

# **REXDAN Research Center**

## **The Genetics Laboratory**

It includes areas suitable for the analyses carried out, physically delimited between them, depending on the equipment or techniques used for the genetic investigation of aquatic ecosystems:

- pre-PCR and nucleic acid extraction area; automatic nucleic acid extraction system;
- amplification area; PCR and real-time PCR equipment;
- electrophoresis area, visualization and analysis: electrophoresis system, genetic analyzer.

The equipment in the Genetics Laboratory is used for:

- assessing biodiversity and conservation of species which develop in the researched area;
- documenting the adaptation of species to changes in environmental conditions;
- documenting the effects of environmental pollution on species;
- monitoring the quality of water and soil, sewage sludge, water, soil and air pollution;
- fundamental and applied research in the field of artificial reproduction of various fish species.

### **Members:**

**Prof. dr. Michaela Dobre**



**CSII dr. Rodica-Cătălina EFROSE**



# The Genetics Laboratory

---

## Equipment:

*KingFisher™ Duo Prime Purification System/ Thermo Fisher Scientific , USA*

## Uses:

- DNA and RNA isolation from various raw materials, proteomic applications, cell isolation;
- versatile selection of kits optimized so as to maximize the purity and yield for every application and sample type in the case of raw materials such as: blood, cells, bacteria, cell cultures, tissues or fluids body without cells;
- extraction and purification of RNA from viral transport medium (VTM) swabs, nasopharyngeal swabs (NP) and saliva samples;
- genomic DNA (gDNA) from a variety of samples, for genetic testing;
- circulating cell-free DNA (cfDNA) for liquid biopsies;
- DNA and RNA from formalin-fixed, paraffin-embedded (FFPE) specimens for clinical cancer research;
- total RNA and miRNA for gene expression research.



## Equipment:

*KingFisher™ Duo Prime Purification System/ Thermo Fisher Scientific ,  
USA*

## Technical specifications:

- uses reverse magnetic particle processing (MPP) technology which allows excellent sample recovery with great reproducibility and efficiency;
- designed for low or medium flow;
- built-in UV lamp for easy and effective decontamination;
- heating/cooling: 10°C to 75°C (plate row block A); 4°C to 75°C (elution band block);
- processing of 6 or 12 samples per run;
- BindIt Software used for creating, downloading, running, modifying and storing protocols corresponding to the KingFisher applications.



