

Large bivalve molluscs (Bivalvia, Unioniformes) of Lake Baikal

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Abstract

Large bivalves represented in Lake Baikal by anodontines of the genus *Colletopterum* Bgt. are revised on the basis of a morphological examination of specimens preserved in Zoological Institute RAS, St. Petersburg (ZISP) and in Institute of Biology and Soil Science Far east Branch RAS, Vladivostok (IBSS). Shell shape, shape of valves, curvature of the frontal section of the valves, location of umbones and the ratio of shell width to height at the ligament were all taken into consideration. Results indicate that Lake Baikal is inhabited by five species of *Colletopterum* instead of only the formerly known subspecies *C. ponderosum sedakovi* (Siemaschko), which we regard as a synonym of *C. anatinum* (L.) following reidentification of the lectotype of the former. Three European–Siberian species: *C. anatinum*, *C. piscinale* (Nilsson), and *C. nilssonii* (Kuester), are recorded from the Baikal drainage for the first time. Specimens of large Baikalian bivalves in the ZISP collection bearing subspecies names by W. Dybowski are recognized as a mixture of different species. All type specimens were examined to establish their identity. It is concluded that *C. sorensianum* (W. Dybowski in B. Dybowski, 1913) (syn.: *Anodonta complanata sorensiana* W. Dybowski in B. Dybowski, 1913; *A. cellensis sorensis* W. Dybowski erroneous spelling by Shadin, 1938; *A. cellensis ssorensis* W. Dybowski erroneous spelling by Shadin, 1952) is a valid species characterized by having the flattest shell. Other subspecies names proposed by W. Dybowski's are regarded as junior synonyms of Siberian–European species: *C. piscinale* (Nilsson, 1822) (syn.: *A. cellensis selengensis* W. Dybowski in B. Dybowski, 1913; *A. nova* W. Dybowski, 1913), *C. anatinum* (L., 1758) (syn.: *A. sedakovi* Siemaschko, 1848); *A. piscinalis sorica* W. Dybowski in B. Dybowski, 1913); *C. ponderosum* (Pfeffer, 1825); *C. nilssonii* (Kuester, 1842). The key to identification of Baikalian large bivalves are also provided.

Introduction

Large bivalves are represented in Lake Baikal by the Palaearctic genus *Colletopterum* Bourguignat of the subfamily Anodontinae, family Unionidae. Anodontines occur in the 'sor' zone and in shallow parts of large bays at depths to 3 m. Recently only the subspecies *C. ponderosum sedakovi* (Siemaschko) was known for the lake drainage (Slugina & Starobogatov, 1999). However, examination of *Colletopterum* specimens preserved in a museum collections, and a study of new, previously unrecorded material from the Baikal region, have provided new data on Baikal large bivalve fauna

(Prozorova & Bogatov, 2002) and the basis for a taxonomic revision of *Colletopterum* (Bogatov et al., in press). This paper attempts to clarify the specific composition of the family Unionidae in Baikal drainage.

Materials and methods

Colletopterum specimens preserved in the Zoological Institute RAS, St. Petersburg (ZISP) and in the Institute of Biology and Soil Science Far east Branch RAS, Vladivostok (IBSS), collected from Lake Baikal, Selenga River, Transbaikalia (Ivan-

Arakhlei lake system) and Enisei River drainage were studied conchologically to clarify specific composition of the genus *Colletopterum* in Lake Baikal drainage. All type specimens of large Baikalian bivalves in the ZISP collection, including those bearing subspecies names by W. Dybowski, were examined to establish their identity. Shell shape, shape of valves, curvature of the frontal section of the valves, location of umbones and the ratio of shell width to height at the ligament were all taken into consideration. Both, the curves of the frontal sections of the left valves, and the contours of anterior views for the shells were examined using light microscope with camera lucida. A list of the material studied is presented in Table 1.

Results

From specimens of *C. ponderosum* (*C. Pfeiffer*) from different localities in Europe and Siberia, we found that the species spreads eastward to the Altai area where it has been previously recorded as *Anodonta ponderosa altaica* Krivosheina et Starobogatov (Krivosheina & Starobogatov, 1970), and further eastward to the River Lena drainage, where it was known as *A. anatina lenae* Shadin, 1938. The subspecies *C. ponderosum sedakovi*, originally described as *Anodonta sedakovi*, we now regard as a synonym of *Colletopterum anatinum* following reidentification of its lectotype (specimen No 9 in ZISP collection from Gusinoe Lake, Selenga River drainage). Paralectotypes of *Anodonta sedakovi* were found belonging to the widespread European–Siberian species *Colletopterum anatinum* (L.), *C. ponderosum* and *C. piscinale* (Nilsson) (Fig. 1). Besides inhabiting the Selenga River drainage, all four of these species occur in the bays of Lake Baikal.

