

WARM-WATER SPECIES OF INVASIVE MOLLUSKS AT EASTERN KAMCHATKA (Avacha Gulf)

D. D. Danilin

Kamchatka Branch of Pacific Geographical Institute (KB PGI) FEB RAS,
Petropavlovsk-Kamchatsky, Russia, danilinbiv@mail.ru



Location of Bechevinskaya Bay.



Bechevinskaya Bay in the middle part.



The author on board the vessel measures the captured mollusks *M. yessoensis*.



Mollusk *M. yessoensis*. at the bottom of the bay Bechevinskaya depth of 15 m.



Live mollusks of *M. yessoensis* from Bechevinskaya Bay in the aquarium.



The valves of bivalve mollusks are *Macoma incongrua*. L= 22.8 mm.

In 2017, employees of the Kamchatka branch of Pacific Geographical Institute first time explored the Bechevinskaya bay, located on the eastern coast of the Kamchatka Peninsula, in the north of the Avacha Gulf, for the discovery of a coastal scallop, the dead shells of which were found by divers at the bottom of this bay. The bay cuts into the Shipunsky Peninsula on 11 km with a maximum depth of 54 m. Its maximum width does not exceed 2 km. Despite the relatively close distance to the regional center, the Bechevinskaya bay was closed for a long time for research because since the 1960s. there was a base of submarines, which was liquidated in 1996. In 2019, the survey of the bay was continued. As a result, a small population of the coastal scallop *Mizuhopecten yessoensis* (Jay, 1857) was found.

According to the literature data, the coastal scallop *M. yessoensis* is a Pacific near-Asian lowboreal species. It lives in the Sea of Japan at the northern coast of the Korean Peninsula, in Primorye north to Rudnaya Bay, at western Sakhalin, at northern Honshu, at Hokkaido, and in the south of the Sea of Okhotsk (Scarlato, 1981; Kafanov, 1991; Arzamashev et al., 2001). The northern boundary of the habitat is the Gulf of Patience on the eastern coast of Sakhalin and the southern part of the Iturup island (Evseev and Yakovlev, 2006). Currently, this species is an object of aquaculture and has been introduced to coastal areas of northern China (Yellow Sea, Liaoning and Shandong Provinces) (Lutaenko et al., 2013). It is found at depths from 0.5 to 83 m., near the Japanese islands up to 311 m. Young sea scallops under the age of 1 year with a shell size of 18-22 mm are attached to algae, sea grasses and rocks with the byssus (Egorova and Sirenko, 2010). According to various sources, the life span of the coastal scallop ranges from 15 to 22 years (Yavnov et al., 2000).

We weren't sure whether it was a self-reproducing population or a one-time ship hull-fouling transfer of juveniles by military vessels from Primorye because all found specimens were larger than 100 mm. At present, more than 24 years have passed since the last military vessel left this bay. In 2020, other survey of the bay was conducted. As a result of it we found another habitat spot of the seaside scallop where young mollusks less than 5 years old live.

Scallops were found in the bathymetric range from 8 to 25 meters on pebbly muddy soils. In the place of catching shellfish at a depth of 8 meters, the water temperature was recorded at 14°C, which are quite comfortable conditions for the habitat of this species. A large number of old large flaps of this species were observed in places where live mollusks were caught. A total of 14 live specimens of *M. yessoensis* were caught in the first survey and 28 specimens were caught in the third survey. The length of the shell of the found mollusks ranged from 55 to 174 mm. The total mass of the largest mollusk reached 752 g. Scallop clusters are quite sparse; there is about one specimen per 8-10 m of the bottom.

The main danger to the found population, in our opinion, is the predation of sea otters and uncontrolled collection by divers. As the observations in the aquarium have shown, scallops quickly dig into the ground without leaving any traces of their presence on the surface. Those mollusks that do not have time to dig in, become easy prey for hermit crabs. Currently, another threat is the planned dredging works during the construction of the gas terminal.

During the analysis of benthic samples in 2020 from depths of 25 m., we found fresh valves of another subtropical lowboreal species of bivalves - *Macoma incongrua* (Martens, 1865). The northern boundary of the distribution of *M. incongrua* is limited to eastern Sakhalin and the South Kuril shallow water (Scarlato, 1981). Probably this is not a complete list of invasive species from Primorye brought in by military vessels. Undoubtedly, the unique biotopes of the Bechevinskaya Bay require protection and more detailed study.

The author thanks the employees of the Kamchatka branch of the Pacific Geographical Institute who took part in the collection of the material, Sergey Maksimov for his invaluable help in the search for scallop clusters, the crew of the ship "Larus" and especially thanks Pavel Larin for his help in collecting samples.