Name of the project:

IRN AP19678812 "The use of genetic and bioinformatic methods for the identification pathogens of zooanthroponotic mycoses of game and farm animals circulating in the territory of Kazakhstan"

Relevance

In connection with the historical features of animal husbandry, Kazakhstan is a stationary natural focus of classical animal and human mycoses, and the identification of pathogens of opportunistic mycoses is also reported. The issue of identifying natural foci of dermatomycosis and opportunistic mycoses, the transmission of pathogens by ectoparasites in populations of wild animals and humans remains unexplored. Data on pathogens of mycoses in Kazakhstan are outdated, not harmonized with the new taxonomy, not confirmed by genome analysis. There is no information on infection of wild animals, there are no publications.

The solution to this problem is possible by conducting a comprehensive study, including the identification of natural foci of mycoses of wild fur and carnivorous game animals, the identification of the relationship with stationary foci of mycoses of domestic and farm animals and human morbidity, which will allow us to show the ways of transmission of pathogens in ecological communities. When implementing the tasks set, the genome of various types of pathogens of mycoses circulating in the territory of Kazakhstan will be established, methods for isolating the DNA of micromycetes and parameters for setting PCR will be worked out; primers were selected, sequencing of specific regions of marker genes was carried out, and phylogenetic analysis was carried out. The project will end with the creation of a collection of various types of mycosis pathogens with genetic confirmation of each identified species circulating in the territory of Kazakhstan, the establishment of the main pathways for the spread of pathogens between natural reservoirs, farm animals and humans.

Purpose: identification of natural foci and determination of the genetic affiliation of various pathogens of mycoses of wild game and farm animals in the territory of northern and central Kazakhstan, using the methods of molecular genetics and bioinformatics.

Expected results

As a result of this project, the expected results are:

- monitoring the incidence of dermatomycoses and other mold and yeast mycoses of livestock of farm animals in the Republic of Kazakhstan;

- identification and molecular genetic characterization of the causative agents of these diseases;

- bioinformatic analysis, identification of the relationship between the spread of opportunistic mycoses with territorial and climatic features, with the incidence of native livestock and imported livestock, with the conditions of keeping and feeding;

- identification of new pathogens of opportunistic mycoses of farm animals, their study and deposit in the Collection of Microorganisms of the Research Institute of Biological Safety Problems of the CS MES RK;

- identification of the dependence of the lesion on the type and breed of animals, scientific substantiation of the reasons for the increase in cases of manifestation of mycoses and mycotoxicoses in animals;

- development of a monitoring scheme for practicing doctors and agricultural producers, issuing recommendations for the treatment and prevention of opportunistic mycoses in livestock of farm animals in the Republic of Kazakhstan.

The project will train highly qualified specialists in the field of molecular biology and veterinary mycology. Two dissertations for the academic degree of Master of Science will be prepared and preparation of at least one PhD will begin.

Research results will be published:

- at least 3 (three) articles and (or) reviews in peer-reviewed scientific publications indexed in the Science Citation Index Expanded Web of Science database and (or) having a CiteScore percentile in the Scopus database of at least 35 (thirty five);

- either at least 2 (two) articles and (or) reviews in peer-reviewed scientific publications indexed in the Science Citation Index Expanded Web of Science database and (or) having a CiteScore percentile in the Scopus database of at least 35 (thirty five), and not less than 1 (one) patent included in the Derwent Innovations Index database (Web of Science, Clarivate Analytics);

- as well as at least 1 (one) article or review in a peer-reviewed foreign or domestic publication recommended by the Committee for Control in Education and Science;

- either at least 2 (two) articles and (or) reviews in peer-reviewed scientific publications included in the 1 (first) and (or) 2 (second) quartile by impact factor in the Web of Science database and (or) having a percentile in CiteScore in the Scopus database of at least 65 (sixty-five);

- either at least 1 (one) article or review in a peer-reviewed scientific publication that is included in the 1 (first) quartile by impact factor in the Web of Science database and (or) has a CiteScore percentile in the Scopus database of at least 80 (eighty);

- presented at scientific conferences organized by scientific state or international organizations.

Study group members:

project leader – Elena Vladimirovna Kukhar, Associate Professor, Doctor of Biological Sciences (Scopus Author ID: 57195366128; Researcher ID Web of Science: AAW-9334-2020; orcid.org/0000-0003-3794-434X, Researcher ID in Publons: AAW- 9334-2020), specialist in veterinary mycology and biotechnology.

research group:

Chief Researcher Kiyan Vladimir Sergeevich, PhD, associate professor, specialist in molecular and cellular biotechnology, veterinary and medical

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Leading Researcher Smagulova Ainura Muratovna, Master of Technical Sciences, h-index-2 (Scopus Author ID: 57213811809, orcid.org/0000-0002-3067-3666), specialist in cell engineering, immunology and molecular genetics, veterinary and medical mycology.

Senior Researcher Uakhit Rabiga Seytbattalkyzy, Master of Technical Sciences in Biotechnology, h-index-1 (ORCID: 0000-0001-7737-7162, Scopus Author ID: 57226673682.), Specialist in the field of parasitology, molecular biology and bioinformatics.

Researcher Leontiev Sergey Valerievich, Master of Agricultural Sciences in the specialty "Hunting and fur farming", h-index-0 (ORCID: 0000-0001-7737-7162, Scopus Author ID: 5722667797), specialist in biology and ecology of animals, as well as hunting.

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