

**The George S. Wise Faculty of Life Sciences – The Department of Zoology  
The Department of Molecular Biology and Ecology of Plants  
Sackler Faculty of Medicine – Department of Anatomy and Anthropology  
The Maurice & Gabriela Goldschleger School of Dental Medicine  
The Lester and Sally Entin Faculty of Humanities – The Sonia and Marco  
Nadler Institute of Archeology  
Department of Archaeology and Ancient Near Eastern Cultures**

**The Steinhardt Museum of Natural History  
Israel National Center for Biodiversity Studies**

**Annual Report 2014/2015**

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Dear friends and colleagues,

We are pleased to present you with the 13<sup>th</sup> Annual Report of the National Collections of Natural History at TAU, the 2<sup>nd</sup> with our formal title – **the Steinhardt Museum of Natural History (SMNH)**.

It has been another intensive and productive year, with much progress on all fronts – academic, scientific and professional training, support to different government agencies providing the tools for science-based decision making, in education and exhibition development. In the past decade, as the Steinhardt Museum developed, so did international perceptions of the crucial role of science in natural resource management. As 'biodiversity', 'conservation', and 'ecosystem services' become key concepts in science and decision-making – the significance of a comprehensive record of biodiversity and its study becomes increasingly evident. In the past year we continued to promote collections development, basic taxonomic research, and general biodiversity research; concurrently the Steinhardt Museum is evolving to fulfill the role of a National Center for Biodiversity Studies also by developing projects, laboratories, and centers, whose role is to develop the applied research required for science-based decision making in a wide array of government activities.

During 2016 we are expected to move into the new museum building! Establishing and promoting the museum was a long process, but throughout the years we were never alone. We are as ever grateful to our many colleagues and friends at Tel Aviv University academic and administrative staffs, to the Israel Academy of Sciences and Humanities, the Planning and Budgeting Committee of the Council of Higher Education (VATAT), the National Council for Research and Development, the Scientific & Public Council, the newly established SMNH Board of Directors, the Ministries of Environmental Protection, Agriculture and Rural Development, Tourism, Science, Technology & Space, Finance, Transportation, Energy and Water, Health, the National Heritage Program in the Prime Minister's Office, the Airports Authority, Keren Kayemeth Lelsrael (KKL-JNF), the Israel Nature and Parks Authority, the Society for the Protection of Nature in Israel, and in the research and higher education systems of Israel as well as many international colleagues, first and foremost the members of our International Scientific Advisory Board. We are also very grateful to Millie Phillips, to the Arison Foundation, and to the executors of the Sheinman brothers' estate, for their generous support and to ACW/Grey Israel who have volunteered to do the SMNH branding and have been remarkably helpful in the past year.

We are deeply indebted to Michael and Judy Steinhardt and to Yad Hanadiv (the Rothschild Foundation) who have not only supported our efforts for many years but were also actively and most constructively involved in the museum's development; in the past year they once again provided generous support. We could not have chosen better partners in this venture and look forward to continuing our joint journey of establishing the Steinhardt Museum of Natural History, Israel National Center for Biodiversity Studies, for the benefit of science and society.



Tamar Dayan  
Chair, the Steinhardt Museum of Natural History



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## **International Scientific Advisory Board**

Vicki Buchsbaum, Pearse Institute of Marine Sciences, University of California, Santa Cruz, USA

Gretchen C. Daily, Department of Biology, Stanford University, Stanford, CA, USA

Jared Diamond, Department of Physiology, University of California, Los Angeles Medical School, Los Angeles, CA, USA

Paul Ehrlich, Department of Biological Sciences, Stanford University, Stanford, CA, USA

Daphne G. Fautin, Ecology and Evolutionary Biology, Invertebrate Zoology University of Kansas, USA

Marcus W. Feldman, Department of Biology, Stanford University, Stanford, CA, USA

Lord Robert May of Oxford OM AC Kt FRS, Department of Zoology, Oxford University, Oxford, UK

Harold A. Mooney, Department of Biological Sciences, Stanford University, Stanford, CA, USA

