Proceedings of the Zoological Institute RAS
Vol. 319, No. 1, 2015, pp. 120–125

УДК 595.753(593)

A NEW GENUS AND NEW SPECIES OF THE FAMILY CALISCELIDAE (HEMIPTERA: AUCHENORRHYNCHA: FULGOROIDEA) FROM THAILAND WITH NOTES ON EVOLUTION OF THE FAMILY

V.M. Gnezdilov

Zoological Institute of the Russian Academy of Sciences, Universitetskaya Emb. 1, 199034 Saint Petersburg, Russia; e-mails: vmgnezdilov@mail.ru, vgnezdilov@zin.ru

ABSTRACT

Thaiscelis alutaceus gen. et sp. nov. is described from Thailand, which is the first record of the subfamily Caliscelinae from this country. The taxonomic position of the genus *Bambusicaliscelis* Chen et Zhang, as well as the evolution of the family Caliscelidae, are briefly discussed. The area of origin and the primitive and advanced groups of the family are hypothesized.

Key words: Augilini, *Bambusicaliscelis*, biogeography, Caliscelini, evolution, morphology, new genus, new species, Peltonotellini, systematics

НОВЫЙ РОД И НОВЫЙ ВИД СЕМЕЙСТВА CALISCELIDAE (HEMIPTERA: AUCHENORRHYNCHA: FULGOROIDEA) ИЗ ТАИЛАНДА С ЗАМЕЧАНИЯМИ ПО ЭВОЛЮЦИИ СЕМЕЙСТВА

В.М. Гнездилов

Зоологический институт Российской академии наук, Университетская наб. 1, 199034 Санкт-Петербург, Россия; e-mails: vmgnezdilov@mail.ru, vgnezdilov@zin.ru

РЕЗЮМЕ

Thaiscelis alutaceus gen. et sp. nov. описан из Таиланда и представляет собой первое указание подсемейства Caliscelinae из этой страны. Систематическое положение рода *Bambusicaliscelis* Chen et Zhang, также как и эволюция семейства Caliscelidae кратко обсуждены. Гипотетически определены территория возникновения и примитивные и продвинутые группы семейства.

Ключевые слова: Augilini, *Bambusicaliscelis*, биогеография, Caliscelini, эволюция, морфология, новый род, новый вид, Peltonotellini, систематика

INTRODUCTION

The family Caliscelidae Amyot et Serville, 1843 comprises nearly 200 species in more than 70 genera divided between two subfamilies with five tribes (Gnezdilov 2013a; Bourgoin 2014). The new genus and species, described below is the first representative of the subfamily Caliscelinae from Thailand. Up to now only two species of the tribe Augilini Baker of the subfamily Ommatidiotinae Fieber (Caliscelidae) were known from the country – *Pseudosymplanella nigrifasciata* Che, Zhang et Webb, 2009 and *Tubilustrium typicum* Distant, 1916 (Che, Zhang and Webb 2009; Gnezdilov 2011). Both of these genera are also

known from other parts of the Indochinese region (China and Vietnam) (Che, Zhang and Webb 2009; Emeljanov 2013). Apparently more new taxa will be discovered from this region in the future.

MATERIAL AND METHODS

Terminology follows Gnezdilov et al. (2014).

The holotype of the species described below is deposited in the Moravian Museum, Brno, Czech Republic.

The photographs were taken using a Leica Z16 APOA microscope with a Leica DFC490 video camera. Images are produced using the software Leica Application Suite ver. 3.7, Auto-Montage Essentials, and Adobe Photoshop. The drawings are made with a Leica MZ95 light microscope.

SYSTEMATICS

Family Caliscelidae Amyot et Serville, 1843

Subfamily Caliscelinae Amyot et Serville, 1843

Tribe Caliscelini Amyot et Serville, 1843

Thaiscelis gen. nov.

Type species: *Thaiscelis alutaceus* sp. nov.

Etymology. The generic name is derived from the combination of words "Thailand" and "*Caliscelis*".

Differential diagnosis. According to carination of the metope the new genus may be placed close to the genus *Bambusicaliscelis* Chen et Zhang, 2011 known from two species from China occurring on bamboo (Chen and Zhang 2011). Externally the new genus is clearly distinguished by the presence of adult sensory pits on the metope, an elongate coryphe and the dark brown or black general coloration.

