**Bulletin 49**

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| УДК 502.3(571.63)  **I.A. Vakhniuk, K.Yu. Kirichenko, V.A. Drozd, A.A. Vakhniuk, A.V. Kirichenko,  A.S. Kholodov, K.S. Golokhvast**  **GRANULOMETRIC AND CHEMICAL ANALYSIS OF ATMOSPHERIC SUSPENSIONS IN SPASSK-DALNIY CITY (PRIMORSKY KRAI)**  The article is devoted to the study of atmospheric suspensions of Spassk-Dalniy city by means of laser granulometry and chemical analysis methods. It is shown that the atmosphere of this city is polluted with the particles of dimension less than 10 microns (PM10). The dangerous to health micro particles in significant proportions – from 18 to 37,7% were detected at 3 different places. The maximum number of particles with the smallest fraction was revealed at the city-forming enterprise – the cement plant. The airborne content of I and II hazard classes (highly hazardous and moderately hazardous) heavy metal particles was revealed.  **Key words:** atmospheric suspension, ecology, cement dust, micro particles, Spassk-Dalniy.  *DOI: 10.17217/2079-0333-2019-49-6-11* |
| УДК 664.951.31:581.6  **V.F. Guzhova, A.V. Chernova**  **TECHNOLOGY OF HOT SMOKED BALTIC HERRING ENRICHED BY HERBS  AND SPICES PHYTOCOMPONENTS**  In the production of hot smoked Baltic herring the herbal supplements were used to improve the organoleptic properties of the finished product and to prolong its life, as well as to stop the lipid oxidation processes. To obtain a salt mixture, finely ground garlic was added to the table salt in a certain way, as well as small powders (Pulveres subtillis) from spices and herbs that have phytoncidal properties – turmeric, paprika, tutsan and marigold. The antioxidant activity of the samples of hot smoked herring was judged by the degree of decrease in the intensity of chemiluminescence of peroxide radicals of alcohol lipid extracts from the samples, which intensity is proportional to the rate of radicals formation. Shimadzu RF-5301 PC spectrofluorophotometer was used to study chemiluminescence spectra. The analysis of the spectra shows that the highest antioxidant activity is registered when adding a mixture of all the above herbs to the salt, as well as when adding garlic and paprika. The shelf life of hot smoked herring enriched with phytocomponents of medicinal herbs and spices is proved. The following method of storage of finished products is proposed: 30 days at a temperature below 18ºC under vacuum, then-defrosting and storage during 30 days at a temperature of 5ºC in a modified gas environment. It is established that the shelf life of hot smoked herring prepared with the use of medicinal herbs and spices phytocomponents can be increased to 60 days with saving high organoleptic characteristics and nutritional value of the product.  **Key words:** hot smoked Baltic herring, salt mixture, phytocomponents, turmeric, paprika, tutsan, marigold, antioxidant activity, chemiluminescence.  *DOI: 10.17217/2079-0333-2019-49-12-20* |
| УДК 664.644.12  **N.L. Naumova, I.M. Chanov, M.V. Syrvacheva**  **COMPARATIVE ANALYSIS OF HIGH-QUALITY WHEAT FLOUR  AND BAKERY MIXTURES AS RAW MATERIALS FOR BAKERY PRODUCTion**  The study of quality, safety and nutritional value of high-grade wheat flour produced by various manufacturers and baking mixtures are analyzed in the article. The acceptable sensory compatibility of raw materials has been established. The protein fraction in the tested samples of flour and mixtures is in the same quantitative range, however, a higher content of gluten proteins is found in the wheat material. The wheat mixture compares favorably with the number of dietary fiber, copper, iron and manganese. The buckwheat mixture is characterized with the content of lipids, phosphorus, calcium and selenium. It was determined that the presence of whole-grain components and bran in baking mixtures does not cause an increase of xenobiotics content in them. The safety of the investigated raw materials for the health of consumers has been proved. The nutritional and technological component of baking mixtures guarantees high quality and nutritional value of bakery products made from the studied samples of wheat flour.  **Key words:** wheat flour, baking mixture, quality, safety and nutritional value of raw materials.  *DOI: 10.17217/2079-0333-2019-49-21-26* |
