

Kazan Golovkinsky Stratigraphic Meeting

2019



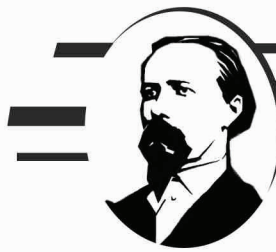
Kazan Federal University
Institute of Geology and Petroleum Technologies

Kazan Golovkinsky Stratigraphic Meeting 2019

Late Palaeozoic Sedimentary Earth Systems:
Stratigraphy, Geochronology, Petroleum Resources

September 24-28, 2019, Kazan, Russia

ABSTRACT VOLUME



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Late Paleozoic Sedimentary Earth Systems:
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Fifth All-Russian Conference “Upper Paleozoic of Russia”

September 24-28, 2019, Kazan, Russia

Abstract Volume

**KAZAN
2019**



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Международная стратиграфическая конференция Головкинского 2019

Осадочные планетарные системы позднего палеозоя:
стратиграфия, геохронология, углеводородные ресурсы

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Международная конференция посвящена проблемам девонской, каменноугольной и пермской планетарных систем, стратиграфическим событиям, эволюции биоты, седиментационным бассейнам и полезным ископаемым.

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Classification of recent and fossil (late Permian) Conchostraca using Fourier shape analysis

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Conchostraca is a group of invertebrates promising for the high-resolution biostratigraphy of continental sediments. Several methods of species determination based on the variation of biometric parameters as well as using the microsculptural ornament have been proposed (Molin, Novojilov, 1965; Stoyan et al., 1994; Chunikhin, 2009; Scholze & Schneider, 2015).

The variety of methodologies often hampers reliable species determination. Measurements of the same biometric parameters may deviate due to the different authors and instruments applied. In order to minimize the “human factor”, the Fourier shape analysis (eigenshape analysis), a tool for morphometric investigation of two-dimensional geometric shapes, can be used. Previous authors already applied Fourier shape analysis to the shape of conchostracan carapaces, focusing on the detection of intraspecific sexual dimorphism (Astrop et al., 2012; Hethke et al., 2017a) as well as on the discrimination of conchostracan species (Hethke et al., 2017b; Morton et al., 2017).



Fig. 1. Modern and fossil conchostracans of the present study: A) Middle Permian to late Permian *Pseudestheria* from the Monastery Ravine section (55°01'40.3"N; 48°53'05.1"E), Volga-Kama Region, European Russia; B) Late Permian *Pseudestheria* from the Babiy Kamen' section (54°23'04.7"N, 87°32'06.3"E), Kuznetsk Basin, West Siberia; C) A modern, taxonomically undetermined species from a mass-occurrence in the Azraq playa in Jordan

In this study, we investigated conchostracans from three localities: 50 specimens from the Monastery Ravine section (European Russia, Urzhumian and Severodvinian regional stages, middle–late Permian) (Fig. 1A); 50 specimens from the Babiy Kamen' section (West Siberia, Kuznetsk Basin, lower member of Maltsevo Fm., late Permian) (Fig. 1B); and 57 recent individuals from the Azraq playa (Jordan) (Fig. 1C).

For determining species- or genus-level differences in the material studied, covariance matrices for the principal components 1 and 2 of the eigenshape analysis have been calculated. The PC1 and PC2 covariance matrices describe 37.5% and 15.7%, respectively, of the total dispersion (Fig. 2).

Two distinct clusters can clearly be seen on the PC1 plot. Positive values characterize conchostracan specimens from the Azraq playa. This group clusters densely near the x axis. The carapace variation can be traced along the y axis: negative values correspond to ovoid shapes of carapace valves, positive values to roundish ones.

Negative values of the PC1 plot correspond to the fossil specimens from the Monastery Ravine and the Babiy Kamen' sections. This material belongs to the genus *Pseudestheria* Raymond, 1946, thus the morphometric parameters of the carapaces are similar, which caused some overlap near the x axis. Furthermore, during digitization of palaeontological samples, parts of the carapace sometimes need to be reconstructed, which also may have led to the overlap as described by other working groups (i.e., Morton et al., 2017).

Considering values of the PC2 plot, negative values belong to specimens from the Babiy Kamen' section, which have carapaces of ovoid shape. Positive values correspond to carapaces of roundish shape from the Monastery Ravine section. It must be noted that specimens with a salient (supramarginal), convex umbo correspond to negative values on the plot and those with a weakly convex umbo correspond to positive values, which reflects the interspecific variability between conchostracans from the Monastery Ravine and the Babiy Kamen' sections.

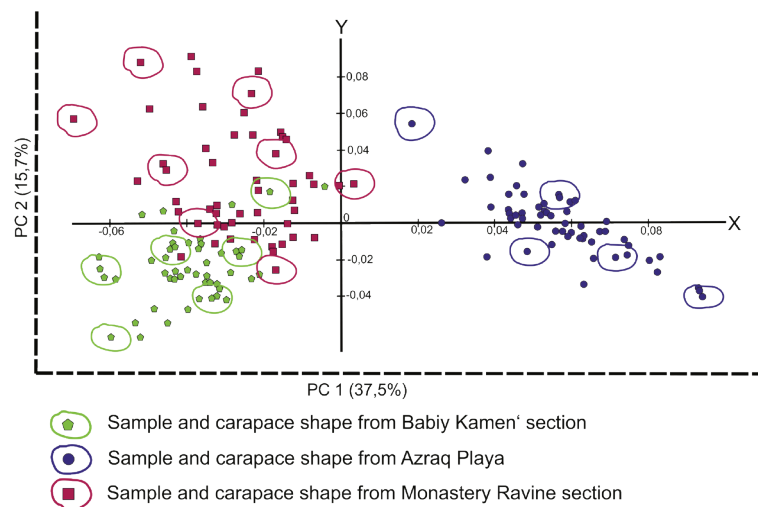


Fig. 2. Results of the Fourier shape analysis. The resulting clustering is based on the shape of the outlines of each investigated conchostracan valve

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