Description. Metope relatively wide, almost square, with distinct median carina running through whole postclypeus across metopoclypeal suture (Figs. 3, 6). Postclypeus large. Sublateral carinae of metope distinctly joined to upper margin of metope, but not joining median carina, almost reaching metopoclypeal suture. Each side of metope between lateral margin and sublateral carina with two vertical rows of sensory pits – 4 large pits along lateral margin (lateral row) and 7 small pits along sublateral carina (sublateral row) (Figs 6, 7), each pit with massive tubercle-like basement (Fig. 8). Pits of lateral row almost twice as large as pits of sublateral row. Six pits of sublateral row situated very closely to sublateral carina, only apical pit at distance from carina. Metopoclypeal suture appearing as weak carina. Ocelli absent. Second rostral segment twice as long as third (apical) one. Coryphe elongate, septangular, anterior margin acutely angulate, posterior margin concave, with very weak median carina interrupted medially (Figs. 1, 5). Pronotum 0.5 time as long as coryphe medially, with strong median carina and with lateral carinae on disc; paradiscal fields of pronotum very narrow; paranotal lobes wide, each with thick transverse carina below eye. Mesonotum longer than pronotum, with distinct lateral carinae, median carina very weak. Metopial surface between (inside of) sublateral carinae, surface of coryphe, pro- and mesonotum, and abdominal segments, except 7th sternum, shagreen. Fore wings short, reaching just hind margin of 3rd abdominal tergite, venation obscure, with claval suture indistinct. All femora slightly flattened laterally; each hind femur with apical tooth (Fig. 9). Hind tibia with single lateral spine distally and with 6 spines apically. First metatarsomere slightly longer than second metatarsomere; both metatarsomeres with only two latero-apical spines.

Female with hind margin of 7th sternum weakly concave (Fig. 10). Hind margin of pygofer distinctly concave medially (Fig. 12). Anal tube narrowing apically (in dorsal view) (Fig. 11). Anal column (paraproct) short. Each gonoplac with comb (Figs. 4, 12).

Male unknown.

Thaiscelis alutaceus sp. nov.

(Figs. 1–12)

Holotype. Female, Thailand, Soppong, 1500 m, 19°27´N 98°20´E, 28–31 May 1995, Vit Kubáň leg., "Collectio Moravský museum Brno".

Etymology. The species is named for characteristic shagreen microsculpture of the face and fore wings surface.

Description. Morphology as mentioned for genus. General coloration from dark brown to black. Metopoclypeal suture and dots on abdominal tergites light brownish yellow. Apical part of median carina of coryphe light yellow. Each femur with pair of light brown patches. Rostrum medially, hind margin of 7th sternum medially, gonoplacs medially and tarsomere soles, light brown.

Total body length. 4.0 mm.

