



## **The Alexander Silberman Institute of Life Sciences**

### **Origin and History**

Research and teaching in biology date to the very early days of the Hebrew University. Already at the time of the laying of the University Foundation Stone in 1918, three research institutes were founded, among them the Institute of Microbiology (the other two were the Institutes of Chemistry and Judaic Studies). In 1925, the year at which the official opening ceremony of the University took place, two new appointees - Prof. Alexander Eig and Prof. Frederick Simon Bodenheimer - established the Departments of Botany and of Zoology. Research and teaching in today's Institute of Life Sciences are a direct continuation of the scientific traditions established in those early days.

Following the Israeli War of Independence, the 1949 armistice agreement with Jordan has left the Hebrew University campus on Mount Scopus as an Israeli-held enclave in Jordanian territory. Since routine activities could not be held there, teaching and research activities were conducted in numerous sites in Jerusalem. The Biochemistry, Genetics and Zoology Departments, for example, were each located in a different part of the city. During the 1950's many of the university activities regrouped in the newly built Givat Ram Campus, but only many years later did these include the aforementioned biological departments. In 1963, the Faculty of Mathematics and Natural Sciences was reorganized in five Institutes – Mathematics, Chemistry, Physics, Biology and Earth Sciences. This decision has led to the unification of the different life sciences departments under one roof; this roof was initially virtual, but in 1968 construction has started on a central biology building in Givat Ram. During the seventies many of the departments were brought in from all over the city, and in 1976 the building was named after Alexander Silberman, founder of the Penn Corporation in Philadelphia, who established a Foundation for Applied Science Research at the Hebrew University.

The first chairman of the new Institute was Prof. Alexander Keynan, appointed in 1967. Subsequent directors included Abraham Mayer, Gidon Orshan, Dan Cohen, Daniel Zohary, Hefzibah Eyal-Giladi, Avraham Loyter, Alexander Levitzki, Etana Padan, Hermona Soreq, Shimon Schuldiner, Yosef Yarom, Joseph Hirschberg, Ioav Cabantchik, Shy Arkin and Ran Nathan.

### **Departements:**

- Biological Chemistry
- Genetics
- Cell and Development Biology
- Plant and Environmental Biology

# Biological Chemistry

## General Research Activities:

- Signal Transduction
- Cellular Regulatory Mechanisms and Development
- Structure Biology
- Bioinformatics

## Researchers and Fields of Expert

Isaiah (Shy) Arkin  
Mail: arkin@cc.huji.ac.il

Research Fields: Computational and experimental structural biology of membrane proteins; use and development of novel experimental and computational approaches to elucidate membrane proteins structure.

Daphne Atlas  
Mail: datlas@vms.huji.ac.il

Research Fields: The mechanism of exocytosis; Neurodegeneration: Development of drugs for Parkinson's and Alzheimer's disorders.

Sergei Braun  
Mail: sergei@vms.huji.ac.il

Research Fields: Enzymology and industrial enzymology: development, preparation and stabilization of industrial enzymes; Industrial microbiology; Adhesion properties of microorganisms.

Ioav Cabantchik  
Mail: ioav@cc.huji.ac.il

Research Fields: Molecular basis of iron disorders, mapping of iron in cells and tissues, diagnosis and treatment of iron overload and diseases of iron accumulation.

Nathan De-Groot  
Mail:

Research Fields: Genomic imprinting. Epigenetic factors in the regulation of gene expression. The level of the expression of imprinted genes and their allelic mode of expression during embryogenesis and carcinogenesis. Imprinted genes as tumor markers. Interaction between normal trophoblast cells and cells derived from choriocarcinoma as a model for the development of tumors in vivo.

David Engelberg  
Mail: engelber@cc.huji.ac.il

Research Fields: Development of constitutively active MAP/stress kinases for studies of the etiology cancer and inflammation. Revealing the mechanism of gene expression under stress in yeast and mammalian cells. Focusing on Gcn4, Hsf1 and Msn2/4. Analysis expression of stress-related genes in oncogenically-transformed cells.

Hagai Ginsburg  
Mail: hagai@vms.huji.ac.il

Research Fields: Biochemistry, physiology and biophysics of red blood cell and malarial parasite membranes. Biochemistry and physiology of energy and oxidative metabolism of malarial parasites. Mode of antimalarial action of quinoline containing drugs and the molecular basis of drug resistance. Development of new antimalarial drugs. Mathematical modeling of the chemotherapy of malaria.