# The Genetics Laboratory

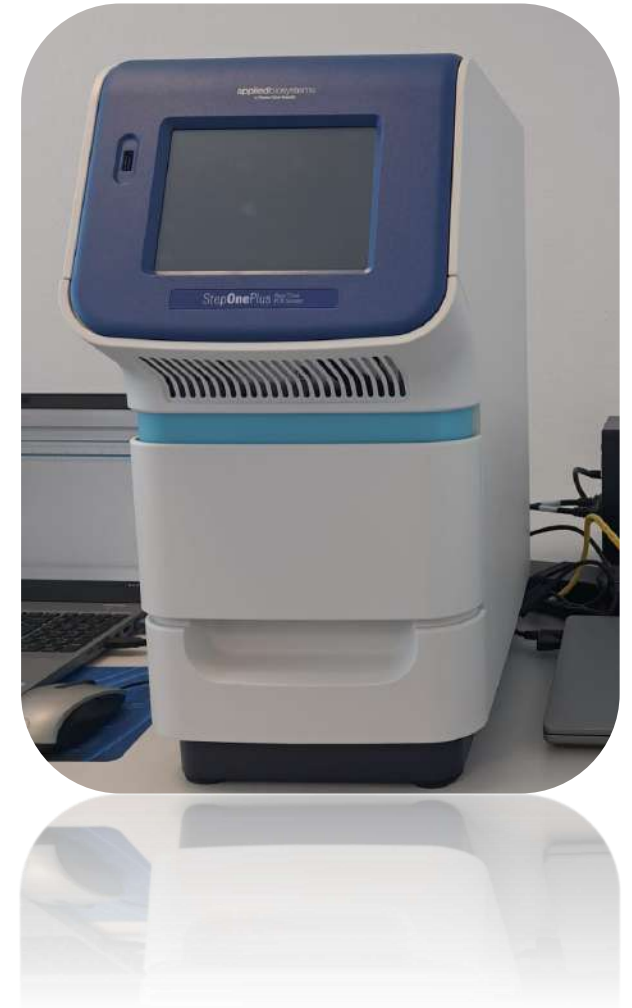
---

## Equipment:

***StepOnePlus™ Real-Time PCR System/Thermo Fisher Scientific USA***

## Uses:

- pathogen detection, gene expression analysis (detection and quantification of target genes, even at very low expression levels; mRNA, microRNA analysis);
- genotyping, analysis of polymorphism determined by a single nucleotide (single nucleotide polymorphism/SNP);
- analysis of chromosomal aberrations;
- quantification of different microorganisms from a wide variety of samples (fermented sample, soil, water, food samples, etc.);
- quantification of the GMO content of different raw or processed materials;
- verification of microarray/NGS data;
- diagnosing diseases and monitoring the effectiveness of therapies;



# The Genetics Laboratory

## Equipment:

*StepOnePlus™ Real-Time PCR System/Thermo Fisher Scientific USA*

## Uses:

- viral quantification (detection of the number of viral particles);
- the mitochondrial DNA study, chromatin immunoprecipitation;
- determination of microsatellite instability;
- determination of DNA methylation level;
- detection of X chromosome inactivation;
- DNA quantification in forensic medicine;
- allelic discrimination and calculation of allele frequency in populations.
- analysis and interpretation of experimental results (standard curve/ absolute quantification; relative standard curve;
- comparative analysis of Ct ( $\Delta\Delta Ct$ )/relative quantification;
- genotyping and genotype presence/absence;
- melting curve analysis and high-resolution melting curve analysis (HRM).

