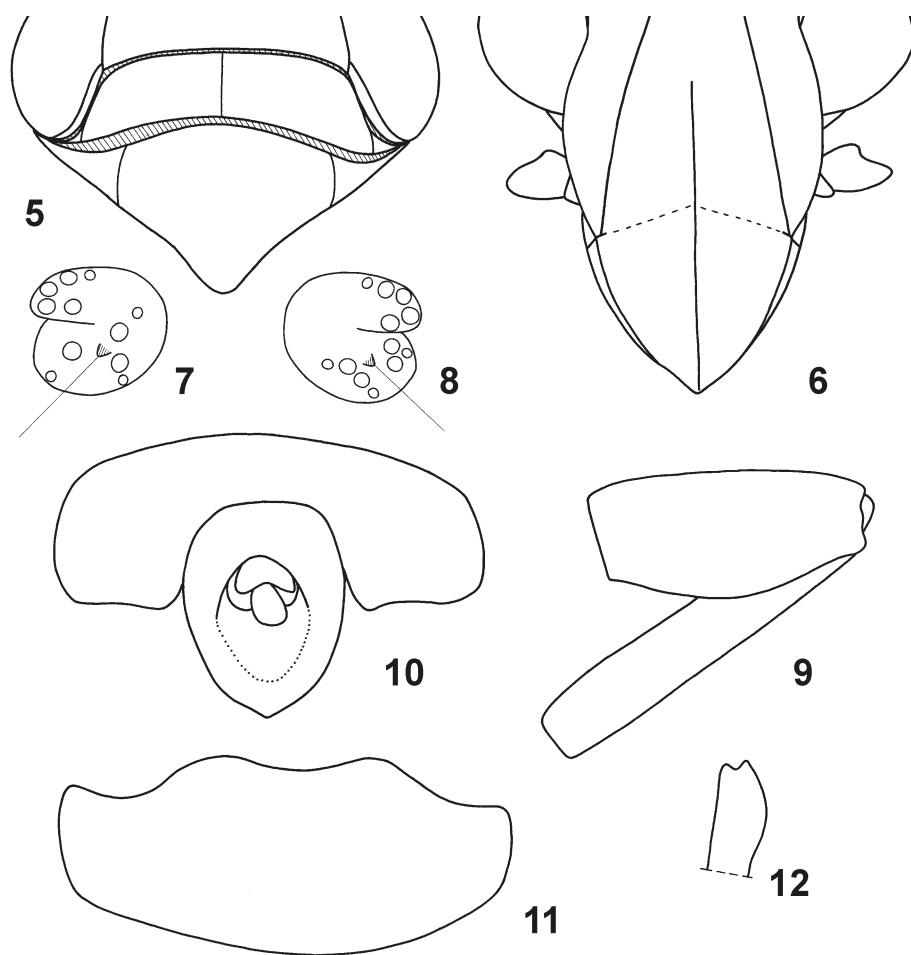
Coloration: General coloration light-brown yellowish with dark-brown spots and dots (Figs 1–4). Genae with dark-brown spot above the scapus. Pedicel dark brown with light-yellow sensory organs. Postclypeus with large oval dark-brown spot on each side. Apex



Figs 1–4. *Campures pallens* gen. et sp. n., holotype: (1) lateral view; (2) frontal view; (3) head and pro- and mesonotum, dorsal view; (4) ovipositor and VII sternum, ventral view. Total length of the specimen: 3.2 mm.

of second segment of rostrum and whole third segment dark brown. Hind trochanters, apices of tibiae, first metatarsomeres apically, whole second and third metatarsomeres, and all claws dark brown. Fore and middle tarsi light yellow. Apices of spines black. Sternum VII basally and gonocoxae VIII dark brown (Fig. 4).

Holotype: ♀ MADAGASCAR: *Toliara Province*: Réserve Spéciale de Cap Sainte Marie, 14.9 km 261°W Marovato (25°35'40"S 45°8'49"E), 160 m, 13–19.ii.2002, "CASENT 3004645", Fisher, Griswold *et al.* leg., "California Acad. Of Sciences/pitfall trap – in spiny forest thicket/code: BLF5650".



Figs 5–12. *Campures pallens* gen. et sp. n., holotype: (5) head, pro-, and mesonotum, dorsal view; (6) head, frontal view; (7, 8) left and right pedicel; (9) left middle femora and tibia; (10) anal tube and pygofer, dorsal view; (11) VII sternum, ventral view; (12) endogonocoxal process. Total length of the specimen: 3.2 mm.



