necessary for their mobility. While sole movement of the IS element normally leads to gene disruption, simultaneous transposition of two IS elements as parts of composite transposon promote relocation, inversion, excision of large DNA regions or even lead to a plasmid fusion as well as new gene acquisition from the environment or horizontal gene transfer. These dramatic events can result in the assembly of new gene clusters providing multidrug resistance or encoding new metabolic pathways. Starting from the first outbreaks of cold-water vibriosis, plasmid pattern investigations had revealed 6 different naturally occurring *Aliivibrio salmonicida* plasmid profiles. Our work is focused on the *A. salmonicida* plasmid profile flexibility and impact of the IS elements to this phenomenon. Our experiments will be carried out on numerous isolates collected from diseased fish and from the water surroundings since the early 1980's and up to present days. Revealing the possible mechanisms of transposition of different isolates of *A. salmonicida* IS elements will bring us closer to understanding the role of this class of mobile genetic elements for the integration/excision of plasmids into the chromosome. Discovering the molecular basis of this process and its impact on virulence of *A. salmonicida* will contribute to the development of revolutionary new types of protective measures against future cold-water vibriosis outbreaks.

SEARCHING OF THE BIOLOGICALLY ACTIVE SUBSTANCES THAT MEDIATE INTRA- AND INTERSPECIFIC COMPETITION BETWEEN EPIBENTHIC ORGANISMS. INVESTIGATION ON THE EXAMPLE OF THE WHITE SEA FOULING COMMUNITIES

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Essential role in itraspecific competition between marine sedentary organisms belongs to allelopathy – negative influence of the one species to another one by chemical agents. Nowadays scientist's interest in allelopathic chemicals rises worldwide. However the White Sea invertebrate's potentials have been studied negligibly in this interest and thus respective biological resources are poorly developed. Actually in the White Sea, just blue mussels (*Mytilus edulis*), brown (*Laminaria saccharina, L. digitata*) and red (*Ahnfeltia plicata*) algae are used as the source of biologically active substances (BAS). Besides of this, there are some prospective producers of chemicals with biological effects or another practicable properties, like a soft coral *Gersemia fruticosa* (prostaglandins), hydroid *Obelia longissima* (photoproteins).

It seems quiet logical to search BAS from organisms possessing allelopathic action. This feature could be a basis for narrowing of BAS screening and increasing of its effectiveness. But such approach implies good knowledgebase of organism's interrelation complex in this or that communities.

From this point of view, fouling communities are the most useful and prospective model for investigations of this kind in the White Sea. Species composition, development dynamics and intraspecific interaction patterns of these communities have been well established by the present time, what could be a reliable basis for directed search of chemical mediated competition among the White Sea sedentary invertebrates.

Therefore, investigations of influence of secretory-excretory products (SEPs), produced by different sedentary organisms, on another hydrobionts were conducted. We tested SEPs of some the most abound species in the White Sea, as follows: bivalve mollusks *Hiatella arctica* and *Mytilus edulis*, sponge *Halichondria panicea*, solitary ascidium *Styela rustica* and starfish *Asterias rubens*. Juvenile or adult mussels (*Mytilus edulis*) were used as a test-object in the work.

On the first stage, competitive relationships among organisms mentioned above were estimated by behavioral reactions. According to the results of field and laboratory experiments, it was shown, that mussels (*M. edulis*) increased byssus production and, thus, movement in response to waterborne cues from sponge *Halichondria panicea* and solitary ascidian *Styela rustica*. Increment of byssus production by mussels in the presence of competitor's SEPs apparently directed to avoidance or even immobilization of a source of stress (Khalaman, Komendantov, 2007; Khalaman et al., 2008a; Khalaman, Lesin, 2008). This reaction is similar to a well known behavioral defense of mussels against carnivorous whelks (Davenport et

al., 1993). In addition, effluent from the sponge affected metamorphosis and caused fate of *S. rustica* (Khalaman et al., 2008b) and *M. edulis* (Khalaman et al., 2009) larvae.

The data obtained instigated biochemical studies of allelopathic action of the principle species in the White Sea fouling communities. In the laboratory experiment, the most changes in mussels metabolism were observed in mollusks treated with SEPs of *A. rubens*, *S. rustica* and *H. panicea*. Water, conditioned with starfish, ascidia and sponge, caused activation of the same enzymes, but to different extend. Foremost among tested enzymes was increment of acid RNase andglycosidases activity in mussel tissues, especially, in the presence of starfish metabolites. But almost all of enzymatic activities tested returned to control level at the end of the experiment in mussel groups treated with SEPs of *A. rubens* and *S. rustica*. This fact could point to compensatory character of metabolic changes observed. In contrast with effect of starfish and ascidian effluents, sponge induced changes in mussel metabolisms were statistically significant at the end of experiment, pointing to slower or different character of biochemical response on *H. panicea* SEPs.

Summarizing results of field and laboratory experiments showed that at least two species pretended to possess allelopathic action. These are sponge *Halichondria panicea* and solitary ascidia *Styela rustica*. In the case of sponge, several known biological activities of chemicals, produced by *Porifera* themselves or their microbial symbionts, may speak well for this suggestion (Althoff et al., 1998; Engel, Pawlik, 2000; Belarbi et al., 2003; Devi at al., 2010; etc.). Ascidian metabolites are not studied as widely as sponge BAS, but there are some with promising clinical application (Kobayashi et al., 1991; McDonald et al., 1994; Ciufolini et al., 1995; Torres et al., 2002; etc.). Thereby, we suggest that *H. panicea* and *S. rustica* from the White Sea could be prospective objects for searching of novel BAS. Additionally, it should be underlined that, if some biologically active compounds with potential application are discovered in these species, they could be cultivated rather easy as they are fouling organisms.

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QUALITY PRESERVATION OF FROZEN SALMON OVARIES

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The salmon caviar refers to the gourmet product with high nutritional and biological value. Volumes of extraction and production of salmon caviar in Russia is enormous and reach 5–6 thousand tons per annum. The amount of caviar produced from frozen salmon ovary has increased in recent years.

As it is known, the quality of caviar products depends on the quality of salmon ovary raw material, processing technology, production sanitary state and conditions of transportation and storage of caviar products.

The preservation of quality is always one of the important issues, so the aim of the work is to study methods to preserve the quality and safety of raw materials.

According to the technical documentations, which serve as a basis for fish processing enterprises, storage life of frozen salmon ovary does not exceed 6 months.

At the present time, the waxed paper is used to preserve the salmon ovary quality with further packaging in waxed boxes and polymer film and bags made of polymer materials, in which salmon ovary are packed under suction or not.

There is another way to preserve the quality of frozen products – icing. We prepared the control samples of salmon ovary packed in waxed film and boxes, and the test samples iced with an antiseptic solution and antioxidants.

Throughout the storage period of the salmon ovary (9 months at the temperature of –18°C) the microbiological properties of the test samples were by an order lower than the properties of the control samples and met hygienic requirements of safety and nutritional value of food products. The content of toxicants – toxic elements, organochlorine pesticides, N-nitrosamines, histamine, in the control and test samples did not exceed the standardized values.