

RESOLUTION

TRAINING COURSE “USING DNA TECHNOLOGIES FOR IDENTIFICATION AND STUDY OF INVASIVE AND RARE SPECIES” Minsk, 20-30 August 2018

Held under the projects as follows:

Global Taxonomy Initiative “Building a national and regional network for the study of alien species using DNA technologies as a great tool helping with the taxonomic impediment”
(financed by the Japan Fund of Biological Diversity)

BioBridge Initiative “Transfer of DNA-Barcoding Technology for the Inventory and Monitoring of Rare and Endangered Species in Belarus and other Central and Eastern European Countries”
(financed by the government of the Republic of Korea).

INTRODUCTION

The biological diversity of living organisms is a vital factor for the functioning of ecosystems. Man’s active influence on the environment (draining of wetlands, creating artificial reservoirs, expanding agricultural areas, deforestation, building roads and residential buildings, and etc.) and the climate change observed in recent decades worsens the living conditions of species and leads to a reduction in their numbers and even to extinction. Another reason for declined biodiversity is invasive species. Rare and endangered plant species are characterized by low adaptability to the above factors, which leads to the loss of valuable genotypes and a decrease in biodiversity as a whole. Timely adoption of appropriate measures will allow preserving the biological diversity of flora and fauna and the functioning of ecosystems.

DNA barcoding, a new genetic technique, developed in Canada and widely applied in other countries is used both in scientific (DNA identification for taxonomy, inventory of genetic resources, timely detection of invasive species, and etc.), and in practical activities (combat poaching, for example). It is particularly effective as a less expensive method in such cases when it is required to analyze a large number of samples.

This project is aimed at training of specialists on the use of DNA barcoding technology as one of the modern molecular genetic methods for quick and effective screening of the species diversity of flora and fauna to identify rare and endangered species, as well as to study invasive and alien species (identifying, monitoring the dynamics of distribution) with a view of developing environmental measures and ensuring the sustainable use of diversity.

A training course on the use of DNA barcoding technology for specialists from Central and Eastern Europe and Central Asia was organized with the assistance of the Secretariat of the Convention on Biological Diversity in the framework of a joint event on the following projects selected as part of international initiatives under the UN Convention on Biological Diversity:

Global Taxonomy Initiative “Building a national and regional network for the study of alien species using DNA technologies as a great tool helping with the taxonomic impediment” (financed by the Japan Fund of Biological Diversity);

BioBridge Initiative “Transfer of DNA-Barcoding Technology for the Inventory and Monitoring of Rare and Endangered Species in Belarus and other Central and Eastern European Countries” (financed by the Government of the Republic of Korea).

Global Taxonomy Initiative Project

“Building a national and regional network for the study of alien species using DNA technologies as a great tool helping with the taxonomic impediment”

Project objective:

Building a national and regional network for quick identification and study of alien species using DNA technologies.

Project targets:

- Check the existing list of aquatic alien species of Belarus (Ukraine, Moldova, Armenia) using DNA barcoding
- Establish a national/regional reference DNA barcodes library of alien species
- Replenish the Republican DNA Bank with new species (25 at least)
- Help the trainees become competent users and individuals contributing to the replenishment of DNA barcode databases such as BOLD and GenBank.

The project outcomes received:

1. Partially checked list of aquatic alien fish species of Belarus, Ukraine and Georgia and the crustaceans of Georgia and Armenia
2. Designed structure of the Regional Reference DNA Barcode Library of aquatic alien species
3. Genetic sequences obtained as a result of samples’ analysis on the Applied Biosystems genetic analyzer prepared for deposit into the BOLD system
4. Established Regional Specialist Network to study aquatic alien species with a view of collaboration between partner country institutions as a basis for building a Regional Network “Barcode of Life”.

BioBridge Initiative Project “Transfer of DNA-Barcoding Technology for the Inventory and Monitoring of Rare and Endangered Species in Belarus and other Central and Eastern European Countries”

Project objective: Contribute to the overall objective of assisting Belarus and other countries of Central and Eastern Europe and Central Asia (Armenia, Kazakhstan, Lithuania, Moldova, Tajikistan, Ukraine, etc.) in use of modern molecular genetic technologies, such as DNA barcoding, to identify rare and endangered species (inventory of genetic resources) and biological diversity monitoring.

Project targets:

- Conduct training for a group of specialists from Belarus and other countries of Central and Eastern Europe and Central Asia, including familiarization with the general program of the Global Taxonomic Initiative and the methodological approaches and techniques used in collecting samples of organisms for their subsequent analysis;
- Develop a prototype of the Regional Reference Library of DNA Barcodes as an independent structural unit of the Republican DNA Bank of a human, animals, plants and microorganisms (Belarus);
- Build a Regional Specialist Network using DNA barcoding technology to exchange scientific and methodological information and conduct practical workshops on the use of DNA identification methods for taxonomic purposes;
- Develop a project proposal on the strengthened regional collaboration of countries in the development of DNA barcoding initiative;
- Assist trainees in becoming competent users and individuals contributing to the replenishment of DNA barcode databases such as BOLD and GenBank.