Other lots of large Baikalian bivalves in the ZISP collection with subspecies names given by W. Dybowski (Dybowski, 1913) were also recognized to be a mixture of forms belonging to different species. Syntypes of both subspecies *Anodonta piscinalis sorica* W. Dybowski and *A. cellensis selengensis* W. Dybowski include three different forms that coincide with the European–Siberian species *Colletopterum piscinale*, *C. anatinum* and *C. nilssonii* (Kuester) (Fig. 1). These three species

are not rare in shallow bays of the lake and Irkutskoye reservoir of the Angara River. The first species is probably the most common in Baikal itself. Thus, three specimens from Posol'skiy Sor, presented by Z. Slugina (Limnological Institute, Irkutsk) to the malacological collection in IBSS, are identified as *C. piscinale*. Molluscs kindly collected for us in Baikal bays by N. Pronin (Institute of General and Experimental Biology, Ulan-Ude) in 2002 were examined too. Fourteen specimens are identified as *C. piscinale*, eight – as *C. anatinum* and two – as *C. nilssonii*. *C. ponderosum* is not found in Baikal itself, but only in Selenga River drainage.

To clean up taxonomic confusion, all type specimens of Baikalian Anodontinae kept in the ZISP collection were examined to establish their identity. On the basis of shell characters of the lectotype, *Anodonta piscinalis sorica* is referred to the synonymy of *Colletopterum anatinum*. Both *Anodonta cellensis selengensis* and *A. sedakovi nova* W. Dybowski are regarded as synonyms of *Colletopterum piscinale*. The lectotype of *Anodonta complanata sorensiana* W. Dybowski (syntype No 1 in ZISP collection), has a very flat form like the European anodontine *Colletopterum ostiaria* (Drouet). Despite the similarity of the curvature of the frontal sections of its valves, we regard this form as a separate species, *C. sorensianum*, distinguished from *C. ostiaria* by shell shape and the absence of a high wing.

Thus Lake Baikal is inhabited by five species of Unionidae, subfamily Anodontinae, instead, as previously believed, of subspecies known as *C. ponderosum sedakovi*: *C. anatinum* (L., 1758) (syn.: *Anodonta sedakovi* Siemaschko, 1848; *Anodonta piscinalis sorica* W. Dybowski in Dybowski, 1913); *C. ponderosum* (Pfeiffer, 1825); *C. piscinale* (Nilsson, 1822) (syn.: *Anodonta cellensis selengensis* W. Dybowski in Dybowski, 1913; *A. nova* W. Dybowski, 1913), *C. nilssonii* (Küster, 1842), *C. sorensianum* (W. Dybowski in Dybowski, 1913) (syn.: *Anodonta complanata sorensiana* W. Dybowski in Dybowski, 1913; *A. cellensis sorensis* W. Dybowski erroneous spelling by Shadin (1938); *A. cellensis ssorensis* W. Dybowski erroneous spelling by Shadin (1952)).

Discussion

The distribution of *C. sorensianum* is probably restricted to the Lake Baikal drainage, and from its

origin may be termed 'Baikalian'. In lake itself the species, like other endemic molluscs, prefers large bays to inshore lakes or nooks of shallow bays. *C. sorensianum* occurs in Proval Bay, on sandy silt. The other four anodontine species are of European origin and have European–Siberian distribution. Three of them occur in the 'sor' zone of the lake on silty sand at the depth 0–3 m (where conditions resemble those typically found in the south of Middle Siberia). *C. piscinale* is the most common and widely distributed bivalve species in the lake, being found also in Lake Arakhlei together with the European–Siberian *C. rostratum* (Rossmassler, 1836).

Conclusions

All five *Colletopterum* species inhabiting Lake Baikal may be distinguished on the basis of shell morphology, in particular; the ratio of shell width to height at the ligament, curvature of the frontal section of the right valves and the location of the umbones. These characters of the widely distributed *C. ponderosum*, *C. piscinale*, *C. nilssonii* and *C. anatinum* were found to be stable throughout the huge Palaearctic area where these species are recorded (pers. observ.; Bogatov et al., in press).