Abraham Hochberg  
Mail: hochberg@cc.huji.ac.il

Research Fields: Genomic imprinting. Epigenetic factors in the regulation of gene expression. The level of the expression of imprinted genes and their allelic mode of expression during embryogenesis and carcinogenesis. Imprinted genes as tumor markers. Interaction between normal trophoblast cells and cells derived from choriocarcinoma as a model for the development of tumors in vivo.

Sebastian Kadener  
Mail: skadener@cc.huji.ac.il

Research Fields: miRNAs in the brain: role of miRNA-mediated control in the regulation of circadian behavior and sleep in Drosophila. Role of transcriptional regulation in the control of circadian rhythms.

Alexander Keynan  
Mail: keynan@academy.ac.il

Research Fields: Molecular mechanisms of bacterial cellular growth and differentiation: cryptobiosis-mechanisms of dormancy, and its termination. Biology of spore-forming bacteria. Biological control of insect pests. Microbial ecology.

Richard Kulka  
Mail: dick@cc.huji.ac.il

Research Fields: Function of ubiquitin in eukaryotic cells: its role in intracellular proteolysis, stress and DNA repair. Protein degradation signals in eukaryotic cells.

Yehuda Lapidot  
Mail: ylapidot@cc.huji.ac.il

Research Fields: Chemistry of nucleic acids.

Alexander Levitzki  
Mail: levitzki@vms.huji.ac.il

Research Fields: Signal transduction, Signal transduction therapy, Cancer Research, Medicinal Chemistry.

Michal Linial  
Mail: michall@cc.huji.ac.il

Research Fields: The dynamic processes of nerve terminals and the molecular aspects of synapse functioning. Control of exocytosis in regulated secretory systems. Differentiation and neurotransmitter phenotype acquisition in neurons, a study by proteomics and genomics approaches. Bioinformatics. Large scale studies of biological sequences and their global organization. Proteomics. Structural genomics.

Oded Livnah  
Mail: livnah@gabriel.ls.huji.ac.il

Research Fields: Structural determination of biologically related macromolecules via X-ray crystallographic techniques. Ligand recognition, initial signaling events, and the role of dimer/oligomer orientation in cytokine receptor systems. Structural studies of avidin/streptavidin - biotin high affinity systems. Structural based drug design and optimization. Combinatorial approaches in drug discovery.

Abraham Loyter  
Mail: loyter@vms.huji.ac.il

Research Fields: Translocation of proteins and nucleic acid across the nuclear envelope of animal and plant cells. Entry of viral genome into nuclei of infected cells, isolation and characterization of plant cells cytosolic receptors required for nuclei import, the use of specific synthetic peptides to block nuclear import of proteins and nucleic acids, as a way to inhibit viral infection.

Yoram Milner  
Mail: milner@vms.huji.ac.il

Research Fields: Control of growth and differentiation of skin epidermal cells: the role of signaling pathways in cancerous and hyperproliferative syndromes. Receptors involved in skin aging and apoptosis. Role of extracellular matrix in skin cell growth, tissue organization and wound healing. Autoimmune pemphigus IgG epidermal cell interaction: a study on signaling system leading to cell death and tissue acantholysis.

Itzhak Ohad  
Mail: ohad@vms.huji.ac.il

Research Fields: Stress responses in photosynthesis. Dynamics of the photosynthetic apparatus in terms of its biogenesis, regulation of its activity and mechanism of stress reaction and protection.

Joseph Orly  
Mail: orly@vms.huji.ac.il

Research Fields: Transcriptional control of genes involved in sex steroid synthesis in the gonads and placenta. Proteolysis and protein quality control during mitochondria organogenesis in steroidogenic cells.

Etana Padan  
Mail: etana@vms.huji.ac.il

Research Fields: Molecular membrane biology, structure biology, bioenergetics, biochemistry, biophysics.