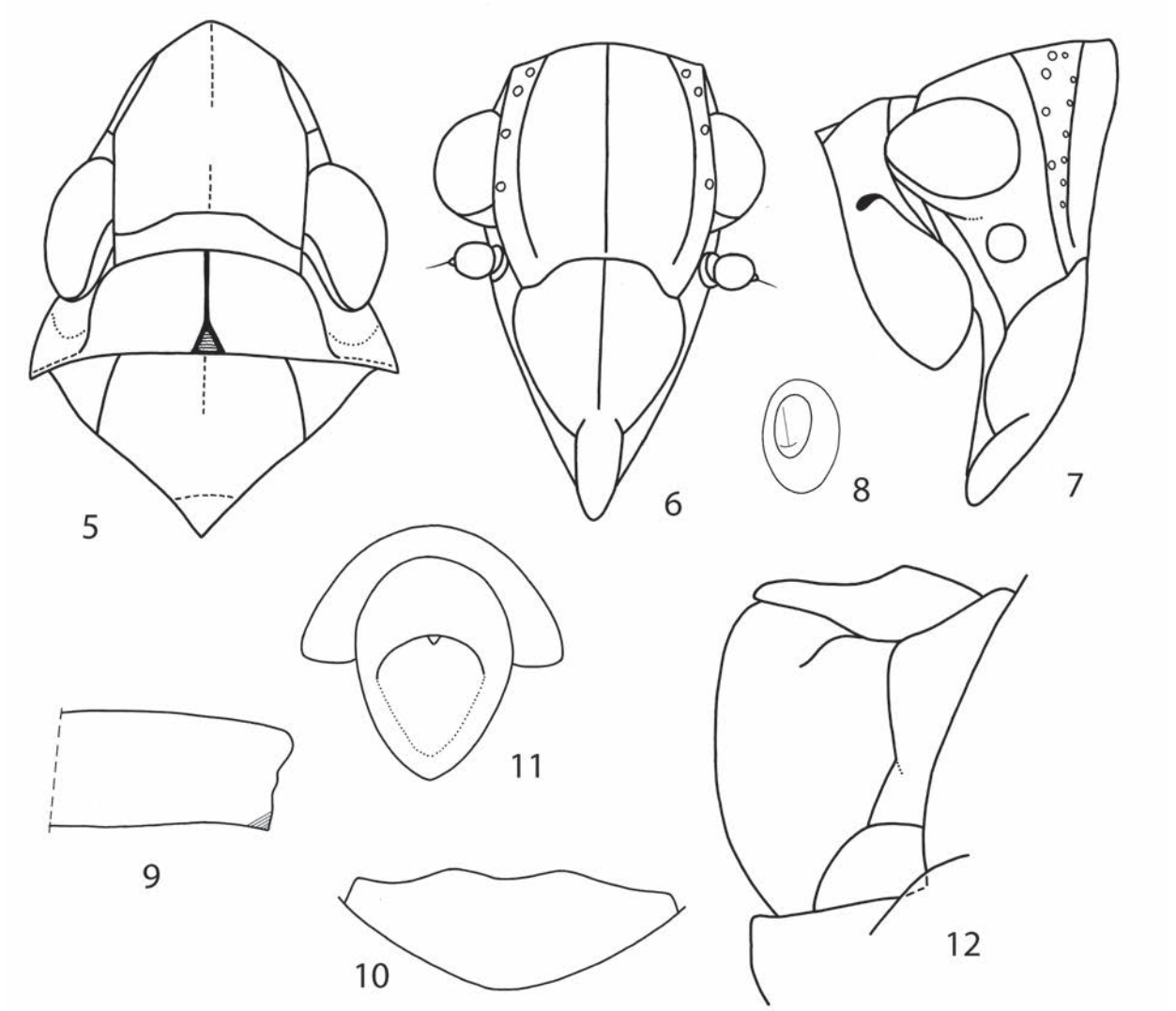
Figs 1–4. *Thaiscelis alutaceus* gen. et sp. nov., holotype. 1 – dorsal view, 2 – lateral view, 3 – frontal view, 4 – ovipositor, lateral view. Total length of the specimen – 4.0 mm.

DISCUSSION

Classification of the family Caliscelidae is well developed (Gnezdilov 2013a). The family comprises the following two subfamilies and five tribes – Caliscelinae Amyot et Serville, 1843 (Caliscelini Amyot et Serville, 1843 and Peltonotellini Emeljanov, 2008) and Ommatidiotinae Fieber, 1875 (Ommatidiotini Fieber, 1875, Augilini Baker, 1915, and Adenissini Dlabola, 1980). The tribe Adenissini includes four subtribes: Adenissina Dlabola, 1980, Bocrina Emeljanov, 1999, Coinquendina Gnezdilov et Wilson, 2006, and Pteriliina Gnezdilov et Wilson, 2006.

No phylogenetic analysis of the family has been performed, but according to morphological data the tribe Augilini and subtribe Pteriliina (Adenissini) may be treated as primitive taxa as the members of these groups have rather well developed fore and hind wings. Other tribes (and subtribes of Adenissini) are characterised by different levels of brachyptery and may be treated as advanced and specialized taxa. On the other hand, one of the most advanced tribes has to be Peltonotellini as it is characterized by adult sensory pits apparently as a result of neoteny (larvalisation). Therefore, within Caliscelidae, there are at least two main evolutionary trends – brachyptery and neoteny.