Peter Raven, Missouri Botanical Garden, St. Louis, MO, USA

Daniel Simberloff, Department of Ecology and Evolutionary Biology, University of Tennessee, Knoxville, TN, USA

Edward O. Wilson, Museum of Comparative Zoology, Harvard University, Cambridge, MA, USA

Nancy Knowlton, Marine Science, US National Museum of Natural History, Washington, DC, USA





## **Scientific and Public Council**

The Steinhardt Museum of Natural History recognized as a project of national significance. The Scientific and Public Council represents the public interest, whether in science, education, culture, or tourism. We have asked a group of leaders in their respective fields to serve as members of this council; many members have already supported us over the years, helping out in their different areas of expertise.

Ruth Arnon

Itamar Borowitz

Ilan Chet

Aaron Ciechanover

Ariel David

Yael Dayan

Ami Federman

Gedalya Gal

Samuel Hayek

Shoni Rivnai

Brian Sherman

Shimshon Shoshani

Michael Steinhardt

Meir Shalev

Yaakov Turkel

Yossi Vardi (observer)

Ariel Weiss

Martin Weyl



## **Scientific and Public Supervision**

**Steering Committee/ Board of Directors** As part of the process of growth and development, in the past year we established a Steering Committee/Board of Directors for the Steinhardt Museum. Aharon Fogel, Itamar Borowitz, Ami Federman, Doron Sapir, Motti Kohn, and Neri Azogui, generously volunteered their time and expertise to oversee and help with the Steinhardt Museum development as members of the Steinhardt Museum Board.

**Steering Committee under the auspices of the Israel Academy of Sciences and Humanities** which represents the collections to the Budget and Planning Committee of the Council of Higher Education: Yossi Loya (Chairperson), Tamar Dayan, Yael Lubin, Rafi Mechoulam (observer), Oded Navon, Ehud Spanier, Yossi Segal.

**Sponsors' Steering Committee:** Sinaia Netanyahu (Chair), David Mingelgrin, Yoav Motro, Yoni Even-Tov, Eldar Kazevith, Neri Azogui, Tamar Dayan.

**Steering Committee for the Israel Taxonomy Initiative**, consortium of 19 organizations (Ministry of Environmental Protection, Ministry of Agriculture, Ministry of Health, Ministry of Science, universities, Academic Colleges, research institutes, Israel Nature and Parks Authority, Keren Kayemet LeYisrael, Society for the Protection of Nature): Leon Blaustein, Yossi Steinberger, Yael Lubin, Bella Galil, Alan Matthews. Observer: Ran Levy. Tamar Dayan and Menachem Goren direct the initiative.



## **Staff**

Prof. Tamar Dayan – Director  
Dr. Menachem Goren – Deputy-Director  
Dr. Revital Ben-David-Zaslow – Administrative Director  
Avigail Ben-Dov-Segal – Administrative Support  
Tirza Stern – IT specialist

## **Zoological Museum**

*Department of Zoology, George S. Wise Faculty of Life Sciences*

### **Division of Terrestrial Vertebrates**

Prof. Shai Meiri – Curator of Amphibians, Reptiles, and Mammals  
Dr. Roi Dor – Curator of Birds  
Prof. Tamar Dayan – Curator of Mammals  
Prof. (emeritus) Yoram Yom-Tov – Curator emeritus  
Dr. Yossi Yovel – Associate Curator of Chiroptera  
Arieh Landsman – Collections Manager – Reptiles and Mammals  
Erez Maza – Collections Manager – Amphibians and Reptiles  
Daniel Berkowic – Collections Manager – Birds and Mammals  
Kesem Kazes – Technical Support – Reptiles  
Avigail Ben-Dov-Segal – Forensic Ornithology, Bird Strike Monitoring  
Igor Gavrilov – Taxidermist  
Dr. Stanislav Volynchik – Taxidermist  
Ori Frid – Technical Support – Taxidermy  
Noam Leichtentritt – Technical Support – Taxidermy  
Gaya Savion – Technical Support – Taxidermy  
Dr. Karin Tamar - VATAT Supported Post-Doctoral Fellow (2014- ) – Reptiles  
Dr. Sharon Renan - VATAT Supported Post-Doctoral Fellow (2015- ) –  
Amphibians

