**Proceedings of the Kazan Golovkinsky Stratigraphic Meeting 2021**

**Template**

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Appendix

Early Triassic conchostracans from the Tiryakh-Kobyume Section (Southern Verkhoyanie, Republic of Sakha (Yakutia))

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Abstract

Conchostracans (Сrustacean) from the Induan deposits of the Tiryakh-Kobyume section (South Verkhoyanie) were studied. We identified seven conchostracan species of five genera: *Pseudestheria* Raymond, 1946*, Сyclotunguzites* Novojilov, 1958*, Sphaerestheria* Novojilov, 1954*, Lioestheria* Deperet et Mezeran*,* 1912, *Wetlugites* Novojilov, 1958. Most of the species identified in the Tiryakh-Kobyume section (*Pseudestheria sibirica*, *Ps. tumaryana*, *Ps.kashirtzevi* and *Sphaerestheria aldanensis*) were described in the middle of the last century from the base of the Triassic of the Western Verkhoyanya (Balbuk section). It is necessary to revise these species based on new methodology of conchostracan classification.

Keywords: Conchostraca, Early Triassic, Southern Verkhoyanie, biostratigraphy.

**1. Introduction**

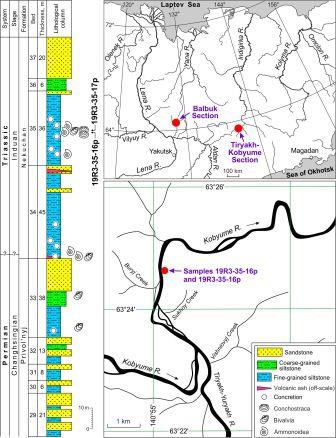
Conchostracans are small ephemeral crustaceans with a bivalved carapace. They are widespread all around the world and exist in continental basins (ponds, lakes or puddles). Conchostracan eggs are microscopic in size. They are easily transported over long distances by wind or other animals. In addition, conchostracan eggs may quickly shift from biological activity to an anabiotic state in extreme environment.

Сonchostracans are one of the best fauna for biostratigraphy and interregional correlations. Some species often appear in Permian and Triassic deposits all around the world and have a narrow stratigraphic range.

**2. Material and Methodology**

The Permian and Triassic Tiryakh-Kobyume section (thickness is more than 3000 m) is located near the mouth of the Tiryakh-Yuryakh river, the right tributary of the Kobyume river in the Southern Verkhoyanie (Republic of Sakha (Yakutia)). It is stratotype for all formations of the Permian system of the Kobyume structure-facies zone [1]. The upper part of the section consists of the Permian– Privol'nyj (thickness is about 600 m) and Triassic Nekuchan formations (Fm) (thickness is more than 500 m). The outcrop of the lower part of Nekuchan Fm was studied on the right bank of the Kobyume river, 2.5 km downstream from the mouth of the Tiryakh-Yuryakh river [2].

Figure 1. Finds of Induan conchostracans in Verkhoyanie: the Permian-Triassic boundary interval of the Tiryakh-Kobyume section with localities of conchostracans, ammonoids and bivalves, the location of the Tiryakh-Kobyume (new finds of conchostracans) and Balbuk (conchostracans were collected by A.S. Kashirtsev in 1951 [4]) sections on Eastern Siberia and the location of the conchostracans on the Kobyume River (Tiryakh-Kobyume section).



Lower part of Nekuchan Fm is represented by close-grained siltstone with rare interlayers of fine-grained sandstones and numerous carbonate-siliceous concretions (Figure 1). Bed 34 is the lower unit of the Nekuchan Fm. Ceratitida of *Otoceras* occurs in bed 34. This genus often occurs in the Permian and Triassic transition deposits of Northern Asia and North America [2]. The ash layers are found in the basement of bed 34. Occurrence of the species *Otoceras boreale* Spath allows to determine the Permian-Triassic boundary in the section in 2.5 m above a basement of bed 34. Numerous carbonate-siliceous concretions from bed 35 includes the remains of ammonoids, conchostracans and bivalves. Ammonoids of the genus *Tompophiceras* indicate that bed 35 belongs to the Lower Induan.