Regarding *Thaiscelis alutaceus* gen. et sp. nov. it is characterized by the presence of adult sensory pits on the metope, appearing intermediate between well-developed pits of Peltonotellini and rudimentary pits or pustules of other Caliscelini. It is very similar to

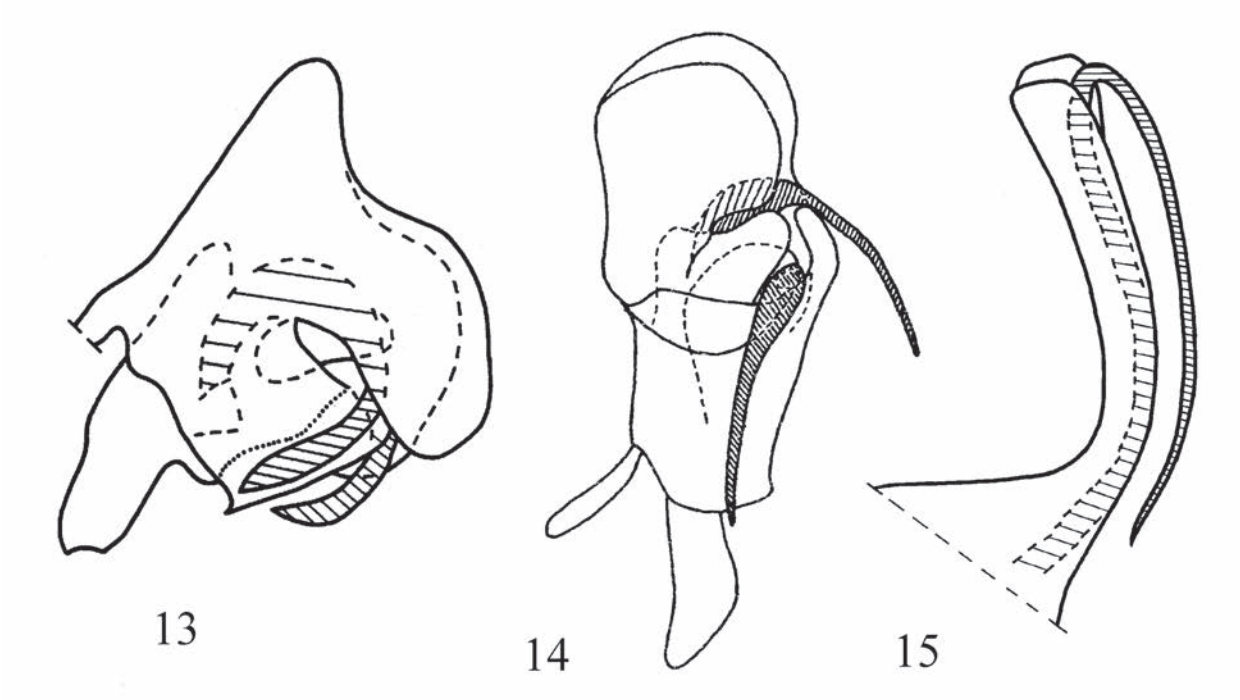


Figs 5–12. *Thaiscelis alutaceus* gen. et sp. nov., holotype. 5 – head, pro-, and mesonotum, dorsal view, 6 – head, frontal view, 7 – head and pronotum, lateral view, 8 – metopial sensory pit, 9 – apex of hind femur, lateral view, 10 – hind margin of 7th sternum, ventral view, 11 – anal tube, dorsal view, 12 – ovipositor, lateral view.

the fifth instar larva of *Bambusicaliscelis* species in the elongate and septangular coryphe and the presence of two rows of sensory pits (4 pits in a lateral row and 7 pits in a sublateral row) on the metope. *Bambusicaliscelis* nymphs also have 4 pits in the lateral row but the sublateral row has 8 pits (Chen and Zhang 2011, on fig. 22 for *B. fanjingensis* just 7 pits are figured). In adult *Bambusicaliscelis* larval pits became pustules according to the original description (Chen and Zhang 2011). So, possibly we have one more case of neoteny in the evolution of Caliscelidae.

Bambusicaliscelis may be treated as one of the most primitive members of the tribe Caliscelini as its phallobase is of the "closed-tube" type (Fig. 15), which is possibly the primitive (ancestral) condition compared to the "open-tube" type of other Caliscelini and Peltonotellini (Figs. 13, 14), which may be treated as a derived condition.

