### УДК 591.152:581.522.4:574.625

The III International Symposium "INVASION OF ALIEN SPECIES IN HOLAR-TIC. BOROK – 3". Programme and Book of Abstracts. October 5th-9th 2010, Borok - Myshkin, Yaroslavl District, Russia. 2010. – 118 pp.

The book represents proceedings of Second International Symposium "Invasion of Alien Species in Holarctic. (Borok -3)" (5 -9 Oct. 2010, Borok - Myshkin, Yaroslavl Region, Russia). The articles are divided into the four main divisions: General Problems, Plants, Invertebrates, and Vertebrates. The wide spectrum of problems related to appearance and spread of invasive plants and animals is discussed. The book may be interesting for specialists expertising in many fields, such as limnologists, hydrobiologists, ecologists, botanists, zoologists, geographers, managers dealing with nature preservation and fisheries.

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Cover photos by (from above): Yury Dgebuadze, Yury Slynko, Alexandr Krylov, Oleg Savinkin

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## Yaroslavl: Print-House Publ. Co, 2010

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ISBN

978-5-904234-13-3

ten (11,3 larvae/g). The high expansion of trichinella invasion was registrated in the native predators: foxes - about 50%, wolfs and badger - about 30%, pine marten - higher than 60%. Such dates indicate the stable functioning of parasitic system of trichinells. Our observations and composition of ration raccoon dogs (this species - pronounced necrofag) are important prerequisites pointing to the successful integration of the raccoon dog in this parasitic system. The mechanism of elimination of raccoon dog can be represented as follows. The high intensity of trichinella invasion causes severe pathology which leads to termination of hibernation and subsequent death of animals. By our calculations period of formation parasite system on the population level with the inclusion in it a new type of host (from the date of introduction) to the stable functioning was about 30 years. We believe that the "local forms" of trichinellas can be attributed to one of the key factors which regulates (by causing elimination) the size of raccoon dog's population in the places of introduction. Firstly these conditions are established in natural ecosystems which stable natural foci of trichinosis. The results of study indicate one of the important functions of the parasites - the protection of ecosystems from the invasion of alien species of mammals.

#### RELATIONS BETWEEN THE RED KING CRAB (PARALITHODES CAMTSCHATICUS) AND SOME NATIVE MACRO-INVERTEBRATES IN THE BARENTS SEA

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Successful invasion of the red king crab in the Barents Sea raised a question on its impact on the benthic communities and populations of native species of macro-invertebrates. To respond on this question we studied the role in the crab diet, the population structure, and if possible, long-term changes in the populations of echinoderms Strongylocentrotus spp., Asterias rubens, Cucumaria frondosa, mollusks Chlamys islandicus, Modiolus modiolus, and decapod Lithodes maja in several inlets of the Barents Sea.

The role of these animals in the crab diet varied significantly. Sea urchins Strongylocentrotus spp. is one of the main components of the diet; starfish A. rubens also is a common prey, while sea cucumber C. frondosa was not found in its digestive tracts at all, that may be caused by the absence of noticeable firm structures in their bodies. Fragments of both mollusks juveniles were found in digestive tract of crabs occasionally. Lithodid crab L. maja is not a prey of the red king crab, but their food preferences are similar.

Sea urchins were common and numerous in the studied areas. However, comparison with the data obtained 40 year ago in the Dal'nezelenetskaja Inlet demonstrated that their average density and biomass on the open surfaces decreased in 4.3 and 1.4 times respectively, while average weight of one specimen and maximum size have increased. Besides, sea urchins became a dominant species in some benthic communities or their significance in the other communities noticeably increased. Starfish A. rubens was common, but not numerous in all Inlets. Insignificant decreasing of its density for forty years period was observed. Single specimens or small groups of sea cucumber C. frondosa were found accidentally hidden in the crevices or under the boulders, while its uniform aggregations of low density on the exposed substrata were common before crab invading. Iceland scallop formed beds in the inlets Dolgaja and Jarnyshnaja (average density 1.23 sp.m-2, max - 25 sp.m-2; average biomass 94 g m-2, max - 1499 g m-2.), while its single specimens were found in all studied inlets. The decreasing of scallop stock was observed in the Jarnyshnaja Inlet during 2004-2006 years. Horse mussel M. modiolus inhabited all Inlets, however its extensive settlement (average density 124 sp/m2; biomass - 5597 g/m2) were found in Jarnyshnaja and Medvezhja Inlets only. Decreasing of this species density and mean shell length was observed in Dal'nezelenetskaja Inlet during 2002-2005. Stone crab L. maja was rather scarce and its number varied significantly from year to year.

