

New Tatarian Representatives of the Subfamily Chaulioditinae (Insecta: Grylloblattida: Chaulioditidae) from European Russia

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Abstract—New Late Permian grylloblattids of the subfamily Chaulioditinae (Chaulioditidae) are described: *Chauliodites afonini* sp. nov. (Sokovka locality, Vladimir Region; Vyatkian Stage), *Ch. gomankovi* sp. nov. (Novo-Aleksandrovka locality, Orenburg Region; Severodvinian Stage), and *Ch. ponomarenkoi* sp. nov. (Isady locality, Vologda Region, upper Severodvinian Stage). Stratigraphic distribution of the subfamily is discussed.

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INTRODUCTION

The family Chaulioditidae was erected by Handlirsch (1906–1908) for *Chauliodites picteti* Heer, 1864 described in the 19th century from Gödewitz, Germany (Lower or Middle Buntsandstein, Triassic). Later the family Tomiidae Martynov, 1936 was synonymized under Chaulioditidae, and the latter was subdivided into two subfamilies, Chaulioditinae and Kargalellinae. The subfamily Kargalellinae is represented only by the genus *Kargalella* (Aristov, 2003, 2004) from the Urzhumian. The subfamily Chaulioditinae comprises three or four genera. The monotypic genus *Nivopteria* is known from the Middle Triassic of China (Lin, 1978). Another monotypic genus *Paratomia* is described from the Maltseva Formation of Siberia (Aristov, 2003). *Yontala camura* from the Lower Triassic of European Russia was also tentatively assigned to the family Chaulioditidae (Aristov, 2005). The most widespread genus *Chauliodites* is known from the Tatarian Epoch of the Permian of Russia,¹ Lower Triassic of Russia and Mongolia, Middle Triassic of France and China, and Triassic of Germany (Aristov, 2003, 2004, 2005). It is necessary to mention that several formations, such as the Maltseva Formation of Babii Kamen', Kemerovo Region, Bugarikta Formation of Anakit and Tura, Krasnoyarsk Region, Upper Yamaan-Uss Formation of Yamaan-Uss, Mongolia are dated Upper Permian by some authors (Maltseva and Bugarikta Formation: Gomankov, 2005; whole Yamaan-Uss Formation: Uranbileg, 2001), but the nature of their insect fauna (including high abundance of Chaulioditinae) indicates an Early Triassic age.

Up to now the genus *Chauliodites* was represented almost exclusively by Triassic species. Three new species of the genus from the Tatarian of Russia, collected in 2004 by field parties of the Paleontological Institute, Russian Academy of Sciences are described below. Formerly the subfamily Chaulioditinae was regarded as mainly Lower and Middle Triassic group, and its more ancient representatives were considered rather exceptional. Description of new members of Chaulioditinae from the Vyatkian and Severodvinian demonstrates that they were quite widespread in the Tatarian Epoch. Therefore, the stratigraphic significance of this subfamily for determining the Permian–Triassic boundary much decreased. So, in the terminal Permian (late Vyatkian) of the environs of Vyazniki, Vladimir Region up to now only Chaulioditinae (more characteristic of the Lower Triassic) and an undescribed member of the family Megakhosaridae (characteristic of the Permian and surviving until mid-Triassic) are known. At the same time, the family Liomopteridae, dominant in almost all (with scattered exceptions) Biarmian and Tatarian (i.e., Middle and Upper Permian) insect faunas and unknown from the Triassic, is not found there. Likewise liomopterids are not found in the Poldarsa Formation (Upper Severodvinian) of Isady, Vologda Region. However, in the latter fauna, chaulioditids constitute a considerable part of grylloblattids identifiable at the family level. Thus, it is still hardly possible to trace the Permian–Triassic boundary based on the disappearance of Liomopteridae and turning of Chaulioditinae into a dominant group (that is characteristic of Early and early Middle Triassic insect faunas). Nevertheless the assemblages with the presence of liomopterids indicate the Permian age of deposits, whereas those dominated by Chaulioditinae indicate the Early Triassic age. The mere presence of Chaulioditinae in the assemblage is insufficient evidence of the Early Triassic age of strata.

