

S. KOZLOVSKII, O. SINTSOVA, I. KASHEVEROV, J. KOROLKOVA,  
I. MOSHAROVA, S. KOSHELEV, E. YURCHENKO, S. KOZLOV,  
E. LEYCHENKO

## First steps in studying of jellyfish *Gonionemus vertens* venom

*Key words:* Cnidaria, jellyfish, neurotoxins, ASIC1a, TRPV1, TRPV2, TRPV3,  $\alpha 7$  nAChR

Jellyfish venoms are one of the most challenging tasks for toxinologists and have considerable difficulty in studying, which explains the almost complete non-study of venoms of some species that have an obvious threat to human health. Jellyfish *Gonionemus vertens* is not lethal to human health, but the effects of envenomation cause severe, painful, in some cases, long-term symptoms, which makes it the most dangerous kind of jellyfish of the Sea of Japan. The venom of this jellyfish has not been studied before, and information about the compounds responsible for its biological activity is absent. This work is devoted to the isolation and identification of these compounds, as well as to identify the types of biological activities responsible for the symptoms of poisoning. In the course of this work, *G. vertens* venom was separated by gel filtration chromatography to seven fractions for biological activity investigation. Some fractions showed activities against the rat TRPV1, mouse TRPV2, human TRPV3 receptors expressed in CHO cells in a Fluo-4-based intracellular calcium assay. One fraction showed high toxic activity on coastal crabs and decreased viability of mouse neuroblastoma Neuro2a cells. This fraction demonstrated 80% inhibition of labeled alpha-bungarotoxin binding to muscle-type *Torpedo californica* ray and human  $\alpha 7$  nAChRs. Also this fraction included components showed 11% inhibition of rat ASIC1a channel expressed in *Xenopus laevis* oocytes. The results of the work demonstrate the activities of substances of the *G. vertens* venom in various tests, as well as their preservation after purification and separation processes and their thermal stability, which makes this species an intriguing and promising object for toxinological and proteomic studies.

---

\* KOZLOVSKII Sergey Antonovich – Graduate student, SINTSOVA Oksana Vladimirovna – Graduate student, Junior Researcher, YURCHENKO Ekaterina Alexandrovna – PhD, Senior Researcher, LEYCHENKO Elena Vladimirovna – PhD, Senior Researcher (G.B. Elyakov Pacific Institute of Bioorganic Chemistry, FEB RAS, Vladivostok, Russia), KASHEVEROV Igor' Evgenievich – DSc, The Head of The Laboratory, KOROLKOVA July – PhD, Senior Researcher, MOSHAROVA Irina – Graduate student, Junior Researcher, KOSHELEV Sergey Gennadievich – PhD, Senior Researcher, KOZLOV Sergey Alexandrovich – DSc, The Head of The Laboratory (Shemyakin-Ovchinnikov Institute of Bioorganic Chemistry, RAS, Moscow, Russia). \*E-mail: sergeimerx@gmail.com

This work was supported by the Far East Program grant №. 18-4-009, RFBR grant № 18-04-01366 and the RSF grant № 16-15-00167.