Tommer Ravid  
Mail: travid@cc.huji.ac.il

Research Fields: Intracellular pathways for protein quality control; Mechanisms of endoplasmic reticulum-associated protein degradation by the ubiquitin-proteasome system; Enzymatic reactions of ubiquitin-chain formation and transfer; Regulation of lipids synthesis, storage, and transport by ubiquitin

Meir Rigbi z"l  
Mail: meirr@cc.huji.ac.il

Research Fields: Proteinase inhibition. Identification of inhibitor reactive sites. Isolation and characterization of bioactive components of leech saliva in particular, inhibitors of coagulation enzymes and of platelet aggregation.

Shimon Schuldiner  
Mail: [shimon.schuldiner@huji.ac.il](mailto:shimon.schuldiner@huji.ac.il)

Research Fields: Biochemistry of Membrane Proteins/ Multidrug Resistance/  
Transport Mechanisms

Zvi Selinger z"l  
Mail: [selinger@vms.huji.ac.il](mailto:selinger@vms.huji.ac.il)

Research Fields: Transmembrane signaling. Visual phototransduction.  
Phosphoinositide metabolism.

Yulia Shifman  
Mail: [jshifman@cc.huji.ac.il](mailto:jshifman@cc.huji.ac.il)

Research Fields: Computational and Experimental protein design. Development  
of computational method for redesign of protein-protein  
interfaces for altered affinity and binding specificity. the projects  
include redesign of calmodulin-target interactions, AChE-toxin  
interactions, Ras-effector interactions, and prion protein  
interactions.

Hermona Soreq  
Mail: [soreq@cc.huji.ac.il](mailto:soreq@cc.huji.ac.il)

Research Fields: Stress responses. Antisense technology. Acetylcholinesterase  
biology. Molecular neurobiology. Messenger RNA studies

## Genetics

### General Research Activities:

Research in the Department of Genetics covers such areas as genetic regulation and cellular differentiation in eukaryotes; genetic control of cell-cycle; interactions between chromosomes and the nuclear envelope; regulation of gene expression in eukaryotes at the transcriptional and post-transcriptional level; effects of chromatin on the regulation of eukaryote gene expression; the role of RNA processing events on the regulation of gene expression; developmental, genetic and molecular analysis of complex characteristics in the nematodes, in chicken and in the mouse; human genetics; stem cell research; molecular analysis of oncogenesis; evolution and population genetics in humans, animals and plants; molecular mapping of complex genomes; molecular analysis of photosynthesis; molecular biology of plants; improvement by genetic engineering of crop plants.

### Researchers and Fields of Expert

Nissim Benvenisty  
Mail: nissimb@cc.huji.ac.il

Research Fields: Differentiation and genetic manipulation of human embryonic stem cells ; Human genetic disorder and human embryonic stem cells ; Genomic analysis of human development ; Oncogenic properties of stem cells

Michael Brandeis  
Mail: brandeis@cc.huji.ac.il

Research Fields: Regulation of the cell cycle and stress responses by ubiquitin mediated proteolysis by the Anaphase Promoting Complex / Cyclosome (APC/C) and screen for APC/C substrates; Study of the human Bora Aurora A kinase activator; Temporal and spatial regulation of cytokinetic furrowing initiation; Global changes of ubiquitination during the cell cycle; Development of live cell imaging methods for cell cycle studies.

Liran Carmel  
Mail: carmell@cc.huji.ac.il

Research Fields: Functional roles of the gene's architecture; Studying the differences between architectures adopted by different eukaryotes, and putting gene architecture as a key element in the wider context of systems biology. study of many other aspects of molecular evolution; Nonsense mediated decay (NMD)

Ariel Darvasi  
Mail: arield@cc.huji.ac.il

Research Genetics of complex traits, Genomics, Human Genetics, Mouse

Fields: Genetics, and Biotechnology.

Raphael Falk

Mail: raphael.falk@huji.ac.il

Research Fields: The history of genetics; meaning of concepts in genetics.  
Eugenics past and present. Epistemology and the history of genetic concepts.

Adam Friedmann

Mail: adamf@cc.huji.ac.il

Research Fields: Determination of genes predisposing or directly associated with disease.

Michal Goldberg

Mail: goldbergm@vms.huji.ac.il

Research Fields: The Cellular response to DNA damage \* The DNA damage mediators \* Cell cycle checkpoints \* Cancer \* DNA repair \* Genome stability

Yosef Gruenbaum

Mail: gru@vms.huji.ac.il

Research Fields: Lamins and their associated proteins in health and disease The roles of the nuclear lamina in development and aging The role of the nuclear envelope in apoptosis Molecular and genetic analysis of mtefin/SUN-1 The sensing and responding to high CO<sub>2</sub> levels.

