Numerical modeling of human anatomy is one of the most rapidly developing areas in applications of nuclear medicine and medical physics. The main modeling tool is the Monte Carlo method. Obviously, in solving problems of radionuclide and radiology diagnostics and therapy, high-quality dosimetric support is required. However, providing this support is usually difficult in at least three aspects: (1) there are a large number of different exposure scenarios; (2) during irradiation, several types of radiation can be used that interact with the substance in different ways, for example photons (and electrons), electrons, positrons, alpha particles, neutrons and protons; (3) The human body consists of three-dimensional heterogeneous tissues and organs of various shapes and densities, which leads to an extremely complex pattern of formation of both a therapeutic dose and a dose in healthy organs and tissues. The possibilities of direct dose measurement are extremely limited, since the placement and use of detectors inside the human body is associated with a number of obvious difficulties.

Currently, the world's widely used numerical phantoms of the human body in conjunction with the transport codes that implement the Monte Carlo method. When using these phantoms, the accuracy of dose assessment in deep-seated organs depends on the quality of the modeling of the composition and the material composition of the tissues of the human body. In this regard, it is voxel phantoms that are the most accurate models of both individual organs and tissues, and the body as a whole. A voxel phantom is a model of the human body, assembled from small parallelepipeds - voxels. The basis for constructing a voxel phantom is a set of tomographic images of a particular person. The description of the voxel phantom in the language of the input file of the dose calculation program is, in fact, the "materialization" of this phantom, which is available for visualization and use in the calculations.

So, since voxel phantoms are the most accurate models of the human body, the creation of voxel phantoms and their use in radiotherapy and dosimetry is an important scientific and technical problem.

THE SURVIVAL RATE OF MARBLE CRAYFISH – A POTENTIAL INVASIVE SPECIES

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Marble crayfish is an invasive species having a large potential for colonization of Belarusian reservoirs. The article explains its possibilities to survive in Belarusian climate conditions.

Keywords: invasive, crayfish, temperature, surviving.

Fig. 1. Countries where marble crayfish has been found in the wild

Marble crayfish is a parthenogenetic triploid form of Procambarus fallax *(Hagen, 1870).* Partenogenetic reproduction type (all individuals are triploid females) representatives Marble crayfish as a potential invasive species of the Republic of Belarus.

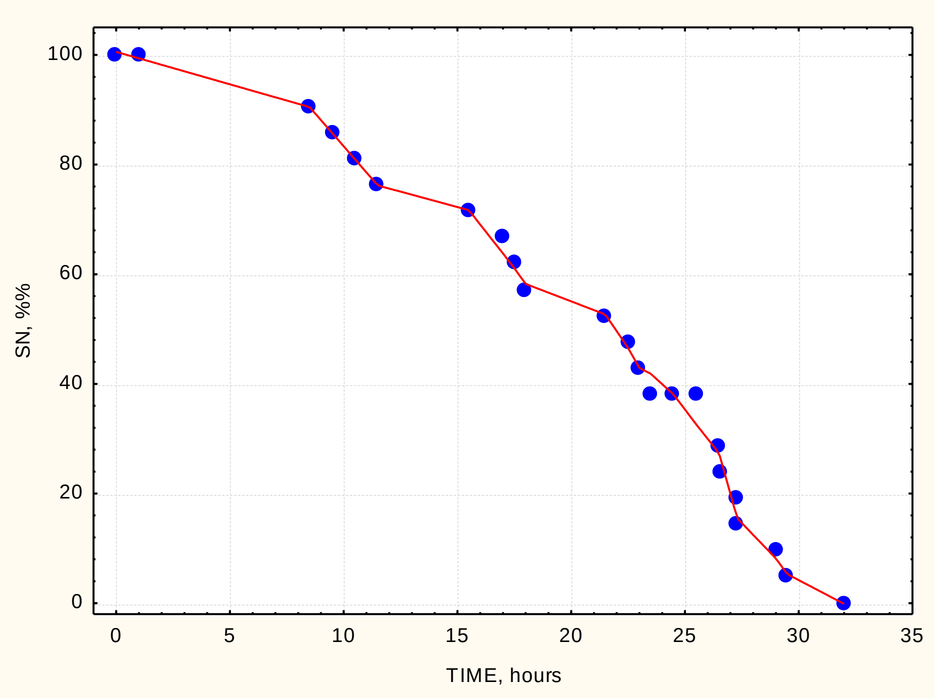
Its native area is North America. The main location and reservoir are Satilla River in Georgia and Florida, United States. It is an aquarium species which have been came into the nature accidentally. Now its population can be found in Dniapro River near the town of Dnipro, Ukraine which is close to the territory of Belarus.

In the wild, P. fallax individuals are presented in two sexes as many others animals. However, its aquarium representatives named P. fallax forma viginalis (Marble crayfish) are triploid females. This is unique situation for decapod crustaceans.