¹ Subdivisions of the Permian are given according to the Resolution of the Interdepartmental Stratigraphic Committee (*Resolutions...*, 2006).

Therefore, the family Chaulioditidae appeared in insect faunas of the Biarmian Epoch. This family was represented by the endemic subfamily Kargalellinae in the Urzhumian Age, and by the earliest, usually infrequent, Chaulioditinae in the Severodvinian and Vyatkian. The latter subfamily reached its heyday in the Early Triassic, when its members not only dominated the grylloblattids, but also constituted a significant share (up to 18%) of the insects in fossil assemblages. The last representatives of the family had become extinct by the mid-Triassic.

MATERIAL

The material studied is deposited in the collection of the Paleontological Institute, Russian Academy of Sciences (PIN).

SYSTEMATIC PALEONTOLOGY

Family Chaulioditidae Handlirsch, 1908

Subfamily Chaulioditinae Handlirsch, 1908

Genus *Chauliodites* Heer, 1864

Chauliodites afonini Aristov, sp. nov.

Etyymology. In honor of the paleobotanist S.A. Afonin.

Holotype. PIN, no. 5102/1, well-preserved forewing (part and counterpart); Vladimir Region, env. Vyazniki, locality Sokovka; Permian, Tatarian, Upper Vyatkian.

Description (Figs. 1a, 2a). Anterior margin of forewing convex; costal area three times as wide as subcostal one, crossed by simple, rarely forked anterior SC branches, connected by crossveins. SC ending in distal wing third; anterior R branches simple or forked, connected by crossveins. RS originating in basal wing quarter, with two branches. MA and MP 3-branched, MP not desclerotized. Branches of CuA parallel, CuA₁ straight. Crossveins mainly simple, forming several cells in radial area. Dark pattern consisting of bands and spots.

Measurements (mm): forewing length, about 17.

Comparison. *C. afonini* sp. nov. is very close to *C. durus* (Aristov, 2003) known from the localities Anakit and Tura, Krasnoyarsk Region (Lower Triassic, Bugarikta Formation). The new species differs in the more convex anterior wing margin, presence of a fork on anterior R branch, and absence of desclerotization at the middle of MP. From another similar species, *C. cancellatus* (Aristov, 2003) from Babii Kamen locality, Kemerovo Region (Lower Triassic, Maltseva Formation) the new species differs in the absence of desclerotization at the middle of MP and of double cell rows in medial and intercubital areas.

Material. Holotype.

Chauliodites gomankovi Aristov, sp. nov.

Etyymology. In honor of the paleobotanist A.V. Gomankov.

