

Administration:

**Gadi Barzili, Dan Haik,
Chaim Kahana, Ariela Mendel**

Antibody:

**Anat Bromberg, Ziv Landau,
Orith Leitner, Alon Levy**

Bacteriology:

**Aharon Eliyahu,
Yocheved Lamed,
Shlomit Maizel**

Bioinformatics:

**Shifra Ben-Dor, Leon Esterman,
Rhoda Frydman, Ron Ophir,
Irit Orr, Jaime Prilusky,
Hershel Safer, Marilyn Safran**

DNA Sequencing:

**Rivi Ascarelli-Goell,
Magda David**

Electronics:

Michael Damari

Flow Cytometry (FACS):

Eitan Ariel, Ayala Sharp

Functional Magnetic Resonance Imaging:

Noam Alperin

Genetic Materials Depository:

Ghil Jona

Irradiation:

**Gideon Ben-Moshe,
Shaul Ovadia**

Mass Spectrometry:

**Moshe Binyamin,
Tevie Mehlman, Dalit Merhav,
Alla Shainskaya, Bassem Ziadon**

Microarrays:

**Shirley Horn-Saban,
Anna Weisman**

Oligo Synthesis:

Ora Goldberg, Michal Ofarim

Protein Analysis:

Aharon Rabinkov, Irina Shin

Biological Services

The Biological Services Department consists of core facilities (units) that provide scientific and technical services to life sciences researchers at W.I.S. and throughout Israel. The units work with technologies that cannot be provided effectively by individual laboratories or scientific departments, such as operating specialized lab equipment and helping with hardware and software for data analysis. Researchers can obtain analysis of their samples, consulting on work to be done in their own labs, training in advanced technologies, etc. The department includes the following units:

Antibody

Bacteriology

Bioinformatics

DNA Sequencing

Electronics

Flow Cytometry (FACS)

Functional Magnetic Resonance Imaging (fMRI)

Genetic Materials Depository

Irradiation

Mass Spectrometry

Microarrays

Oligo Synthesis

Protein Analysis

A. Antibody

Antibodies are an important part of the body's defense system and are normally produced by the immune system to fight disease. They are proteins that recognize and bind to sites on cells, viruses, and other organisms in a highly specific manner. This specificity makes antibodies useful research tools; the interaction of an antibody with an antigen forms the basis of all immunochemical techniques.

A monoclonal antibody is produced from a single cell known as a hybridoma. All antibodies produced by the hybridoma are identical and bind to the same specific target in the same way.

The Antibody Unit develops monoclonal and polyclonal antibodies against antigens (proteins and synthetic peptides) provided by customers. Advice and help in preparation of antigens for immunization and evaluation of the sera and the hybridoma supernatant is also available.

B. Bioinformatics

Bioinformatics uses computation to advance the scientific understanding of living systems. We help life scientists use computing tools to make biological research, primarily in molecular biology, more productive. In order to provide a wide range of expertise, the group includes scientists with advanced training in both the life sciences and the computational / mathematical sciences. Our primary activities are:

Department of Biological Services

 972 8 934 3938

 972 8 934 4113

 ariela.mendel@weizmann.ac.il

 www.weizmann.ac.il/biological_services

Training: We teach courses, sponsor workshops series with both lecture and hands-on sessions, and help organize BigRoc, the interdepartmental bioinformatics seminar.

Consulting: Our helpdesk provides consulting on using bioinformatics tools. Primary topics are "sequence to function" analysis of molecular biology data and microarray data analysis; help with design of databases and software systems is also available

Infrastructure: Many researchers use our computers to access commonly needed bioinformatics software and databases; some also develop bioinformatics software and run advanced data analyses.

Our website, bioportal.weizmann.ac.il, provides convenient access to a large variety of bioinformatics resources and training materials.

Our unit is part of the Center of Knowledge for Bioinformatics Infrastructure (COBI, cobi.org.il), headed by Meir Edelman of the Plant Sciences Department. COBI, which is funded by the Ministry of Science and Technology, is a consortium of eight academic and government groups that provides bioinformatics resources, training, and consulting to researchers in academia, government, and industry. Our unit also hosts INN (inn.org.il), the Israeli National Node of the European Molecular Biology Network, and runs a national helpdesk and visiting lecturer program.

C. Flow Cytometry (FACS)

Flow cytometry measures biophysical properties of individual cells as they flow past a laser beam and a series of detectors, at rates of up to thousands per second. Cells may be stained with fluorescent dyes and their specific binding to cellular constituents may be correlated with the biological properties investigated. Flow cytometers can also be used to precisely sort cells from selected populations and separate them into tubes or onto plates.

The Flow Cytometry unit serves all aspects of doing flow cytometry; we provide help planning, executing, and analyzing projects using the unit's instruments. Lab courses are generally taught twice a year.

D. Genetic Materials Depository

The Genetic Materials Depository is a new addition to the Biological Services Department. The depository is a library of vectors, fusion-clones, strains, and whole genome collections that will be available to research groups. We currently have a set of vectors and three whole genome collections of budding yeast (a chromosomal TAP-tag collection and two over-expression libraries of yeast open reading frames (ORFs)) that together contain more than 18,000 clones and strains.

An online, searchable database will be available for researchers to browse through the available materials and collections that are available from the depository. During the coming year we plan to buy the following collections:

- RIKEN mouse cDNA book of clones (>60,000 cDNA clones in bacterial vectors)
- Dharmacon siRNA library
- Human microRNA library
- Yeast ORF deletion collection (>3700 strains)

E. Irradiation

The Irradiation Unit provides gamma- and X-rays of plants, tissue cultures, and many other kinds of material. The irradiation is provided by an Andrex X-ray machine and a Cesium 137 Gamma-Cell irradiator. These facilities enable a wide range of experimental investigations, particularly in the field of biology and plant genetics. Consultation is available for irradiating experimental animals, whole bodies, or special organs.

Custom-built devices to achieve homogeneous irradiation are also possible.

F. Mass Spectrometry

The Mass Spectrometry Unit provides rapid and sensitive analyses of proteins, peptides, and oligonucleotides. The unit uses modern techniques to allow analysis of low abundance proteins, identification of post-translational modifications, de novo sequencing, recognition of protein interactions, etc.

Routine sample analyses include protein identification/confirmation from Coomassie stained gels, verification of protein-related reactions, and determination of peptide sequence. More specialized services include protein identification from complex mixtures and post-translational modification.

G. Microarray

Microarray technology is a simple but robust method to screen thousands of probes at once, by placing thousands of gene fragments (mainly oligonucleotides) on a solid surface (such as glass), and querying them with labeled RNA/DNA which was extracted from cells/tissues that need to be compared.

The Microarray Unit offers a broad range of services, platforms, and equipment, based on state-of-the-art technology. The unit hosts the major players in the field, including an Affymetrix GeneChip system, Agilent SurePrint technology, and self-brewed spotted microarrays. These are used for multiple applications, such as RNA expression profiling, SNP analysis, CGH, re-sequencing, protein arrays, and others. The unit also provides general counseling and assistance in defining the ultimate experimental design, done in cooperation with the Bioinformatics Unit.

The Microarray Unit processes hundreds of samples per year and serves dozens of research groups, mainly (but not exclusively) in the life-sciences.

An additional technology which we acquired recently is the Laser Capture Microdissection (LCM) system by PALM, which allows researchers to select and isolate single cells or tissue regions, thus generating a homogenous cell population for downstream applications, such as microarray analysis.

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