The climate of the place of origin of marble crayfish and the climate of Belarus are different. So, there is a question: can marble crayfish make a population in our country? Number of experiences try to answer this question correctly.

One of the important factor of the environment is temperature. Average summer temperature in Belarus is higher than in the native area of marbled crayfish. So, we used a special machine in the laboratory to create temperature of Belarusian summer. Besides, a fridge was using whilst the experiment to model Belarusian winter.

According to these experiments capacities of marble crayfish are too short for surviving in Belarusian climate. In these experiments we took 21 individuals of marbled crayfish and watched after its reaction for the higher temperature (in experiment it was +35°C). In the graphic 1 is showed the specific of its surviving for the 32 hours in that temperature.



Graphic 1. Time of the Marble crayfishes surviving in +35°C.

By the way, the other group of 10 individuals was put in a fridge with low temperature (+4°C was chosen for the experiment).

Aim of the experiments is researching of marble crayfish's capacity to pass Belarusian summer in the wild reservoirs. Results of the first one can be showed on the graphic 1. It says that P. fallax forma viginalis can't survive in the wild of the Republic of Belarus because of its low temperature stability. 20 out 21 individuals died whilst setting of the experiment with high temperature machine and all of the 10 ones died in a fridge whilst the experiment with low temperature.

Medium time of its life in the machine with high temperature was 20.5 hours (the first crayfish died after 8.5 hours from starting the experiment and the 20th did after 29.5 hours from starting the experiment). The last one has survived 32 hours. After that the experiment was stopped. So the only one individual stay alive after the experiment. The last individual in the experiment with low temperature died near the second week after it was put in.

The last one individual survived the experiment was named "terminator" for its survivability upon others individuals in the experiment. It was moved out into the separate jam and now we should to see how their survivability transfers between millenniums if it does at all.

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ANALYSIS OF LOCAL MONITORING DATA OF JSC "BOBRUISK PLANT OF BIOTECHNOLOGIES"

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The paper analyzes the local monitoring data on controlled indicators. The air and groundwater pollutant concentration changes during the period of the study have also been analyzed.

Keywords: local monitoring, control, pollutant emission, groundwater.

Local environmental monitoring is one of the types of the national environmental monitoring system and is carried out by legal entities exploiting the sources of harmful environmental impact to observe the state of the environment in the vicinity of these sources. The study analyzes the system of local monitoring of groundwater and emissions at JSC "Bobruisk plant of biotechnologies".

The main activity of the enterprise, the user of natural resources, is the production of ethyl alcohol of agricultural origin, denatured rectified spirit; fodder; industrial gases, carbon dioxide; windshield washer fluids; agrochemical products and fertilizers; pharmaceuticals, and veterinary medicines.

During its production activity the enterprise has a complex impact on the components of the environment: air pollutant emissions from 141 sources comprised 108.19 tons per year which is much less than the allowed indices; water consumption and wastewater discharges into the city sewer systems; production waste management (storage, utilization and disposal). About 85% of production wastes were recycled.

The enterprise carries out production environmental and analytical control, local monitoring, which is aimed at the observation of groundwater in the area of the revealed or potential sources of pollution, and the emissions of air pollutants.

According to the schedule local monitoring of emissions is carried out once a month on the following observation parameters: concentration and mass emission of carbon oxide, nitrogen oxide (in terms of dioxide), and particulate matter. The pollutant concentration measurement is carried out according to the techniques, included in the area of accreditation of Central Laboratory Quality Control of JSC "Bobruisk plant of biotechnologies".

The analysis of monitoring data on pollutant emissions at the main site over the past 3 years has shown a significant increase, in particular, in such indicators as sulfur dioxide, nitrogen oxides (II and IV), carbon oxide and particulate matter. First of all, it is referred to the increase in the output of fodder yeast and lignin fuel briquettes. The main part of emissions is non-methane volatile organic compounds represented by methyl, ethyl, propyl, isopropyl, butyl, and isobutyl alcohols, however, the emissions of these substances has remained approximately the same in the recent several years. Gross emission of the pollutants coming from the experimental production site manufacturing fuel briquettes in the settlement of Tugolitsa, and a lignin warehouse in the settlement of Titovka has remained at the level of the 2014. For the period studied the excess of permissible levels of emission, dumping and concentration of pollutants haven't been recorded.

Local monitoring aimed at the observation of groundwater is carried out with the network of the underground wells located at the lignin storage site in the settlement of Titovka. The quantity and location of observation bores and wells are defined by the project documentation. The local monitoring of groundwater is carried out once in three months in the first year of observations, and once a year during the recession of spring flood in subsequent years according to the observation schedule. The list of parameters is as follows: a groundwater depth,