Table 1. Material studied from Lake Baikal drainage

Specimens	Identification	Locality
ZISP, collection of W. Dybowski types of <i>Anodonta piscinalis sorica</i> (5,5 specimens)		
No 1 (lektotype)	<i>Colletopterum anatinum</i>	Baikal Lake, Bol'shoi (Posol'skiy) Sor
No 2 (1,5sp.)	<i>C. piscinale</i> (1sp.), <i>C. anatinum</i> (0,5sp.)	
No 3 (1sp.)	<i>C. anatinum</i>	
No 4 (1sp.)	<i>C. nilssonii</i>	
No 5 (1sp.)	<i>C. anatinum</i>	
No 6 (14sp.)	<i>C. anatinum</i>	Baikal Lake, Barguzinskiy Bay, Near Barguzinka R. mouth
ZISP, collection of W. Dybowski types of <i>A. cellensis selengensis</i> (2sp.)		
No 1 (lektotype)	<i>C. piscinale</i>	Selenga River, Ust'-Kyahta vicinity, 25.07.1927
No 2 (1sp.)	<i>C. nilssonii</i>	
ZISP collection		
Types of <i>Anodonta sedakovi</i>		
No 9 (lektotype)	<i>C. anatinum</i>	Gusinoye Lake, Verhneudinsk vicinity, 14.07.1930
No 1 (1sp.)	<i>C. ponderosum</i>	Gusinoye Lake, Selenginsk vicinity, 25.07.1927
No 2 (13sp.)	<i>C. anatinum</i>	Small lakes near Chikoi R., Ust''-Kiran vicinity, 25.07.1929
No 5 (3sp.)	<i>C. anatinum</i> (2sp.)	Gusinoye Lake
	<i>C. ponderosum</i> (1sp.)	
No 6 (4sp.)	<i>C. piscinale</i>	Kiran R., inflowing into Gusinoye Lake
No 8 (1sp.)	<i>C. anatinum</i>	Gusinoye Lake
ZISP collection		
2 sp.	<i>C. piscinale</i> (1sp.)	Angara River, Irkutsk vicinity
	<i>C. anatinum</i> (1sp.)	
IBSS collection		
3sp.	<i>C. piscinale</i>	Baikal Lake, Bol'shoi (Posol'skiy) Sor, 07.1997
IBSS collection		
5sp.	<i>C. anatinum</i> (3sp.)	Baikal Lake, Chivyrkuy Bay, 06.2002
	<i>C. nilssonii</i> (1sp.)	
	<i>C. nilssonii</i> (1sp.)	
IBSS collection		
19sp.	<i>C. piscinale</i> (13sp.)	Baikal Lake, Istominskiy Bay, Cherkalov Sor, 04.2002
	<i>C. anatinum</i> (5sp.)	
	<i>C. nolssonii</i> (1sp.)	