Southeast Asia may be considered the place of origin of the family Caliscelidae as four of its five tribes are present here. Current distribution of the family Caliscelidae shows that it is mostly an Old World



Figs 13–15. Caliscelidae, penis in lateral view. 13 – *Caliscelis swazi* Gnezdilov et Bourgoin (after Gnezdilov and Bourgoin 2009), 14 – *Peltonotellus turgidus* Emeljanov (after Emeljanov 2008); 15 – *Bambusicaliscelis fanjingensis* Chen et Zhang (after Chen and Zhang 2011, modified).

group with just one tribe, Peltonotellini, native to the modern New World fauna (Gnezdilov 2013a). Two Old World species of the tribe Caliscelini, *Caliscelis bonellii* (Latreille, 1807) and *Asarcopus palmarum* Horváth, 1921, are introductions to California, U.S.A. (O'Brien 1988). One more tribe, Augilini, is known from fossils, of Early Miocene age, from the Neotropics (Bourgoin, Wang and Gnezdilov in press).

Interestingly there are two Augilini genera, *Cano* Gnezdilov, 2011 and *Signoret*a Gnezdilov et Bourgoin, 2009, endemic to Madagascar (Gnezdilov and Bourgoin 2009; Gnezdilov 2011). These, together with the above New World fossil, suggests they are probably relicts of a group of wider distribution, which possibly also included Continental Africa, that later became extinct, as happened with Lemuriformes Gray (Mammalia) (Briggs 2003) or simply not yet found as the African fauna of the family is incompletely described. Similarly, only recently the first representative of the subfamily Colpopterinae Gnezdilov (Nogodinidae Melichar), considered New World endemic, was discovered in Southern Africa (Gnezdilov 2012). For this find I hypothesized a rather recent disjunct distribution from a former wider (Old and New World) distribution, by means of extinction of the "connecting" forms on the northern continents, following Eskov (1984). So, the same may be true for Augilini as well as for other members of the "issidoid group" of higher Fulgoroidea to which Caliscelidae and Nogodinidae belong (Gnezdilov 2013b). Thus, these might have emerged just at the boundary of the Cretaceous and Paleogene and underwent a rapid diversification in the Eocene–Miocene (Szwedo 2002). I might hypothesize as well that there was a single invasion (as the "simplest way") of the Peltonotellini to the New World with a subsequent diversification, according to the molecular phylogeny of Urban and Cryan (2007). This is supported by the three studied North American genera (*Aphelonema* Uhler, *Bruchomorpha* Newman, and *Fitchiella* Van Duzee), which form a monophyletic group (Urban and Cryan 2007), and according to my unpublished data the North American genus *Papagona* Ball, distributed in Arizona (USA) (Bartlett et al. 2014), is the closest relative to the genus *Itatiayana* Metcalf from Brazil (Schmidt 1932).

ACKNOWLEDGEMENTS

I am glad to thank Dr Igor Malenovský (Brno, Czech Republic) who made available the specimen for my study and Dr Lois O'Brien (Tucson, USA) and Mr Mick Webb (London, UK) for their comments on the manuscript and language editing. My trip to the Moravian Museum (Brno, Czech Republic) was financially supported by the Alexander von Humboldt Stiftung (Bonn, Germany).

REFERENCES

Bartlett C.R., O'Brien L.B. and Wilson S.W. 2014. A review of the planthoppers (Hemiptera: Fulgoroidea) of the United States. *Memoires of the American Entomological Society*, **50**: 1–187.

Bourgoin T. 2014. FLOW (Fulgoromorpha Lists on The Web): a world knowledge base dedicated to Fulgoromorpha. Updated at: http://hemiptera-databases.org/flow/ Accessed 27 November 2014.

Bourgoin T., Wang Rong Rong and Gnezdilov V.M. First fossil record of the family Caliscelidae (Hemiptera: Fulgoroidea) – a new early Miocene Dominican amber genus extends the distribution of Augilini to the Neotropics. *Journal of Systematic Palaeontology.* [In press].

Briggs J.C. 2003. Fishes and birds: Gondwana life rafts reconsidered. *Systematic Biology*, **52**(4): 548–553.