It is probable that changes in sea urchin population were really connected with consumption of its juveniles by crabs at the exposed bottom. This leaded to relocation of urchin juveniles towards refuges, decreasing of intra-specific competition, and as a consequence, increasing of their mean size and weight. Negative tendencies in the population dynamic of island scallop in the Jarnyshnaja Inlet were likely related with illegal catch by divers and trawling. As to M. modiolus we believe that changes observed were related with natural mortality, rather than crab predation, since big specimens are inaccessible for crabs. Reasons of density and location changes of C. frondosa are not evident, since the role of the species in crab diet not obvious, fishery is absent, and environment is not polluted. Fluctuations of L. maja density rather related with location of the studied sites at the border of the area, than with inter-specific interaction with red king crab. Thus, some changes in the population structure of macro-invertebrates were observed that may be considered as a result of invaded red-king crab impact. However, in the most cases they were caused by other anthropogenic or natural causes.

This study was supported by the programs "Biological diversity", "Fundamental basis of resources management" of Russian Academy of Sciences, and RFBR (№ 10-04-01764-a).

# ON ROLE SHIPS'BALLAST WATERS IN DISTRIBUTION OF PLANKTON SPECIES IN THE NORTHEASTERN BLACK SEA

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In the port of Novorossiysk in 2004-2005 for the first time in Russia a study was initiated to investigate aquatic organisms in ships'ballast waters (Selifonova, 2009). It has been established that the most probable is the risk of introduction of Mediterranean species into the Novorossiysk Bay. The basic "groups of risk" are copepods and polychaetes. It has been supposed, that ships'ballast water can become a primary factor of "mediterranization" of copepod fauna (Copepoda) in the northeast of the Black Sea. A mass number of the cyclopoid copepod *Oithona brevicornis* Giesbr., a new species for the Black Sea, was recorded in samples collected in autumn 2005 and 2006. For the period of research in the Novorossiysk Bay, 36 species of Mediterranean copepods were recorded. The status of invader was attributed to the polychaete of *Streblospio gynobranchiata* Buch.

In 2009-2010 researches of the ballast waters of commercial vessels in the port Novorossiysk and biological invasions in the port areas of the Northeastern Black Sea were continued.

The plankton in ships'ballast water of the Super Lady tanker consisted of 33 phytoplankton taxa, 16 taxa of ciliates, 2 – rotifers, 3 – meroplankton, 14 – holoplankton. The tanker came to Novorossiysk from Amsterdam in October 2009. In the ships'ballast water organism unusual for the Black Sea (17 taxa), including the phytoplankton Thalassiosira nordenskioldii Cleve, Rhizosolenia setigera Bright, R.cf. styliformis Bright, Lithodesmium cf. undulatum Ehren, Odontella sinensis (Grevielle) Grunow, ciliates Eutintinnus spp., Favela sp., Tintinnopsis fimbriata Meun., rotifers Synchaeta neapolitana Rousselet, Synchaeta sp., copepods A. bifilosa (Giesbr.), Clausocalanus arcuicornis (Dana), Centropages kroyeri Giesbr., Ctenocalanus vanus, Giesbr., Microcalanus pygmaeus (Sars.), O. brevicornis Giesbr. were found. The heterotrophic bacteria density attained  $4.7\cdot10^6$ /ml, phytoplankton –  $18.4\cdot10^6$ /m<sup>3</sup>, ciliates –  $116.9\cdot10^6$  ind/m<sup>3</sup>, rotifers –  $12.5\cdot10^3$  ind/m<sup>3</sup>, meroplankton – 480 ind/m<sup>3</sup>, holoplankton –  $21.6\cdot10^3$  ind/m<sup>3</sup>.

The water salinity in the ballast tanks reached 20.05‰. The water salinity was 17-18‰ in the Black Sea, 30-35‰ in the Mediterranean and the North Seas (Sukhovei, 1986). A species are a widely spread in the moderate waters of the Atlantic ocean, the North, Black and Mediterranean seas were recorded in the ballast water of *Super Lady* tanker. Hence, it follows that the crew of commercial vessel have executed the partial change of ballast water (Selifonova, 2010).