| УДК 639.2.05(571.6)  **P.A. Balykin**  **Wedge variability of the Russian far East catches**  **in the current century**  The analysis of possible global warming impact on the results of Russian fisheries in the seas of the Far East is carried out. It is concluded that in the next decade we should most likely expect a decrease in the fish resources catches in the Pacific waters of Kamchatka. Later, a similar situation may arise in the western part of the Bering Sea. An urgent need to study thoroughly the given question for long-term forecast of fishing industry condition in the Russian Far East was determined.  **Key words:** global warming, fishery, the Far East of Russia, fish resources, a pollack, a cod, Pacific salmons.  *DOI: 10.17217/2079-0333-2019-49-27-35* |
| УДК 595.323.1:574.58(571.15)  **L.V. Vesnina, G.V. Lukerina, T.O. Ronzhina**  **NUMERICAL AND DESCRIPTIVE CHANGES OF CRUSTACEAN *ARTEMIA* LEACH, 1819 POPULATION IN HYPERHALINE LAKE KUCHUKSKOYE OF ALTAISKY KRAI  IN TERMS OF WATER CONTENT TRANSGRESSIVE PHASE**  The abiotic and biotic factors affecting the biological productivity of the hyperhaline Lake Kuchukskoe, Blagoveshchensky district of Altaisky Krai were described. The lake biota was in a depressed state for a number of years due to the achievement of salt lethal concentrations for hydrobionts in brine. Because of hydrological regime and general moisture content changes of reservoir catchment area in 2017–2018, the population of Artemia crustaceans with high numerical and production indicators has increased in the lake. The population of Artemia in Lake Kuchukskoe belongs to the parthenogenetic race. The development of three generations was observed in the lake during the described period. Each generation of Artemia had unique size-age structure, sex ratio and fertility indicators. They varied the proportion of females with titanocene. The current environment conditions in Lake Kuchukskoe helped to increase its productivity and to include it in a list of water bodies of Altaisky Krai which are perspective for Artemia (at cyst stage) catch.  **Key words:** hyperhaline lake, *Artemia* crustacean, Artemia (at cyst stage), fecundity, catching, Altaisky Krai.  *DOI: 10.17217/2079-0333-2019-49-36-42* |
| УДК 502.51:597.851  **E.B. Romanova, E.S. Ryabinina**  **SCREENING CYTOGENETIC METHOD FOR RECORDING MICRONUCLEI  IN THE BLOOD OF *PELOPHYLAX LESSONAE* AS A STATE INDICATOR OF AQUATIC BIOLOGICAL RESOURCES**  To assess the quality of the environment in the screening and monitoring of territories genotoxic pollution micronucleus test was used by which an account of micronuclei in cells of proliferating tissues of zooindicators – pond frogs is fulfilled. The aim was to assess the dynamics of hematological and cytogenetic parameters (by taking into account micronuclei in red blood cells) of pond frogs in two water bodies of Nizhny Novgorod region during the three-year monitoring (2016–2018). The studied reservoirs were characterized by different hydrochemical conditions. According to specific combinatorial index of water pollution (WCISW) the status of water bodies in 2018 deteriorated in comparison with that in 2017. It was established that peripheral blood of pond frogs mainly contained erythrocytes with attached and disintegrated micronuclei. In both samples of pond frogs living in dirty and extremely dirty environments for a long time, an increase in the total number of micronuclei and attached micronuclei (‰); decrease in the total number of red blood cells and leukocytes were revealed. The largest micronuclei in pond frog erythrocytes were disintegrated micronuclei (7,27 ± 0,85 µm2), exceeding the area of small attached micronuclei (1,31 ± 0,11 µm2) by 5,5 times. The differentiated calculation of micronuclei shows the need for comprehensive studies using the cytogenetic characteristics of living organisms to obtain information about the ecological and genetic state of organism populations and their habitat.  **Key words:** *Pelophylax lessonae*, bioindication, attached micronuclei, disintegrated micronuclei, micronucleus test.  *DOI: 10.17217/2079-0333-2019-49-43-49* |