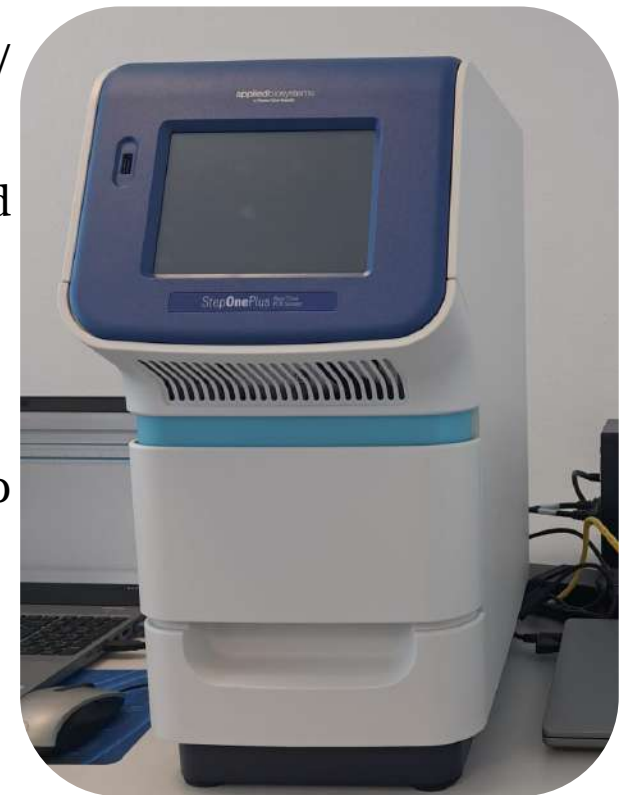


## Equipment:

### *StepOnePlus™ Real-Time PCR System/Thermo Fisher Scientific USA*

## Technical specifications:

- 4-colour optical system used for recording fluorescence from FAM™/SYBR® Green, VIC®/JOE™, NED™/TAMRA™ and ROX™ dyes;
- intuitive and robust software, perfect for both beginners and advanced users;
- simple and flexible configuration and use of tools;
- format: 96-well plate, 8-tube strips, 0.1 ml tubes;
- possibility to discriminate between 2 populations of 5,000 to 10,000 template copies of a TaqMan® assay with 99.7% confidence.
- thermal accuracy: 0.25°C (35°C to 95°C) of display temperature;
- compatibility with high performance;
- multiplexing;
- detection method: SYBR, primer-sample detection;
- run time/reaction speed: <2 hours/run (standard mode); <40 minutes/run (fast mode).



# The Genetics Laboratory

---

## Equipment:

*Applied Biosystems SeqStudio Genetic Analyzer/Thermo Fisher Scientific, USA*

## Uses:

- Sanger sequencing and DNA fragment analysis;
- de novo DNA sequencing, next generation sequencing (NGS) validation;
- heterozygotes detection, minor variant detection, microbial identification, genome editing verification;
- cell line authentication, SNP genotyping, microsatellite analysis, MLPA™ PCR compatible, etc.
- fragment analysis, sequence analysis, resequencing, comparative sequencing, detection and reporting of minor mutations or sequence polymorphisms, etc. by means of the secondary analysis software.



# The Genetics Laboratory

---

## Equipment:

*Applied Biosystems SeqStudio Genetic Analyzer/Thermo Fisher Scientific, USA*

## Technical specifications:

- CE system for Sanger sequencing and analysis of DNA fragments, in the same work round, without reconfiguration;
- the integrated cartridge includes a POP-1 universal polymer, for DNA sequencing and fragment analysis, a matrix with 4 capillaries, an anodic buffer, all in one unit;
- minimum working time;
- up to 125 injections/500 reactions;
- format/capacity with standard 96-well plates or standard 8-tube strip; up to 192 samples/24 h;
- independent instrument, with a small footprint, integrated computer with integrated touch screen for a quick, intuitive and flexible configuration;
- Wi-Fi or local area network (LAN) connectivity;
- web-enabled remote monitoring and control capability.





# The Genetics Laboratory

---

## Equipment:

*Thermo Cycler Genesy 96T/Xi'an Tianlong Science and Technology Co., Ltd, CHINA*

## Uses:

- pathogen detection and genetic analysis, by the PCR method.
- conventional PCR, gradient PCR, long distance PCR, isothermal amplification, in: molecular biology, biotechnologies, microbiology, medical sciences, forensic medicine, environmental sciences, food industry, clinical diagnostics, epidemiology, genetics.

## Technical specifications:

- color LCD touch screen and Android operating system;
- operable directly or through a Windows interface;
- supports custom protocols and is compatible with a wide range of reagents;
- the thermal block ensures uniform and accurate temperatures, fast and precisely controlled ramp rates and fast and reproducible PCR cycles;
- simple and intuitive programming;



# The Genetics Laboratory

---

## Equipment:

*Thermo Cycler Genesy 96T/Xi'an Tianlong Science and Technology Co., Ltd, CHINA*

## Technical specifications:

- the integrated sample block is compatible with tubes or strips of 8 tubes x 0.2 mL, or 96-well plates (skired/semi-skirted/unskirted), with a reaction volume of 0-100  $\mu$ L;
- possible storage of 1000 protocols and management of experiments, including creation, editing or deletion of files;
- the gradient module (12 gradients) ensures precise control of the PCR reaction between 30-99.9°C
- gradient temperature span from 50 to 90°C with a minimum of 3.5°C/s; from 90 to 50°C with a minimum of 2.5°C/s; temperature uniformity:  $\pm 2^\circ\text{C}$ ; temperature accuracy:  $\pm 0.1^\circ\text{C}$ ;
- voltage drop protection.