Joseph Hirschberg

Mail: hirschu@vms.huji.ac.il

Research Fields: Plant molecular biology; Secondary metabolism; Carotenoid biosynthesis; Plant biotechnology

Bat Sheva Kerem

Mail: kerem@cc.huji.ac.il

Research Fields: 1.The molecular basis of genetic diseases. We focus on Cystic fibrosis research ; 2.The mechanism underlying chromosome structure and function. We focus on chromosomal instability in cancer.

Eran Meshorer

Mail: meshorer@cc.huji.ac.il

Research Fields: Live imaging of nuclear dynamics in stem cell differentiation; Chromatin plasticity in embryonic stem (ES) cells and in ES cell differentiation; Chromatin structure in neuronal stem cell and neuronal differentiation; Identification and characterization of stem cell chromatin proteins; Stem cell epigenetics (including

the development of antibody microarrays); Signaling pathways and molecular networks in stem cells and cancer.

Sagiv Shifman

Mail: sagiv@vms.huji.ac.il

Research Fields: Genetics of autism, schizophrenia and variation in gene expression

Giora Simchen

Mail: simchen@vms.huji.ac.il

Research Fields: Molecular genetics in yeast: meiosis, cell cycle, chromosome pairing, segregation and recombination in meiosis. Instability in the human, mouse and yeast genomes. DNA repair.

Moshe Soller

Mail: soller@vms.huji.ac.il

Research Fields: DNA-level genetic polymorphisms in agricultural species and their use for genetic analysis and breeding improvement of quantitative traits of economic importance. Physiological-genetic analysis of growth rate in chickens.

Ruth Sperling

Mail: sperling@vms.huji.ac.il

Research Fields: Structure and function of the nuclear pre-mRNA processing machine. Pre-mRNA splicing. Pre-mRNA processing. Regulation of gene expression in eukaryotes. Assembly and structural studies of biological systems. Autoantibodies against nuclear RNPs-probes for inflammatory myopathies and RNA processing. Physical biochemistry. Electron microscopy.

Yehuda Tzfati

Mail: tzfati@cc.huji.ac.il

Research Fields: Telomerase, Telomeres, RNA structure and function.

## Cell and Development Biology

### General Research Activities:

The Department of Cell and Developmental Biology, formerly the experimental branch of the Department of Zoology, carries out research and teaching on a broad spectrum of biological topics ranging from the molecular/cellular level to the level of the intact, behaving organism. The unifying concept is the investigation of how cellular mechanisms serve larger scale, integrative functions such as the development and physiology of tissues and functional systems, sensation and behavior. This integrative, interdisciplinary approach is served by faculty members whose individual specialties span physiology, toxinology, endocrinology, neuroscience, immunology, developmental, cell and tumor biology and neuroethology. Although most of the department's work is in basic science, some applied research is also carried out. Examples are projects on new types of insecticides, novel analgesic drugs, differentiation factors, biomaterials and aquaculture.

### Researchers and Fields of Expert

Benjamin Aroeti

Mail: [aroeti@cc.huji.ac.il](mailto:aroeti@cc.huji.ac.il)

Research  
Fields:

Studying the functions of cholesterol and lipid rafts in transcytosis; Identifying novel molecular players that govern polarized membrane trafficking; Studying the interface between endocytosis and mitosis; The mechanisms by which enteropathogenic *E. coli* disrupt epithelial cell polarity and tight junctions; Exploitation of membrane trafficking by viruses that cause human hepatitis for mediating pathogenesis.

Nissim Ben-Arie

Mail: [nbenarie@vms.huji.ac.il](mailto:nbenarie@vms.huji.ac.il)

Research  
Fields:

Developmental Neuro-Genetics: the study of bHLH transcription factors regulating embryonic development, focusing on the nervous system. Characterization of the role and function of the transcription factors at the cellular and whole organism levels, utilizing chick embryos and knockout and transgenic mice. Revealing their molecular mode of action at various levels (transcription regulation of target genes, molecular interactions: DNA-protein, protein-protein etc.). We also study the involvement of transcription factors in human diseases (developmental, inherited and cancer).