| УДК 639.3.043 + 639.55  **S.E. Leskova, N.N. Kovalev, Y.M. Pozdnyakova, E.V. Mikheev, R.V. Esipenko**  **SOME SURFACTANTS INFLUENCE ON GROWTH AND SURVIVAL RATES OF FAR EASTERN TREPANG JUVENILE IN EXPERIMENTAL CONDITIONS**  The influence of multicomponent feed formulations on weight, survival, growth rate and rate of feed absorption of pigmented and non-pigmented trepang juvenile in experimental conditions was investigated. It is shown that the growth rate of juveniles under constant temperature conditions is not linear. A decrease in body weight of trepang juvenile on the first and second month of the experiment was noted. The stimulating effect on the growth of pigmented juvenile and not-pigmented trepang juvenile survival caused by adding salmon roe DNA in the feed formulation. The addition of DNA and gammarus to the feed led to the weight increase of experimental animals compared to that in the control group by 216,7–222,2 times. The study showed that the addition of DNA to the feed had no effect on the absorption rate and growth rate of pigmented trepang juvenile. The introduction of gammarus into the feed formulation of pigmented juvenile trepang, on the contrary, increased the rate of its absorption.  **Key words**: trepang, aquaculture, feeds, DNA, gammarus, survival, growth rate, feed absorption rate.  *DOI: 10.17217/2079-0333-2019-49-50-56* |
| УДК 577.1:582.26  **Zh.V. Markina, N.A. Aizdaicher**  **UNICELLULAR MICROALGAE *THALASSIOSIRA PSEUDONANA* (BACILLARIOPHYTA) POPULATION AND PHYSIOLOGYCAL CHANGES IN LOW SALINITY AND CADMIUM POLLUTED CONDITIONS**  Cadmium influence in concentrations 10, 30 and 50 mkg/L combined with different salinity (32, 24 and 16‰) on diatom *Thalassiosira pseudonana* was investigated. The salinity 32‰ with adding 50 mkg/L of cadmium slightly stimulated microalgae growth on the 7th day of experiment. The salinity reduction to 16‰ combined with all cadmium concentrations led to growth inhibition and chlorophyll *a* fluorescence diminishing. Cadmium addition to medium with salinity 24 and 16‰ provoked decreasing of larger cells, inner cells structure simplified. Neutral lipids content increased under low salinity and metal addition. The registered effects were dose-dependent. Within the combination of cadmium and low salinity factors the salinity regime plays a decisive role.  **Key words:** *Thalassiosira pseudonana*, cadmium, salinity, chlorophyll *a* fluorescence, reactive oxygen species, neutral lipids, flow cytometry.  *DOI: 10.17217/2079-0333-2019-49-57-64* |
| УДК 58.02:582.272.74  **A.V. Klimova, A.N. Kashutin, Т.А. Клочкова**  **DEVELOPMENT OF GERMLINGS OF *FUCUS DISTICHUS* SUBSP. *EVANESCENS* (PHAEOPHYCEAE, FUCALES) UNDER CHANGING CONDITIONS OF SALINITY, TEMPERATURE AND PHOTOPERIOD**  The influence of salinity, low temperatures and short day on the development of germlings of *Fucus distichus* subsp. *evanescens* in conditions of laboratory experiments were studied. The most active growth and development of *Fucus* germlings was observed at 10ºC and 12-hour light period; during the observation period, their absolute growth rate was 24,9 μm/day. A slight delay in growth was observed at 8ºC and in a short-day condition, since the growth rate did not exceed 19,5 μm/day. In the embryos grown under conditions of low temperature (2ºC) and short day, despite of significantly slower growth and delay of cell differentiation, the increase in length was constant and the average growth rate was 11,6 μm/day. Since our cultivation conditions were close to those in the winter months, we can assume that in temperate latitudes during cold season juvenile plants of *F. distichus* subsp. *evanescens* also have a steady increase in length. Moreover, their morphofunctional development is significantly slowed down. Experiments on the cultivation of seedlings of *F. distichus* subsp. *evanescens* under changing salinity conditions have shown that in the fresh water their early development was not possible. Mass death of the embryos developing at 10ºC in conditions of zero salinity begins on the 6th day, complete death occurs on the 15th day. Our experiments would provide an explanation to some peculiarities of reproduction and distribution of *Fucus* in Kamchatka.  **Key words**: absolute growth rate, gradient of temperature and salinity, photoperiod, early developmental stages, *Fucus distichus* subsp. *evanescens*, Kamchatka.  *DOI: 10.17217/2079-0333-2019-49-65-75* |