Conchostracans are collected in the Tiryakh-Kobyume section (bed 35, Nekuchan Fm) during field work in 2019. About 150 conchostracan specimens are obtained.

Some conchostracan shells are well preserved. Their size ranges from small to medium. Some specimens have possessed shell substance.

The optic microscope Zeiss with the digital ocular Zeiss DiscoveryV8 and special software application Zeiss Axio Vision are used during the study of conchostracans.

Conchostracan species are determined by using a modern methodology of conchosstracan classification [3]. This method is based on measuring the main parameters of conchostracan shell (size and shape of conchostracan shells, length of dorsal margin, position of the umbo in the horizontal and vertical directions, size of the larval valves, as well as maximal curvatures at the anterior, posterior, and dorsal margins).

**Results and Discussion**

Assemblage includes seven species of conchostracans: *Pseudestheria sibirica* Novojilov, 1959, *Ps. tumaryana* Novojilov, 1959, *Ps. kashirtzevi* Novojilov, 1959, *Sphaerestheria aldanensis* Novojilov, 1959, *Lioestheria ignatjevi* Novojilov, 1959, *Wetlugites pronus* Novojilov, 1958, *Cyclotunguzites gutta* (Lutkevich, 1938).

Holotypes and paratypes of four species (*Pseudestheria sibirica*, *Ps. tumaryana*, *Ps. kashirtzevi*, *Sphaerestheria aldanensis*) was collected by A.S. Kashirtsev in 1951 on the Balbuk river (right tributary of the Tumara river, Aldan river basin, Western Verkhoyanie), in 18 km higher up the mouth, in the lower part of Triassic. These species were first described by N.I. Novojilov [4, 5]. It is necessary to revise these species based on new methodology (biometry, microsculpture etc.). These species are widespread in the Induan and Olenekian deposits of northern part of Yakutia, Induan deposits of the Volga Region and Pechora Coal Basin [4, 5, 6]. It is worth to remark that V.A. Molin and N.I. Novojilov [5] noted occurrence of species *Ps. sibirica* and *S. aldanensis* in Triassic deposits in the basin of the Kobyume river. Unfortunately, the precise locations of these species are still unknown. Species *Ps. kashirtzevi* and *Ps. sibirica* were previously found in Indian deposits in the Pechora Coal Basin [6].

The species *Lioestheria ignatjevi* is known fromthe Lower Triassic sediments (Induan stage) of the Volga Region, South Urals and northern part of Yakutia [5]. Holotype of this species was collected from the Induan deposits of the Volga Region, the Vetluga Basin [4, 5].

The species *Wetlugites pronus* occurs in the Lower Triassic sediments (Induan stage) in the Volga Region and northern part of Yakutia. This species is also reported from the Lower Triassic sediments of the Kobyume river basin [5]. Holotype of *W. pronus* was sampled in the Induan deposits of the Vyatka river (Volga Basin), in 3 km north of Putyatino village [6, 7].

Finding a species of *Cyclotunguzites gutta* is important forbiostratigraphy of the Southern Verkhoyanie. This species is widespread in Induan and Olenekian deposits of northern part of Yakutia and Induan deposits of the Volga Region and Pechora basin [6]. Earlier we found *C. gutta* in the Lower Triassic deposits (Maltsevo Fm) in the Babii Kamen section (Kuznetsk Coal Basin) [8] and in the Induan deposits of the Pechora basin [6]. Holotype of this species is known from the Induan deposits of Northern European Russian [5, 9].

**Conclusion**

Conchostracan assemblage in the Tiryakh-Kobyume section contains several species characterized by wide geographic and narrow stratigraphic range. For biostratigraphy, it is essential to study conchostracan from this section because they were found in the same stratigraphic layer with Early Induan ammonoids. The validity of *Ps. sibirica*, *Ps. tumaryana*, *Ps.kashirtzevi*, *S. aldanensis* must be revised by using new methodology and equipment.

**Acknowledgments**

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