The project outcomes received:

- The study of 27 plant species using DNA-barcoding technique conducted;
- Genetic sequences obtained by analyzing samples on the Applied Biosystems genetic analyzer prepared for deposit into the BOLD system (27 species);
- Prototype of the Regional Reference DNA Barcodes Library as a structural unit of the database of the Republican DNA Bank of a human, animals, plants and microorganisms (Belarus) designed;
- A regional network of specialists for collaboration between research and other involved partner country institutions to study rare and endangered plant species as a basis for building a regional network “Barcode of Life” established.

JOINT EVENT OUTCOMES

The following reports were made as part of the joint event:

1. Overview of the Global Taxonomy Initiative program and of other research programs in Canada. Speaker: Alexey Borisenko, PhD, Deputy Director, Department of International Cooperation, University of Guelph, Canada;
2. DNA barcoding as a tool for the quick identification of animal and plant species, inventory and conservation of genetic resources. Reporter: T.P. Lipinskaya, PhD, Scientific and Practical Centre for Bioresources, NAS of Belarus; E.P. Mikhalenko, PhD, Institute of Genetics and Cytology, NAS of Belarus;
3. DNA barcoding as a tool for the quick identification of animal and plant species, inventory and conservation of genetic resources also used as a research and educational tool at the Belarusian State University. Reporter: N.V. Voronova, PhD, Belarusian State University;
4. Invasive alien species and the area-related strategy. Reporter: V.P. Semenchenko, PhD, NASB Corresponding Member, Scientific and Practical Centre for Bioresources, NAS of Belarus;

5. Introduction to the Convention on International Trade in Endangered Species of Wild Fauna and Flora, CITES. Reporter: R.V. Novitsky, PhD, Scientific and Practical Centre for Bioresources, NAS of Belarus;
6. Introduction to the Nagoya Protocol to the Convention on Biological Diversity – international mechanism regulating access to genetic resources and benefit-sharing. Reporter: E.N. Makeyeva, PhD, Institute of Genetics and Cytology, NAS of Belarus;
7. Global UNDP-GEF Project progress “Strengthening of human resources, legal frameworks and institutional capacities to implement the Nagoya Protocol in the Republic of Belarus”. Reporter: E.N. Makeyeva, PhD, Institute of Genetics and Cytology, NAS of Belarus;
8. Practical experience in providing (transfer) of genetic resources: examples and procedures for obtaining the required documentation. Reporter: K.A. Panteley, Institute of Genetics and Cytology, NAS of Belarus.

Lectures on molecular genetics and the theory and practice of DNA barcoding technique use heard

- Theoretical course “Introduction to DNA barcoding and BOLD system”. Reporter: Alexey Borisenko, PhD, Deputy Director, Department of International Cooperation, University of Guelph, Canada
- Practical course on the bases of molecular genetics.
 - Speaker in the group studying animal origin objects:
A. Moldovan, Laboratory of Systematics and Molecular Phylogeny, Institute of Zoology, Moldavian State University, the Republic of Moldova
 - Speaker in the group studying plant origin objects:
E.I. Kuzminova
- Bioinformatics and megadata analysis:
 - Reporters: Alexey Borisenko, PhD, Deputy Director, Department of International Cooperation, University of Guelph, Canada
 - N.V. Voronova, PhD, Belarusian State University
- Introduction to the DNA barcoding of animals. Data upload into BOLD, BLAST and MEGA systems
Reporter: T.P. Lipinskaya, PhD, Scientific and Practical Centre for Bioresources, NAS of Belarus
- Introduction to the DNA barcoding of plants. Data upload into BOLD, BLAST, and MEGA systems. Reporter: M. Kuzmina, University of Guelph, Canada

Practical activities were conducted in two groups organized by “the object of study”: a group studying aquatic animals and a group studying plants.

Laboratory practicals were held at the Scientific and Practical Centre for Bioresources, NAS of Belarus, and the Institute of Genetics and Cytology, NAS of Belarus, correspondingly. Sequencing was held at the Shareable Core Facilities GENOME, the Institute of Genetics and Cytology, NAS of Belarus.

The workshop participants noted:

In modern conditions of increased pressure on wildlife, both anthropogenic factors and climate change the training course subject-matter “Using DNA technologies for identification and study of invasive and rare species” is acute and of interest to the countries they represent.

DECIDED

1. Build a Regional DNA Barcoding Specialist Network to ensure the active collaboration of partner country specialists and information exchange on theoretical and practical aspects of DNA barcoding use;
2. Build a Regional Coordination DNA Barcoding Board with the membership of E.N. Makeyeva, T.P. Lipinskaya, (Belarus) and A. Lozan, A. Moldovan (Moldova) to coordinate the activities of specialists in the development of regional projects for the study of biological diversity using DNA barcoding as one of the modern and effective molecular-genetic methods used for taxonomy, as well as for the organization of workshops and training courses;
3. Design a prototype of the Regional Reference DNA Barcode Library of aquatic animals at the Hydrobiology Laboratory of the Scientific and Practical Centre for Bioresources;
4. Design a prototype of the Regional Reference DNA Barcode Library of plants based on the Republican DNA bank of a human, animals, plants and microorganisms of the Institute of Genetics and Cytology of the National Academy of Sciences of Belarus.