| УДК 577.151:633.853.52:632.954  **M.P. Mikhailova, L.A. Kamanina, V.T. Sinegovskaya**  **CHANGE IN THE ENZYMATIC ACTIVITY AND BIOCHEMICAL COMPOSITION OF SOYBEAN SEEDS UNDER THE INFLUENCE OF HERBICIDE**  The data of the Pulsar herbicide effect on the enzymatic activity change in the leaves of soybean varieties MK 100 and the biochemical composition of its seeds. The studies were performed on the experimental field of All-Russian Scientific Research Institute of Soybean during 2017-2018. It was found that the annual usage of the Pulsar herbicide in the phase of 3-rd trifoliate leaf caused a decrease in the specific activity of the peroxidase enzyme. The increase in the specific activity of the enzyme was observed during the plants flowering phase. It indicates the active participation of the enzyme in the plant adaptation mechanisms. Pulsar herbicide treatment with a 0,8 l/ha dose led to the decrease of protein content in seeds, change of its qualitative composition and increase of linolenic acid content in seeds of the studied variety.  **Key words:** soybean, soybean varieties MK 100, the Pulsar herbicide, specific enzymatic activity, peroxidase.  *DOI: 10.17217/2079-0333-2019-49-76-80* |
| УДК504.3:613  **A.S. Kholodov, K.Y. Kirichenko, K.S. Zadornov, K.S. Golokhvast**  **EFFECT OF PARTICULATE MATTER IN THE AIR OF RESIDENTIAL AREAS ON HUMAN HEALTH**  The review focuses on the effects of particulate matter in the air of residential areas on human health. Particulate matter can be a significant hazard depending on its diameter, morphometric and physico-chemical characteristics. Notably, the respiratory organs of people living in the proximity of town-forming enterprises, highways and hazardous industries get affected. The variety of respiratory diseases developing under the influence of minute particles of coal, cement and rocks is a serious danger. The paper also includes a comparison of Russian and international standards of permissible concentrations of particulate matter in the atmospheric air of residential areas.  **Key words:** atmospheric aerosol, airborne particles, air pollution, microparticles, PM, respiratory diseases.  *DOI: 10.17217/2079-0333-2019-49-81-88* |
| УДК 597.317: 639.32  **A.V. Vinogradskaya, A.A. Matveev, T.V. Ryazanova, D.A. Terentiev, U.K. Kurbanov**  **VISUALIZATION METHODS OF ANNUAL RINGS ON THE CALLBOARDS OF SOME TYPES OF ROMBIAN SKATES (RAJIDAE BLAINVILLE, 1816)**  To determine the age of three species of rombian skates, including shield-bearing *Bathyraja parmifera* Bean, purple *Bathyraja violacea* Suvorov, and Aleutian *Bathyraja aleutica* Gilbert, several methods of visualization of annual rings located on the concave upper surface (calareums) of the vertebrae were tested. Besides applying methods described in the scientific references, their modifications and standard histological protocols, we also used our personally developed method to stain the whole vertebra in 1% alcohol solution of brilliant green (*Viride nitens*) followed by heat treatment. The annual rings were best observed in histological sections and after staining with brilliant green. In contrast to the time-consuming histological processing, our newly designed method was fast enough and effective for determining the number of annual rings on the vertebrae of rombian skates. It does not require complex and time-consuming processing, special reagents and expensive equipment and can be applied even in the field.  **Key words:** rombian skates, annual rings, vertebral staining, histological section, decalcification, brilliant green.  *DOI: 10.17217/2079-0333-2019-49-89-97* |