### **Division of Fishes**

Dr. Jonathan Belmaker – Curator of Mediterranean Fishes  
Dr. Roi Holzman – Curator of Red Sea Fishes  
Dr. Menachem Goren – Curator of Fishes  
Dr. Revital Ben-David-Zaslow – Collections Manager  
Nir Stern – Technical Support

### **Division of Invertebrates**

Prof. Yehuda Benayahu – Curator of Octocorallia (Anthozoa)  
Dr. Frida Ben-Ami – Curator of Mollusca  
Dr. Noa Shenkar – Curator of Tunicata  
Prof. Micha Ilan – Associate Curator of Porifera  
Prof. (emeritus) Yossi Loya – Associate Curator of Hexacorallia (Anthozoa)

Prof. Bella Galil – Associate Curator of Crustacea and Scyphozoa  
Dr. Sigal Shefer – Collections Manager – Bryozoa and Porifera  
Henk Mienis – Collections Manager – Mollusca  
Oz Rittner – Collections Manager – Mollusca  
Alex Shlagman – Collections Manager – Octocorallia (Anthozoa) and Crustacea  
Ya'arit Levitt – Technical Support – Crustacea  
Dr. Gil Koplovitz – VATAT Supported Post-Doctoral Fellow (2013-2014) –  
Tunicata  
Dr. Omri Bronstein - VATAT Supported Post-Doctoral Fellow (2014-2015) –  
Echinodermata  
Dr. Noga Sokolover - VATAT Supported Post-Doctoral Fellow (2014- ) –  
Bryozoa  
Dr. Yaron Hershkovitz– Manager - The Israel National Aquatic Ecology Center  
Tuvia Eshcoly – Chief technician and office administrator  
Shira Gonen – Technical Support

#### Division of Entomology

Dr. Netta Dorchin – Head Curator – Diptera  
Dr. Amnon Freidberg – Curator of Diptera  
Dr. Vladimir Chikatunov – Curator of Coleoptera  
Dr. Vasily Kravchenko – Curator of Lepidoptera  
Dr. Sergei Zonstein – Curator of Arachnida  
Prof. (emeritus) Dan Gerling – Associate Curator of Parasitica (Hymenoptera)  
Prof. Abraham Hefetz – Associate Curator of Hymenoptera  
Dr. Yael Mandelik – Associate Curator of Hymenoptera  
Dr. Inon Scharf– Associate Curator of Neuroptera  
Dr. Gal Ribak – Associate Curator of Coleoptera  
Dr. Dany Simon – Associate Curator of Neuroptera  
Dr. David Furth - Associate Curator of Entomology and Museum Advisor  
Dr. Moshe Guershon – Collections Manager – Hymenoptera and Collections  
Staff Manager  
Dr. Zoya Yefremova – Collections Manager – Parasitica (Hymenoptera)  
Dr. Wolf Kuslitzky – Collections Manager – Parasitica (Hymenoptera)  
Dr. Armin Ionescu-Hirsch – Collections Manager – Hymenoptera  
Dr. Tatyana Novoselsky – Collections Manager – Heteroptera  
Leonid Friedman – Collections Manager – Coleoptera  
Tirza Stern – Collections Manager – Auchenorrhyncha (Hemiptera)  
Alex Shlagman – Collections Manager – Live Insect Collection  
Elisabeth Morgulis – Technical Support  
Oz Rittner – Collections Manager – Coleoptera  
Dr. Avi Keysary – Volunteer  
Dr. Efrat Gavish-Regev – VATAT Supported Post- Doctoral Fellow (2008-9, 2011-  
2014) – Arachnida  
Dr. Achik Dorchin – VATAT Supported Post-Doctoral Fellow (2013-2014, 2015) –  
Hymenoptera