## Equipment:

### *Savant™ SpeedVac™ DNA 130-230 Integrated Vacuum Concentrator System/Thermo Fisher Scientific™, USA*

## Uses:

- fast and efficient concentration of DNA and RNA samples, by drying small volumes of ethanol or isopropanol used in DNA and RNA isolation processes.

## Technical specifications:

- uses a combination of centrifugal force and vacuum to achieve efficient sample drying;
- includes corrosion-resistant, PTFE-coated chamber and a built-in, oil-free vacuum pump that provides maintenance-free operation;
- includes a rotor with a capacity of 36 x tubes of 1.5-2.0 ml;
- ensures constant drying times and reproducible results;
- the selected drying temperature ranges between 35°C and 65°C, in intervals of 5°C;
- dry at ambient temperatures or using low heat to maintain samples integrity;
- the maximum vacuum value is < 10 Torr (13 mbar or 1.3 kPa).



## Equipment:

***E-Gel Power Snap Electrophoresis System (include E-Gel Power Snap Camera)/Invitrogen/Thermo Fisher Scientific™ , USA***

## Uses:

- routine analysis of restriction fragments and PCR products;
- low and medium-throughput genotyping ;
- screening of the cell population for quality control or mutations;
- clone library analysis and clone identification, etc.



## Technical specifications:

- the all-in-one E-Gel Power Snap electrophoresis system is designed for fast and convenient E-Gel agarose gel electrophoresis, from DNA sample loading to gel imaging;
- allows the migration of DNA samples in just 10 minutes and the visualization of samples separation in real time in dry, E-Gel pre-cast agarose gels, and pre-stained with SYBR Safe or SYBR Gold II;

# The Genetics Laboratory

---

## Equipment:

***E-Gel Power Snap Electrophoresis System (include E-Gel Power Snap Camera)/Invitrogen/Thermo Fisher Scientific™ , USA***

## Technical specifications:

- the only "benchtop" system that integrates DNA sample separation with gel visualization and capture in a single workflow, with pre-programmed protocols for each type of compatible E-Gel gel;
- compatible with all low-throughput E-Gel™ precast agarose gels including E-Gel™EX, E-Gel™ SYBR Safe, E-Gel™Go!, E-Gel CloneWell™II and E-Gel™ SizeSelect™ II ;
- the built-in digital camera allows rapid imaging and documentation of gels, and the touch screen provides an intuitive interface for quick image capture and editing;
- images can be stored using the internal Power Snap memory or transferred to an external USB.



# The Genetics Laboratory

---

## Equipment:

### *PCR Cabinet (PCR1200), BIOBASE-CHINA*

## Uses:

- ensuring a protected environment with a high degree of air purity, for the polymerization chain reaction (PCR) experiments.
- essential in experiments involving the handling of DNA/RNA samples in controlled and sterile conditions, preventing their contamination (DNA/RNA sample preparation, PCR/qRT-PCR reactions, sample preparation for sequencing, mutation analysis, etc.).



## Technical specifications:

- cabinet made of cold-rolled steel, with a thickness of 1.2 mm, coated with anti-bacterial powder;
- work surface in 304 stainless steel resistant to the corrosive actions of chemicals;
- easy-to-use touch screen control panel and a front window actuator system;
- the air filtration system consisting of a fan and a HEPA filter, transfers the filtered air into the work area and ensures a vertical, constant air flow with an efficiency of 99.999% (0.3 $\mu$ m);

# The Genetics Laboratory

---

## Equipment:

### *PCR Cabinet (PCR1200), BIOBASE-CHINA*

## Technical specifications:

- maintains a positive pressure inside it, ensuring that no contaminants from the environment enter;
- 30W UV lamp, with 253.7 nm emission, for effective decontamination of the work table and the air;
- 12W LED lamp that provides illumination of the work surface; two waterproof sockets.