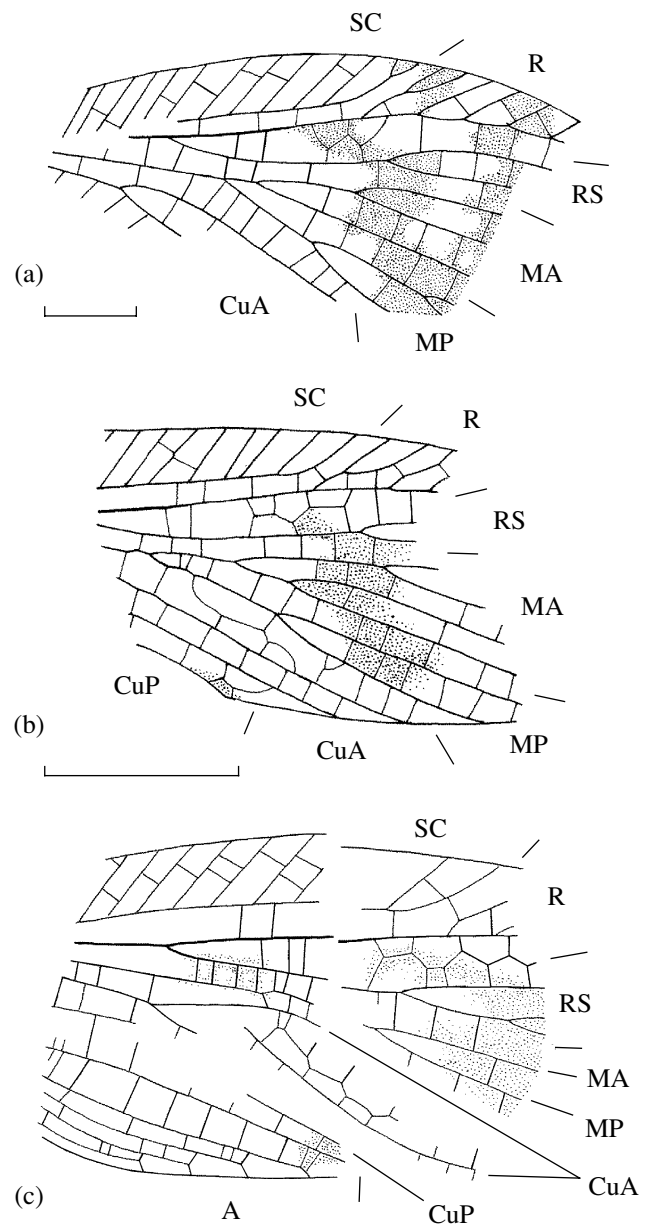


Fig. 1. Forewings of *Chauliodites* spp.: (a) *C. afonini* sp. nov., holotype PIN, no. 5102/1; (b) *C. gomankovi* sp. nov., holotype PIN, no. 2781/167; (c) *C. ponomarenkoi* sp. nov., holotype PIN, no. 3840/29. Scale bar 3 mm.

Holotype. PIN, no. 2781/167, well-preserved forewing (part and counterpart); Orenburg Region, 6 km north of the village of Troitskoe, left bank of the Kuplya River near Novo-Aleksandrovka, locality Novo-Aleksandrovka; Permian, Tatarian, Severodvinskian.

Description (Figs. 1b, 2b). Anterior margin of forewing weakly convex; costal area two times as wide as subcostal one, crossed by simple anterior SC branches connected by crossveins. SC ending in distal wing third; anterior R branches simple or forked, connected by crossveins. RS originating in basal wing



Fig. 2. Forewings of *Chauliodites* spp.: (a) *C. afonini* sp. nov., holotype PIN, no. 5102/1, $\times 20$; (b) *C. gomankovi* sp. nov., holotype PIN, no. 2781/167, $\times 12$.

quarter, with two branches. MA and MP 4- and 2-branched, respectively. Branches of CuA parallel, CuA₁ straight. Crossveins mainly simple, forming dou-

ble cell rows in medial and intercubital areas. Dark pattern consisting of bands and spots.

Measurements (mm): forewing length, about 12.

Comparison. Most similar to *C. antiquus* (Aristov, 2003) from the younger locality Aristovo (Lower Vyatkian of the Vologda Region), differing in the forked anterior R branches, less branched RS and more branched MA.

Remarks. At present *C. gomankovi* is the oldest known member of the genus and of the subfamily Chaulioditinae.

Material. Holotype.

Chauliodites ponomarenkoi Aristov, sp. nov.

Etymology. In honor of the paleontologist A.G. Ponomarenko.

Holotype. PIN, no. 3840/29, incomplete forewing; Vologda Region, Velikii Ustyug District, left bank of the Sukhona River, 1.2 km downstream of the area of Mutovino, locality Isady; Permian, Tatarian, Upper Severodvinskian, Poldarsa Formation, Kichug Member.

Description (Fig. 1c). Anterior margin of forewing weakly convex; costal area 1.5 times as wide as subcostal one. SC and R with simple anterior branches connected by crossveins. RS originating in basal wing third, with three branches. Media forked very late, somewhat proximal to SC apex, MA and MP simple. CuA of usual structure, A₁ simple, A₂ 4-branched. Crossveins simple or (in radial area and between CuA branches) forming double cell rows. Dark pattern consisting of spots.

Measurements (mm): forewing length, about 19.

Comparison. Distinct from all known congeners in the combination of the M that forks very late and double cell row between CuA branches.

Material. Holotype.

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