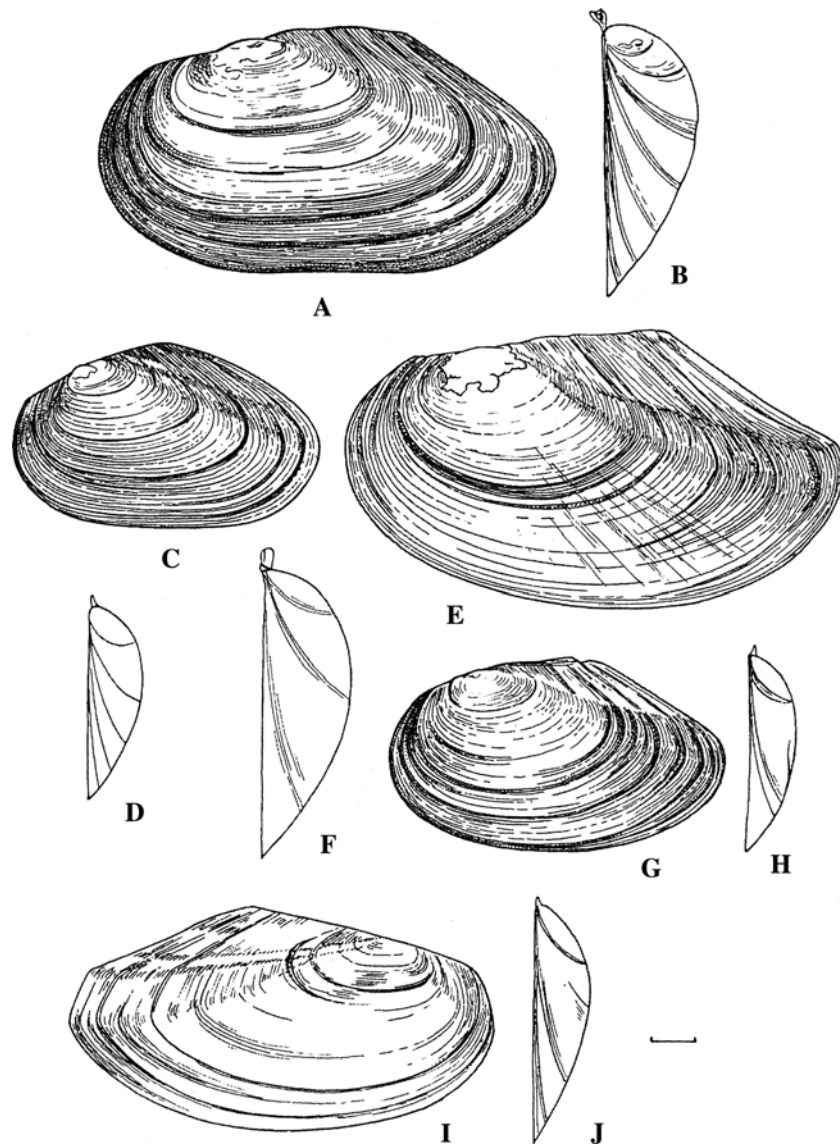


Figure 1. Shells of Baikalian species of the genus *Colletopterum* (A, C, E, G, I – side view; B, D, F, H, J – frontal view of right valves): A, B – *C. ponderosum* (Pfeffer); C, D – *C. anatinum* (L.); E, F – *C. piscinale* (Nilsson); G, H – *C. nilssonii* (Kuester); I, J – *C. sorensianum* (W. Dybowski in B. Dybowski). Scale bar – 1 cm.

C. ponderosum evidently has a more inflated shell than the others (Figs. 1, 2). The shell of *C. anatinum* is a little flatter than that of *C. ponderosum*. The shell of *C. piscinale* in its turn is a little flatter than that of *C. anatinum*. Furthermore, these species are well distinguished from each other by the location of the umbones. *C. sorensianum*

differes from other Baikalian anodontines by having the flattest shell. The ratio of shell width to height of *C. nilssonii* is a little more than that of *C. sorensianum*. To illustrate the conchological differences between the species, drawings of shells in both side and anterior views (Fig. 1) and curves of the frontal sections of left valves are presented

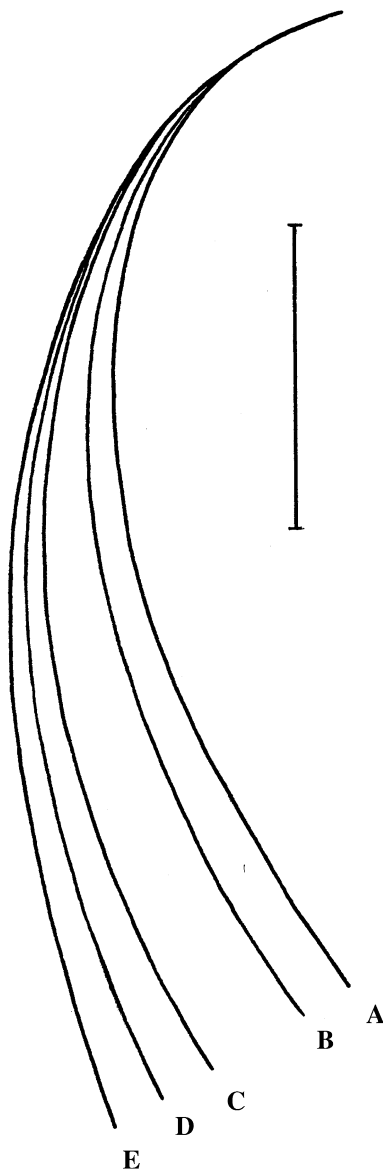


Figure 2. Curves of frontal valve sections of Baikalian species of the genus *Colletopterum*: A – *C. ponderosum* (Pfeiffer); B – *C. anatinum* (L.); C – *C. piscinale* (Nilsson); D – *C. nilssonii* (Kuester); E – *C. sorenianum* (W. Dybowski in B. Dybowski). Scale bar – 1 cm.

(Fig. 2). A key to identification of Baikalian large bivalves is also provided.

Key to Baikalian Anodontinae

1(2). Shell significantly inflated; ratio of shell width to height for middle-size shells not less than 0.62.....*C. ponderosum*.

- 2(1). Shell moderately inflated or flattened; ratio of shell width to height for middle-size shells not more than 0.58.
- 3(6). Shell inflated; ratio of shell width to height for middle-size shells not less than 0.52.
- 4(5). Distance between umbones and anterior margin of the shell 0.30–0.35 of the shell length.....*C. anatinum*.
- 5(4). Distance between umbones and anterior margin of the shell 0.20–0.25 of the shell length.....*C. piscinale*.
- 6(3). Shell flattened; ratio of shell width to height for middle-size shells not more than 0.46.
- 7(8). Shell oval; wing is weakly developed.....*C. nilssonii*.
- 8(7). Shell elliptical; wing not high, – but well developed.....*C. sorenianum*.

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