## DISCUSSION

All Madagascan caliscelid species, except *Issopulex gloriosus* China & Fennah, 1960, known also from the Glorios Islands situated to the north-west of Madagascar, are endemic to Madagascar. On the generic level, only the genus *Afronaso* Jacobi, 1910 of the tribe Caliscelini is shared with continental Africa (Gnezdilov & Bourgoïn 2009); all other eight genera are supposed to be endemic to Madagascar. *Calampocus* and *Issopulex* are close to African *Savanopulex* Dlabola, 1987 (Gnezdilov & Bourgoïn 2009). As was shown for the example of *I. gloriosus*, originally described from small islands (China & Fennah 1960), the distribution of taxa from Africa to Madagascar and back could have happened across the ocean on “islands of plants” (Gnezdilov 2014).

Within the Madagascan genera, the presence of two Augilini taxa, *Signoreta* Gnezdilov & Bourgoïn, 2009 and *Cano* Gnezdilov, 2011, is supposed to be the most interesting fact from the biogeographic point of view as these taxa, together with the Indian *Symplanodes conjunctor* Fennah, 1987, are treated as the most primitive ones in the tribe (Gnezdilov 2011a). These genera are characterised by the presence of latero-apical spines on the first and second metatarsomeres. All other modern Augilini are distinguished by a lack of spines on the metatarsomeres. Currently the tribe Augilini is present only in the Old World and there only in the Oriental Realm and on Madagascar (Gnezdilov 2013a). However, recently a fossil genus of the tribe was discovered in Early Miocene amber of the New World (Bourgoïn *et al.* 2015). This fossil genus also has spines on the first metatarsomere. Thus, according to the spinulation of metatarsomeres, there is a group of related genera distributed formerly in America and currently in Madagascar and southeastern India. It is for this reason that Madagascan *Cano* and *Signoreta* should be treated as relicts on the margin of a former wide Old and New World distribution of Augilini. Caliscelidae, as with other families of higher Fulgoroidea grouped by me in the “issidoid” group of families (Gnezdilov 2013b), may be treated as rather evolutionarily young taxa, as according to the palaeontological data these families could have evolved at the boundary of the Cretaceous and the Cenozoic, and underwent a rapid diversification in the Eocene–Miocene (Szwedo 2002). The advanced position of the Caliscelidae is showed by molecular analysis (Urban & Cryan 2007). I accept Eskov’s (1984) explanation of the modern disjunctive distribution of some taxa by the extinction of “connecting” forms on the northern continents. So, possibly, Augilini were distributed much more widely in former times than at present. On the other hand, to explain the distribution of the tribe and close relationships of Madagascan and Indian taxa from the position of the “Gondwanian group”, we would need to date the origin of Augilini at least by 160–130 mya (the time of the split between Indo-Madagascar and Africa) and expect that the Indian genus *Symplanodes* Fennah, 1987 existed about 90 mya (the time of the split between India and Madagascar) (Rabinowitz *et al.* 1983; Praveen Karanth 2006).

I leave the question of origin of the Madagascan caliscelid fauna open until more taxa are discovered on the island and the phylogeny of the family Caliscelidae is complete. Either of the two aforementioned scenarios could have taken place; however, the scenario of recent evolution and distribution of the family looks more realistic in terms of the climatic and geological changes during the Cenozoic. By way of analogy, the Issidae fauna of the Western Palaearctic, presently comprising more than 400 species in 51 genera (Gnezdilov *et al.* 2014), developed in the dry biotopes of the ancient

Mediterranean region; however, the presence of the biotopes of the Mediterranean type of climate in the Northern Hemisphere is dated only by the Miocene–Pliocene (Zherikhin 1995). The richness of Western Palaearctic Issidae in comparison with the time of the appearance of Mediterranean biotopes indicates a rather rapid diversification of this group. In relation to Madagascan groups, an example is the famous baobabs. Currently the genus *Adansonia* L. (Bombacaceae) comprises eight species — one species distributed in Continental Africa and Madagascar, six species endemic to Madagascar, and one species known from Australia (Baum 2003). Phylogenetic analysis showed that the time of divergence of the Madagascan group of species is 10.5–9.4 mya and all six Madagascan endemic species were derived during the last 3.6 million years. According to the molecular clock it is expected that the distribution of the genus *Adansonia* from Africa/Madagascar to Australia happened no more than 17 mya and not before 7 mya (Miocene) (Baum 2003). As expected, the genus spread from Africa/Madagascar to Australia either by transoceanic transmission or by land bridges which do not exist anymore (Baum 2003). We cannot directly compare the processes of evolution and dispersal of animals and plants, or even those of different groups of animals, but the case of the rapid evolution of *Adansonia* species give a sense of the evolution of the group, with current distribution similar to “typical Gondwanian” but actually very recent.

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