TO THE PROBLEM OF MERCURY POLLUTION OF THE ARCTIC

Rumyantseva O.Yu., Khabarova L.S., Poddubnaya N.Ya.
Department of Biology, Cherepovets State University, 5 Lunacharsky Ave.,Cherepovets 162600, Vologda region, The Russian Federation

Introduction

Mercury causes concern on a global scale due to its unique physico-chemical properties that result in a higher degree of biomagnification than other heavy metals. Due to atmospheric transport from the southern and middle latitudes, where mercury sources are sufficient, mercury enters the polar regions. As a result, mercury transport in the atmosphere leads to its global spread, including increased levels of mercury concentration observed in the naturalenvironment of the Arctic.
In the Arctic, in areas where heavy metals are particularly significant, the effects on ecosystems are evident.
The mercury that has entered the ecosystem undergoes a whole series of biogeochemical transformations and becomes bioavailable and capable of accumulating in the organism of animals and humans.

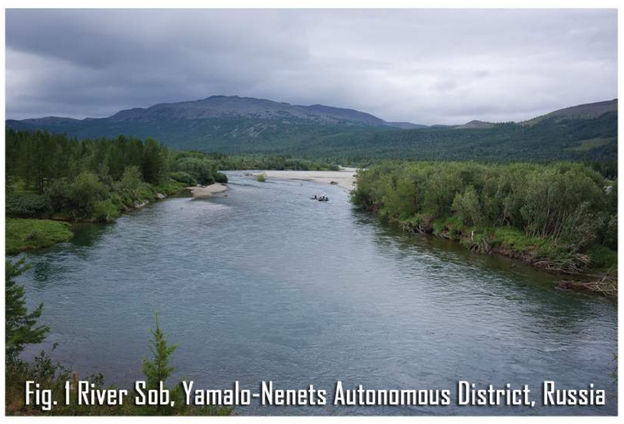
Fig. 1 River Sob, Yamalo-Nenets Autonomous District, Russia


Fig. 2 River Sob, Yamalo-Nenets Autonomous District, Russia


Fig. 3 Island Zajachii, Yamalo-Nenets Autonomous District, Russia

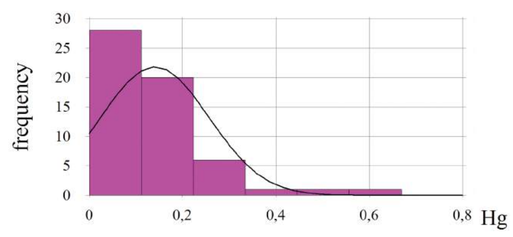

Fig. 4 frequency analysis of mercury in Tabanus bovinus

Materials and methods

Samples of the pale giant horse-fly (Tabanus bovinus Linnaeus, 1758) and the freshwater fish Thymallus sp. were collected on the Zayachy island (Sobi river),Yamal-Nenets Autonomous district (66º92' N, 65º74' E) in 2018 (fig 1-3). The horse-fly and muscles of Thymallus sp. were dried to a constant weight at the temperature of 37-39º C.The mercury content in the samples was measured by the mercury analyzer RA-915 M. The nonparametric method (Spearmen rank correlation) was usedto evaluate the correlation between mercury concentrations and the morphometric parameters of the horseflies.

Results

There is a hypothesis that the smaller the dimensions of the body of the horse-flies, the higher the content of mercury in their body (Ivanova, in press).
The average value of mercury in horse-flies is 0.140 ppm, and the median value is 0.112 ppm. The minimum value is 0.015 ppm, the maximum value is 0.659 ppm (Tabl. 1).
The average value of mercury in Thymallus sp. is 0.178 ppm, and the median value is 0.151ppm. The minimum value is 0.116 ppm, the maximum value is 0.376 ppm (Tabl. 1).
Correlation dependencies are not established between the mercury content and the length of the horse-flies (Tabl. 2). Correlation dependencies are not established between the mercury concentration and the weight of the horseflies (Tabl. 2).

Tabl. 1 Hg in Tabanus bovinus and muscles of Thymallus sp in the Arctic

	Mean	Median	SD	SE	Min-Max	Q25-Q75
Tabanus bovinus	0.140	0.112	0.116	0.015	0.015-0.659	0.063-0.184
Thymallus sp.	0.178	0.151	0.090	0.034	0.116-0.376	0.126-0.178

Tabl. 2 Spearmen correlation

	Spearmen R	p-value
length	-0.050	0.710
weight	-0.163	0.226

The reported study was funded by RFBR according to the research project № 18-34-00569