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Giant amphipods from Lake Baikal in the collections of the “Grigore Antipa” National Museum of Natural History

Ana-Maria PETRESCU, Iorgu PETRESCU***

, ** National Museum of Natural History “Grigore Antipa”, Kiseleff 1, **011341,
Bucharest, Romania
e-mail: anapetrescu@antipa.ro, iorgup@antipa.ro*

Abstract. A small collection of giant amphipods from Lake Baikal was presented. It was collected and donated by researchers from the Royal Institute of Natural Sciences from Bruxelles who took part of the BAIK95 expedition in 1995. It's one of the most valuable collections of Peracarida from the "Grigore Antipa" National Museum of Natural History.

Keywords: Lake Baikal, Amphipoda, giant specimens, endemite, museal collection

Introduction

Lake Baikal is in southern Siberia (Russia), in a rift zone in the Yenisei River Basin. It is a freshwater lake, with the largest freshwater reserve in the world, 23000 km³, 22-23% of the world's drinking water reserves (excluding glaciers). It

is the oldest (20–25 million years) and deepest lake on the globe (1637 m) (Kozhov 1963) and has a diverse endemic fauna (Takhteev 2019).

It is fed by more than 300 watercourses, among which the Selenga, in the Buryat Republic, located in the SE of the lake and forming small delta, is the most important, and from this lake only one river rises, the Angara, separating the eastern and southern regions (Touchart 2014).

On the eastern side of the lake the average temperature ranges from a winter low of -19 °C to a summer high of 14 °C. UNESCO declared Baikal a World Heritage Site in 1996.

Lake Baikal is known to be one of the most important regions of the planet with high number of endemic species, along with the Ponto-Caspian region, South of Europe, South of Australia, and the karst regions of eastern U.S. (Vaïnölä et al. 2008). The geographical isolation determined an accentuated speciation (Gurkov et al. 2019), while a most rigorous study combined the morphological and molecular data proved that the Baikal amphipod fauna resulted from two independent invasions in the lake from nearby waters (Macdonald et al. 2005).

So far 354 species and subspecies of amphipods are known from Lake Baikal, most of them being endemic (Takhteev et al. 2015, Takhteev 2019). The total number of Amphipod taxa, superfamily Gammaroidea, from the Lake Baikal is now around 7 families, 3 subfamilies, 51 genera, and 354 species and subspecies (Takhteev 2019).

They were systematically studied by many specialists, starting with Dybowsky in the 19th century and ending with Bazikalova, Kamaltynov, Mechanikova, Chapelle and others in our time. The amphipod fauna of Lake Baikal is extremely diverse morphologically, ranging from the classical form of freshwater *Gammarus* to the most armoured and processiform carapace of the Acanthogammaridae. In some situation the higher concentration of oxygen in the water leads to larger body sizes in amphipods (Chappelle & Peck 2004).

A collection of amphipods of Lake Baikal is quite an exquisite part of any crustacean collection. In the zoological collections held at various natural history museums in the world we could not find many catalogues or mentions. The vast majority of these endemic species are held in Russia (Baikal Limnological

Museum of Irkutsk Scientific Center of the Russian Academy of Science, Zoological Institute of the Russian Academy of Sciences, St. Petersburg, the State Darwin Museum, Moscow), some in Finland (the Finnish Museum of Natural History, University of Helsinki, 26 samples of Amphipoda from Lake Baikal, according to Albrecht et al. 2012), Royal Belgian Museum, Naturalis Biodiversity Center, Copenhagen Museum (Stebbing 1899), Zoological Museum, Moscow State University, Moscow; the amphipod type collection of Benedict Dybowski from the Museum and Institute of Zoology of the Polish Academy of Sciences in Warsaw and Krakow, the Natural History Museum Vienna, the Zoological Museum of Lviv University, the Museum of Natural History in Berlin, the Zoological Institute and Museum of Hamburg University, the Senckenberg Natural History Collections Dresden; the Natural History Museum in London, and the Lake Biwa Museum (exhibited live in Aquarium in Oroshimo, Kusatsu, Japan, as part of a collaboration between the Lake Biwa Museum and the Baikal Limnological Museum).

The "Grigore Antipa" National Museum of Natural History is among the very few natural history museums in the world that possess such valuable pieces.

Material and methods

The material is represented by 43 specimens of endemic amphipods, some of them being the largest of the known amphipod species, which were obtained by the late Alexandru Marinescu, former head of the Public Relations Department, a television personality, passionate oceanologist and consummate researcher of the history of science, known for his connections with Jacques Yves Cousteau, famous for all the research and actions undertaken related to Romania's great biologists (starting with Grigore Antipa and continuing with Emil Racoviță and others). Following the visits and discussions undertaken in 1995 at the Institut Royal des Sciences Naturelles de Belgique in Brussels, especially with the illustrious Belgian amphipodologist Claude de Broyer, he received as a gift a small collection of amphipods collected by him and his colleague, Gauthier Chapelle, during the BAIK95 Campaign in August 1995 in Lake Baikal.