Jeff Camhi

Mail: [jeff@vms.huji.ac.il](mailto:jeff@vms.huji.ac.il)

Research Fields: My main research concerns neuroethology of insects, with special emphasis on the escape system of the cockroach. More recently, my research has been in the area of museology, focusing on educational methods for improving the impact of guided tours at nature museums.

Mona Castel  
Mail: mona@vms.huji.ac.il

Research Fields: Circadian phenomena.

Marshall Devor  
Mail: marshlu@vms.huji.ac.il

Research Fields: Plasticity in the somatosensory system in mammals. Neural mechanisms whereby injury provokes sensory dysfunction and chronic pain. Pathophysiology of injured nerve and abnormal impulse generation. Synaptic reorganization in the brain and spinal cord after peripheral nerve injury. Regeneration and collateral sprouting of injured nerve fibers. Animal models of chronic pain states and pain relief. Heritability of chronic pain. Neural mechanisms of loss of pain response and of consciousness in general anesthesia.

Amir Eden  
Mail: eden@vms.huji.ac.il

Research Fields: Epigenetic regulation of gene expression. Cancer epigenetics.

Heftziba Eyal-Giladi  
Mail: eyalg@vms.huji.ac.il

Research Fields: Early development of the avian embryo. Axis determination. The effect of gravity on axis formation. The origin of avian primordial germ cells. Spatial and temporal expression of homeobox genes during changing conditions of neural induction and differentiation. The role of retinoic acid as a transforming factor in neural induction.

Uri Gat  
Mail: gatu@vms.huji.ac.il

Research Fields: The hair follicle as a model for organogenesis; The role of Runx factors in the development of hair and other skin appendages; Molecular control of the hair keratin genes in mouse and man; The spider silk proteins – structure and function in fiber formation; Synthesis of recombinant spider silk fibers as novel biomaterials.

Jacob Hochman  
Mail: hochman@vms.huji.ac.il

Research Fields: The relation between cell adhesiveness and growth control in malignant lymphoma cells. Molecular mechanisms involved in the selection of non-malignant variant cells from malignant cell populations. Different approaches to reversal of multi-drug resistance of malignant cells. Growth regulation of malignant lymphoma. Metastasis of malignant lymphoma.

Daniel Kaganovich  
Mail: dan@cc.huji.ac.il

Research Fields: protein folding, aggregation, neurodegenerative disease, protein misfolding, protein folding quality control, compartmentalization of protein folding and aggregation, spatial organization of the cell, super-resolution microscopy, chaperones, prions, molecular basis of neurodegenerative disease.

David Kahan  
Mail: dkahan@vms.huji.ac.il

Research Fields: Aquaculture.  
Eduardo Mitrani  
Mail: mitrani@vms.huji.ac.il

Research Fields: Genes coding for factors involved in control of differentiation and development. Control of proliferation and differentiation in adult tissues. Epithelial mesenchymal interactions. Gene therapy, angiogenesis, ageing. Differentiation of stem cells. Cell therapy.

Yaakov Nahmias  
Mail: ynahmias@gmail.com

Research Fields: 1. Metabolic programming: nuclear reactors-based control of metabolism 2. Human embryonic stem cell differentiation to hepatocytes 3. Liver tissue engineering and liver regeneration 4. Hepatitis C Virus (HCV) infection

Meir Paul Pener  
Mail: pener@vms.huji.ac.il

Research Fields: Density-dependent phase polymorphism of locusts and the endocrine relations of such phase polymorphism. Interrelations between environmental physiology, neurohormones, diapause and life-cycle strategies of insects. Taxonomy, bionomics and general biology of grasshoppers (Tettigoniidae and Acrididae).

Eliahu Zlotkin Z"L  
Mail: zlotkin@vms.huji.ac.il

Research                      Neuropharmacology. Toxinology. Chemical ecology.  
Fields:

## **Plant and Environmental Sciences**

### **General Research Activities:**

The Department of Plant and Environmental Sciences was established in 2005 as a result of a merger between the Department of Plant Sciences (formerly the Department of Botany) and the Microbial Ecology Section of The Alexander Silberman Institute of Life Sciences.

