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Representatives of the genus *Fabaeformiscandona* Krstič, 1972 (Crustacea, Ostracoda) from Quaternary deposits of Western Siberia

Représentants du genre Fabaeformiscandona *Krstič, 1972 (Crustacea, Ostracodes) de dépôts du Quaternaire de la Sibérie occidentale*

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Abstract

The present paper deals with the study of the Ostracode species of subfamily Candoninae Kaufmann, 1900 from the Quaternary deposits of Western Siberia. The main goal is to reassess their generic affiliation based on their morphological features. The Siberian forms mentioned by Kazmina (1968, 1975, 1989) as *Candona caudata* and *C. fabaeformis* should be assigned to the genus *Fabaeformiscandona*. Shells classified by Kazmina as *Candona rectangulata* Alm are referred to *Fabaeformiscandona balatonica* Daday (Konovalova, 2012b). For the first time in the Pleistocene deposits of Western Siberia, species *Fabaeformiscandona* aff. *hyalina* (Brady et Robertson) and *Fabaeformiscandona holzkampfi* Hartwig were encountered, along with *Fabaeformiscandona harmsworthi* (Scott).

Keywords: Ostracoda; Candonidae; *Fabaeformiscandona*; Western Siberia; Quaternary deposits

Résumé

Le présent article traite l'étude de l'espèce des ostracodes de la sous-famille Candoninae Kaufmann, 1900 à partir des dépôts quaternaires de la Sibérie occidentale. L'objectif principal est de réévaluer leur appartenance générique en fonction de leurs caractéristiques morphologiques. Les formes de Sibérie mentionnées par Kazmina (1968, 1975, 1989) comme *Candona caudata* et *C. abaeformis* devraient être affectées au genre *Fabaeformiscandona*. Des coquilles classées par Kazmina comme *Candona rectangulata* Alm sont appelées *Fabaeformiscandona balatonica* Daddy (Konovalova, 2012b). Pour la première fois dans les dépôts du Pléistocène de la Sibérie occidentale, les espèces *Fabaeformiscandona aff. hyalina* (Brady et Robertson) et *Fabaeformiscandona holzkampfi* Hartwig ont été rencontrées, ainsi que *Fabaeformiscandona harmsworthi* (Scott).

Mots clés : Ostracoda ; Candonidae ; *Fabaeformiscandona* ; Sibérie occidentale ; Les dépôts quaternaires

1. Introduction

Candoninae Kaufmann, 1900 is a large subfamily of freshwater ostracodes comprising more than 500 fossil forms and over 250 recent species widely spread in the Holarctic biogeographic region (the Holarctic is the terrestrial ecozone that encompasses the majority of habitats found throughout the northern continents of the world. This region is divided into the Palearctic, consisting of North Africa and all of Eurasia, with the exception of Southeast Asia and the Indian subcontinent, and the Nearctic, consisting of North America north of southern Mexico) (Nikolayeva et al., 1989; Meisch, 2000; Krstič, 2006).

Since the beginning of the XX century, researchers tried to divide the genus *Candona* into close groups according to the morphology of both shell and the soft body, due to the great species diversity. On the base of anatomical diversity, G. Müller (1900) established two species-groups within the tribe *fabaeformis* (*fabaeformis* and *acuminata*) without specifying their

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taxonomic status. The diagnostic signs of the shell form in the tribe *fabaeformis* were as follows:

- the shell sharply compressed laterally;
- the shell width is one third of its length;
- the left valve with a well-developed lobe-like expansion of the outer lamella overlapping the right valve (in most species).

Subsequently, for the species of the *fabaeformis*-group, Krstič (1972) established the subgenus *Fabaeformiscandona*, which Danielopol (1973, 1978) raised to the genus rank with a type species *Cypris fabaeformis* Fischer, 1851 (Krstič, 1972; Danielopol, 1973, 1978). Krstič (1972) suggested the species of the *acuminata*-group to be left within the scope of the subgenus *Eucandona*, previously established by Daday (1900) as a separate genus with the type species *Candona balatonica* Daday, 1900. In the monograph on fresh-water ostracoda of Poland, Sywula (1974) assigned all species of two above-mentioned groups to the subgenus *Eucandona*.