The collected material was identified by the great Russian specialists Ravil Masalimovich Kamaltynov and Irina Mechanikova from the Limnological Institute of the Siberian Branch of the Russian Academy of Sciences, Irkutsk, Russia.

This material was mainly collected during the joint Russian-Belgian expeditions on Lake Baikal in 1995 on the board of R.V. 'Vereschagin' (Martin et al. 1995).

The specimens were collected using an 'autonomous trap system' developed at the Royal Belgian Institute of Natural Science beam trawl, with an acoustic trap, during 18-29.08.1995, at 20-1000 m deep, especially on the Eastern shore (as described by Mekhanikova et al. 2001). The specimens were collected from Frolikha Bay, Chivyrkui Gulf, Olkhon Island (Irkutsk), Cape Ireksokon, Selenga Delta, Cape Krestovy, and Kharauz Creek (Selenga Delta).

For the taxonomic update we used five bibliographic sources: Barnard & Barnard 1983, Bousfield 1977, Bazikalova 1945, Kamaltynov 2009, Takhteev 2019.

Results

The Amphipoda collection of the "Grigore Antipa" National Museum of Natural History in Bucharest holds more than 38,000 specimens and is one of the largest in the country. Most of them were collected from Romania, while others were donated from several remoted areas, from different expeditions, from the Indo-Pacific Ocean, Indonesia (1991), and from Tanzania (1973-1974). Among these we have identified a small collection of amphipods from Lake Baikal.

Seven endemic families are known in Lake Baikal: Acanthogammaridae, Baikologammaridae, Eulimnogammaridae, Macrohectopidae, Micruropodidae, Pachyschesidae and Pallaseidae (Vaïnölä et al. 2008).

In our collection we have identified 43 amphipod specimens belonging to 3 families, Gammaridae, Acanthogammaridae and Pallaseidae, 10 genera and 14 species.

Many of them present exuberant spines and crests on the carapace or very long antennae. Specimen length varied from 10 mm up to almost 63 mm, for *Acanthogammarus (Ancyracanthus) maculosus*.

Gammaridae Leach, 1914***Odontogammarus calcaratus* (Dybowsky, 1874)**

Lake Baikal, station 37, Frolikha Bay, 55°31'N 109°51'E, 100 m, trap, 24.08.1995, leg. Claude de Broyer & G. Chapelle, BAIK95, det. R. Kamaltynov & I. Mechanikova, 3 specimens (AMP 10). Size: 23-25 mm (max. body length-35 mm, Chapelle 2002).

***Ommatogammarus albinus* (Dybowsky, 1874)**

Lake Baikal, station 21, Cape Ireksokon, 55°31'N 109°51'E, 92 m, acoustic trap, 22.08.1995, leg. Claude de Broyer & G. Chapelle, BAIK95, det. R. Kamaltynov & I. Mechanikova, 3 specimens (AMP 11). Size: 25-27 mm.

Acanthogammaridae Garjajew, 1901**Acanthogammarinae Garjajew, 1901*****Acanthogammarus (Ancyracanthus) maculosus* Dorogostaisky, 1930**

Lake Baikal, Mys Kharantsy (Cape Kharantsi), Olkhon Island, station 11, 53°10'N 107°11'E, 50 m, beam trawl, 19.08.1995, leg. Claude de Broyer & G. Chapelle, BAIK95, det. R. Kamaltynov & I. Mechanikova, 3 specimens (AMP 3). Size: 60- 62.8 mm, (Fig. 1) (max. body length 56 mm, Takhteev 2019).



Fig. 1 *Acanthogammarus maculosus* Dorogostaisky, 1930 (scale 2 cm).

***Brachyuropus grewingkii* (Dybowsky, 1874)**

Lake Baikal, station 52, Chivyrkui Gulf, 760 m., beam trawl, 27.08.1995, leg. Claude de Broyer & G. Chapelle, BAIK95, det. R. Kamaltynov & I.

Mechanikova, 2 specimens (1 specimen damaged) (AMP 1). Size: 45.7 mm (max. body length 90 mm - Chapelle 2002) (Fig. 2).



Fig. 2 *Brachyuropus grewingkii* (Dybowsky, 1874) (scale 2 cm).

Lake Baikal, station 52, Chivyrkui Gulf, 750 m beam trawl, 27.08.1995, leg. Claude de Broyer & G. Chapelle, BAIK95, det. R. Kamaltynov & I. Mechanikova, 1 specimen (AMP 2). Exhibited in the museum hall in a glass cylinder.

***Brachyuropus reichertii* (Dybowsky, 1874)**

Lake Baikal, station 58, Selenga Delta, 52°19'N 106°07'E, 150 m, beam trawl, 28.08.1995, leg. Claude de Broyer & G. Chapelle, BAIK95, det. R. Kamaltynov & I. Mechanikova, 6 specimens (AMP 4). Size; 10.2- 44.3 mm, (Fig. 3). It can reach a body length up to 70 mm.