Che Yanli, Zhang Yalin and Webb M.D. 2009. A new genus and species of the planthopper tribe Augilini Baker (Hemiptera, Caliscelidae, Ommatidiotinae) from Thailand and China. *Zootaxa*, **2311**: 49–54.

Chen Xiang-Sheng and Zhang Zheng-Guang. 2011. *Bambusicaliscelis*, a new bamboo-feeding planthopper genus of Caliscelini (Hemiptera: Fulgoroidea: Caliscelidae: Caliscelinae), with descriptions of two new species and their fifth-instar nymphs from Southwestern China. *Annales of the Entomological Society of America*, **104**(2): 95–104.

Emeljanov A.F. 2008. New species of the genus *Peltonotellus* Puton (Homoptera, Caliscelidae) from Kazakhstan, Middle and Central Asia. *Tethys Entomological Research*, **16**: 1–12.

Emeljanov A.F. 2013. New genera and new species of the tribe Augilini (Homoptera: Caliscelidae). *Caucasian Entomological Bulletin*, **9**(2): 217–221.

Eskov K.Y. 1984. The Continent Drift and the Problems of Historical Biogeography. In: Y.I. Chernov (Ed.). Faunogenesis and Phylocenogenesis. Nauka, Moscow: 24–92. [In Russian].

Gnezdilov V.M. 2011. New and little known planthoppers of the subfamily Ommatidiotinae (Homoptera, Fulgoroidea, Caliscelidae) from Madagascar and South Asia. *Entomologicheskoe obozrenie*, **90**(2): 329–334. [In Russian]. English translation published in *Entomological Review*, 2011, **91**(6): 750–754.

Gnezdilov V.M. 2012. Revision of the tribe Colpopterini Gnezdilov, 2003 (Homoptera, Fulgoroidea, Nogodinidae). *Entomologicheskoe obozrenie*, **91**(4): 757–774. [In Russian]. English translation published in *Entomological Review*, 2013, **93** (3): 337–353.

Gnezdilov V.M. 2013a. Modern system of the family Caliscelidae Amyot et Serville (Homoptera, Fulgoroidea). *Zoologichesky Zhurnal*, **92**(10): 1309–1311. [In Russian]. English translation published in *Entomological Review*, 2014, **94**(2): 211–214.

Gnezdilov V.M. 2013b. Issidisation of fulgoroid planthoppers (Homoptera, Fulgoroidea) as an evidence of parallel adaptive radiation. *Entomologicheskoe obozrenie*, **92**(1): 62–69. [In Russian]. English translation published in *Entomological Review*, 2013, **93**(7): 825–830.

Gnezdilov V.M. and Bourgoin T. 2009. First record of the family Caliscelidae (Hemiptera: Fulgoroidea) from Madagascar, with description of new taxa from the Afrotropical Region and biogeographical notes. *Zootaxa*, **2020**: 1–36.

Gnezdilov V.M., Holzinger W.E. and Wilson M.R. 2014. The Western Palaearctic Issidae (Hemiptera, Fulgoroidea): an illustrated checklist and key to genera and subgenera. *Proceedings of the Zoological Institute RAS*, **318** (Supplement 1): 1–124.

O'Brien L.B. 1988. Taxonomic changes in North American Issidae (Homoptera: Fulgoroidea). *Annals of the Entomological Society of America*, **81**(6): 865–869.

Schmidt E. 1932. Neue und bekannte Zikadengattungen und Arten der neuen Welt. (Hemipt.-Homopt.). *Entomologische Zeitung. Herausgegeben von dem entomologischen Vereine zu Stettin*, **93**: 35–54.

Szwedo J. 2002. Amber and amber inclusions of planthoppers, leafhoppers and their relatives (Hemiptera, Archaeorrhyncha et Clypaeorrhyncha). *Denisia 04, zugleich Kataloge des OÖ. Landesmuseums, N. F.*, **176**: 37–56.

Urban J.M. and Cryan J.R. 2007. Evolution of the planthoppers (Insecta: Hemiptera: Fulgoroidea). *Molecular phylogeny and evolution*, **42**: 556–572.

Submitted November 27, 2014; accepted February 4, 2015.