Having studied species of the *Eucandona* genus, Petkovski and Karanovič (2000) expressed doubt about the validity of the *Fabaeformiscandona* genus. They considered that the species *Fabaeformiscandona* (*Eucandona*) *balatonica* Daday, 1900 should not be assigned to the genus *Fabaeformiscandona*, because it is easily distinguishable from other species of this genus by its morphological characteristics. More recently, Krstič (2006) recognized the right for existence of the independent genus *Eucandona* with a type species *E. balatonica* Daday, 1900. Having revised the genus *Fabaeformiscandona*, Krstič (2006) proposed to leave in it only species with a very low shell shape and characteristic details of the soft body.

The taxonomic problems of these two genera have been discussed by ostracodologists up to the present.

The images and descriptions of the studied Siberian Candoninae representatives assigned by the present author to the genus *Fabaeformiscandona* Krstić, 1972 are submitted for discussion in this paper.

2. Geographical, geological and stratigraphic settings

Western Siberia is situated between the Urals in the west and the Yenisey river in the east (Fig. 1). Its area is about 2.8 million km^2. Its greater part is occupied by the West-Siberian plain having distinct natural zones: from the tundra zone in the north to the steppe one in the south.

The West-Siberian plain is one of the greatest low-lying accumulation plains of the Earth. Its length from the north to the south is 2500 km and from the west to the east 1900 km. Its area is 2.6 million km^2. Its surface is flat, weakly differentiated, with minor elevation range. The plain has developed within the Epihercynian West-Siberian plate. Its basement is composed of the intensely dislocated Paleozoic deposits. The sedimentary cover was formed by marine and continental Mesozoic-Cenozoic sediments (clay, sandstone, marl and others) over 1000 m in thickness (in the basement troughs up to 3000–4000 m). West-Siberian plain belongs to the regions, which has been developed as isolated areas of lithosphere for long period of time.

Zonation of West Siberian plain in Pleistocene is traditionally carried out according to major paleogeographical and paleoclimatic events of the Quaternary period. Four zones are recognized from north to south of West Siberian plain: the marine transgression zone, maximum glaciation zone, periglacial and extraglacial zones (Volkova et al., 2002). The area of research is located in two zones: glacial and extraglacial (Fig. 1). The glacial zone is characterized by the alternation of interglacial alluvial sediments (clays, sands, sandy loams, loams) with marginal glacial and fluvioglacial formations. In the extraglacial zone, the alternation of subaerial covering, loess and soil strata, alluvial formations and terraces complexes. The Quaternary regional stratigraphic units of Western Siberia are represented by horizons, which are based on the consecutive replacement of glacial and interglacial periods and their biotas. Each horizon corresponds to marine isotope stages (MIS) (Bassinot et al., 1994). The most significant local lithogenetic and stratigraphic subdivisions have been substantiated by radiometric, paleomagnetic, and biostratigraphic data, based on mammals, microfauna, malacofauna, and fossil flora remains (Volkova et al., 2002).

3. Material and methods

Ostracodes are one of the most abundant microfauna groups in the Quaternary deposits. Ostracodes from several natural outcrops and from drill core samples have been studied. The most representative ostracode fauna was encountered in lacustrine facies, flood plain and oxbow facies of the ancient alluvium; in channel deposits, only solitary ostracode shells are encountered.

The sediment samples were obtained from clayey, sandy-clayey and peaty deposits from 5 sections of Ob, Chulym, Chet, Kiya, and Yaya river terraces, along with 5 boreholes from the territories of mammoth fauna site Lugovskoye (Leshchinskiy et al., 2006) and Kozhevnikovo exploration areas (Figs. 1 and 2; Tables 1 and 2). Samples were taken from each lithological layer every 0.1–0.5 m (0.2 m on the average) for the clayish part of the section and 1.0 m for the sands. In outcrops, samples were taken from the bottom, midpoint and top of a layer. The sampling frequency depended on the section complexity, texture of sediments, presence of the vegetation detritus and so on. The standard technique (Nikolayeva et al., 1989) was applied to process samples for microfaunal analyses. The preliminary stage began with splitting sediment samples into portions of 100 g mass, which were provided with labels. After the description and registration, a probe was placed into a glassy vessel with water for disintegration and washing. After the soaking of a sediment piece and its deposition on the bottom of the vessel, the contents were poured out into a larger container. Then, a sample was roiled by a jet of water and vessel rotation. After that, the solution was settled during ≈ 2 min, and then the suspension was filtered out for removing fine clay particles. The suspension was passed through the screens with mesh dimension of 0.15 to 0.01 mm. The washing of the sediments was repeated up to obtaining clear water. The washed samples were placed into porcelain cups