Research in the department encompasses the physiology, biochemistry and molecular biology of higher plants, algae, cyanobacteria, halophilic bacteria and other microorganisms. Topics as seed germination, light responses; transport mechanisms; membrane biophysics; biogenesis of photosynthetic apparatus; import and processing of nuclear encoded chloroplast proteins; protein folding and cellular transport; structure-function relationships in electron transfer proteins like Fe-S proteins; molecular evolution; programmed cell death; plant-microbe interactions; oxidative stress in plants; signaling in plant-pathogen interactions; developmental physiology; factors determining photosynthetic efficiency; environmental stress; phytogeography; flora and microbiology of Israel and the Middle East; development of molecular sensors for monitoring water contaminants; formation of biofilm and biofouling in water treating systems; studies on transition and heavy metals in plants and bacteria.

### **Researchers and Fields of Expert**

Shimshon Belkin  
Mail: shimshon@vms.huji.ac.il

Research                      Environmental microbiology/Microbial ecology; Water quality;  
Fields:                          Novel methodologies for water quality assessment; Biosensors  
and bioassays for environmental monitoring, with an emphasis  
on toxicity and genotoxicity testing.

Joseph Gale  
Mail: galej@vms.huji.ac.il

Research                      Basic and applied environmental plant physiology. Relationship  
Fields:                          between stress and plant-gas exchange. Photosynthesis.  
Respiration, transpiration and plant carbon gain.

BenZion Ginzburg  
Mail:

Research Fields: Biophysical analysis of water and ion behavior in biological systems, with emphasis on halophilic microorganisms. Biotechnology of conversion of algae into liquid fuel. Dielectric spectroscopy of living cells.

Rachel Green  
Mail: rgreen@vms.huji.ac.il

Research Fields: Circadian rhythms in the model plant *Arabidopsis thaliana*:  
1)The role of transcript stability regulation in the circadian oscillator  
2)Identification of novel genes involved in regulating the circadian system and the control of photoperiodic flowering.  
3)Interactions between the components of the molecular oscillator

Aaron Kaplan  
Mail: aaronka@vms.huji.ac.il

Research Fields: Study of mechanisms which drive ecological processes mainly in photosynthetic organisms. What determines who is there and how do the organisms interact with one another and with their changing environment.

Nir Keren  
Mail: nirkeren@vms.huji.ac.il

Research Fields: Metal transport, accumulation and homeostasis in photosynthetic organisms. Dynamics of the photosynthetic apparatus: adaptation of photosynthetic organisms to the ever changing environment.

Alexander Levine  
Mail: alexl@vms.huji.ac.il

Research Fields: The signaling network that coordinates plant responses to environment.

Avraham Max Mayer  
Mail: mayer@vms.huji.ac.il

Research Fields: Role of IAA in host infection by broomrape; Enantiomers of essential oil components and their biological activity; Biochemistry of germination of broomrape.

Rachel Nechushtai  
Mail: rachel@vms.huji.ac.il

Research Fields: The structure-function relationships of membrane proteins mainly of the photosynthetic apparatus. Chloroplast development and light regulated expression of chlorophyll-protein complexes.

Aharon Oren  
Mail: orena@cc.huji.ac.il

Research Fields: Microbial ecology of the Dead Sea; Microbial ecology of saltern ponds; Adaptation of microorganisms to life at high salt concentrations; UV-absorbing pigments in cyanobacteria; Prokaryote taxonomy

Uzi Plitmann  
Mail: uzi@vms.huji.ac.il

Research Fields: Biosystematics and evolution of wild and cultivated legumes. Reproductive and population biology with special emphasis on gametophyte population, mating systems, reproductive efforts and dispersal modes. Population biology, ecology and evolution of higher plant parasites. Taxonomic and molecular systematic studies (Viciaeae). Bioactivity of potentially medicinal plants.

Anton Post  
Mail: anton@pob.huji.ac.il

Research Fields: Nutrient Regeneration and Acquisition among Marine Microbial Communities.

Leonora Reinhold  
Mail:

Research Fields: Transport mechanisms for sugars, amino acids, and ions in plant cell membranes. Inorganic carbon concentrating mechanisms, particularly in aquatic microorganisms. Membrane function as related to adaptation to saline stress. Phloem transport