Fig. 3 *Brachyuropus reichertii* (Dybowsky, 1874) (scale 1 cm).

Garjajewiinae Tachteew, 2000

***Garjajewia cabanisii* (Dybowsky, 1874)**

Lake Baikal, station 58, Selenga Delta, 52°19'N 106°06'E, 150 m, beam trawl, 28.08.1995, leg. Claude de Broyer & G. Chapelle, BAIK95, det. R. Kamaltynov & I. Mechanikova, 4 specimens (AMP 8). Size: 24.6- 43.3 mm (max. body length 80 mm, Takhteev 2019) (Fig. 4).



Fig. 4 *Garjajewia cabanisii* (Dybowsky, 1874) (scale 1 cm).

***Garjajewia sarsi* Sowinsky, 1915**

Lake Baikal, station 4, Cape Krestovy, 52°34'N 106°26'E, 1000 m, beam trawl, 18.08.1995, leg. Claude de Broyer & G. Chapelle, BAIK95, det. R. Kamaltynov & I. Mechanikova, 3 specimens (AMP 9). Size: 38.2-54.7 mm (Fig. 5).



Fig. 5 *Garjajewia sarsi* Sowinsky, 1915 (scale 1 cm).

Hyalellopsinae Kamaltynov, 1999

***Hyalellopsis (Boeckaxelia) potanini* (Dorogostaisky, 1922)**

Lake Baikal, station 62, Selenga Delta, 52°18'N 106°09'E, 50 m, beam trawl, 28.08.1995, leg. Claude de Broyer & G. Chapelle, BAIK95, det. R. Kamaltynov & I. Mechanikova, 3 specimens (AMP 5). Size: 46.8- 57.1 mm, (Fig. 6).



Fig. 6 *Boeckaxelia potanini* (Dorogostaisky, 1922) (scale 0.5 cm).

Pallaseidae Tachteew, 2000**Pallaseinae Tachteew, 2000*****Poekilogammarus pictus* (Dybowsky, 1874)**

Lake Baikal, station 62, Kharauz Creek (Selenga Delta), 52°18'N 106°09'E, 50 m, fish trawl, 28.08.1995 leg. Claude de Broyer & G. Chapelle, BAIK95, det. R. Kamaltynov & I. Mechanikova, 3 specimens (AMP 15). Size: 26-29 mm.

***Propachygammarus dryshenkoi* (Garajew, 1901)**

Lake Baikal, station 66, Selenga Delta, 52°20'N 106°01'E, 450 m, beam trawl, 29.08.1995, leg. Claude de Broyer & G. Chapelle, BAIK95, det. R. Kamaltynov & I. Mechanikova, 2 specimens (AMP 12). Size: 22-25 mm.

Parapallaseinae Kamaltynov, 1999***Parapallasea borowskii* (Dybowsky, 1874)**

Lake Baikal, station 59, Selenga Delta, 52°19'N 106°04'E, 210 m, beam trawl, 28.08.1995, leg. Claude de Broyer & G. Chapelle, BAIK95, det. R. Kamaltynov & I. Mechanikova, 2 specimens (AMP 13). Size: 28.5-32.2 mm.

***Parapallasea lagowskii* (Dybowsky, 1874)**

Lake Baikal, station 4, Cape Krestovy, 52°34'N 106°26'E, 1000 m, beam trawl, 18.08.1995, leg. Claude de Broyer & G. Chapelle, BAIK95, det. R. Kamaltynov & I. Mechanikova, 2 specimens (AMP 14). Size: 35-40 mm.

***Ceratogammarus cornutus* (Sowinsky, 1915)**

Lake Baikal, station 59, Selenga Delta, 52°19'N 106°04'E, 210 m, beam trawl, 28.08.1995, leg. Claude de Broyer & G. Chapelle, BAIK95, det. R. Kamaltynov & I. Mechanikova, 3 specimens (AMP 6). Size: 30.8- 36.2 mm (Fig. 7).



Fig. 7 *Ceratogammarus cornutus* (Sowinsky, 1915) (scale 0.5 cm).

***Ceratogammarus dybowskii* Sowinsky, 1915**

Lake Baikal, station 52, Chivyrkui Gulf, 53°58'N 109°03'E, 760 m, beam trawl, 27.08.1995, leg. Claude de Broyer & G. Chapelle, BAIK95, det. R. Kamaltynov & I. Mechanikova, 3 specimens (AMP 7). Size: 37.8- 45.2 mm (Fig. 8).



Fig. 8 *Ceratogammarus dybowskii* Sowinsky, 1915 (scale 1 cm).

Conclusions

Museum collections are part of the national patrimony and with the rigorous documentation and identification (which can simplify the digitization process of the collections and therefore they become more available to the scientific community and the public), they create a bridge between natural science communicators and other scientists. The Baikal amphipod collection is one of utmost beauty and uniqueness within the crustacean collections of the Natural History Museum in Bucharest.

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