Dr. Irina Zonstein – VATAT Supported Post-Doctoral Fellow (2014- ) –  
Hymenoptera  
Dr. Gidi Pisanty – VATAT Supported Post-Doctoral Fellow (2014- ) – Hymenoptera  
Ittai Renan – Manager - The Entomology Lab for Ecological Monitoring  
Yael Leshano – Technical Support  
Noa Nevo – Technical Support  
Idan Talmon – Technical Support  
Lilach, Rajzman – Technical Support  
Ahikam, Gera – Technical Support  
Thoar, Roth – Technical Support  
Yoni, Elkalay – Technical Support  
Shlomi, Aharon – Technical Support  
Shahar, Argeman – Technical Support  
Carmel, Herold – Technical Support  
Lior, Klain – Technical Support  
Tal, Sagi – Technical Support  
Gal, Sharig – Technical Support  
Omri, Shalev – Technical Support

#### Division of Molecular Systematics

Dr. Dorothee Huchon – Curator of Molecular Systematics  
Prof. Eli Geffen – Associate Curator of Vertebrate Molecular Systematics  
Dr. Tamar Feldstein-Farkash – Collections Manager and Molecular Systematics  
Laboratory Director

#### Division of Paleontology

Dr. Youri Katz – Curator of Paleontology  
Dr. Olga Orlov-Labkovsky – Curator of Micropaleontology  
Dr. Daniella Bar-Yosef – Collections Manager – Paleontology and  
Archeomalacology

### Herbarium

*Department of Molecular Biology and Ecology of Plants*

*George S. Wise Faculty of Life Sciences*

#### Division of Algae and Lichens

Dr. Yaakov Lipkin (ret.) – Curator emeritus  
Dr. Razy Hoffman – VATAT Supported Post-Doctoral Fellow (2012-) – Algae

#### Division of Fungi

Dr. Nissan Binyamini (ret.) – Curator emeritus  
Bruria Gal – Collections Manager - Fungi

## Biological Anthropology Museum

Division of Physical Anthropology

*Department of Anatomy and Anthropology*

*Faculty of Medicine*

Prof. Israel Hershkovitz – Curator of Physical Anthropology

Dr. Hila May – Curator of Physical Anthropology

Dr. Rachel Sarig – Curator of Dental Anthropology

Prof. (emeritus) Yoel Rak – Curator of Early Hominid Cast Collection

Prof. (emeritus) Baruch Arensburg – Curator emeritus

Julia Abramov – Collections Manager – Physical Anthropology

Adi Egozi – Technical Support – Physical Anthropology

Avital Tractman – Technical Support – Physical Anthropology

Shirly Cohen – Technical Support – Physical Anthropology

Linoy Namdar – Technical Support – Physical Anthropology

## Division of Biological Archaeology

*Sonia and Marco Nadler Institute of Archaeology*

*Faculty of Humanities*

Dr. Dafna Langgut – Curator of Palynology and Archaeobotany

Dr. Lidar Sapir-Hen – Curator Archaeozoology

Dr. Meirav Meiri – VATAT Supported Post-Doctoral Fellow (2013- ) –  
Ancient DNA

## Nature Campus

*Public outreach Project of Science and Environmental Education – Partnership with  
the I. Meier Segals Garden for Zoological Research and the Botanical Gardens*

Dr. Yael Gavrieli – Director

Irit Sidis – Office administration and public programs Coordinator

Ilil Pratt – Project Manager/Content Developer

Daphna Lev – Project Manager/Content Developer

Chen Biton - Administrative Assistant

Anat Feldman – Editor

~30 graduate students as guides



## Exhibitions Team

Hagai Segev – Curator of Exhibitions

Halina Hamou – Principal Designer

Naama Berg – Scientific Curator of Exhibitions

Gev Weil – Project Manager

Eli Gdulin Technical Support – Project manager

Hadas Zemer – Curator of Exhibitions

Eran Yuval – Multimedia Manager

Gaudeamus Productions – Multimedia Productions

Exhibition Designers: Nitzan Studio, Studio Amir Zehavi, Design Mill Studio,  
Tucan Design Studio, Ori Glazer,

## Israel Taxonomy Initiative

*National Project of the Higher Education and Research Systems; Ministries of Environmental Protection, Agriculture, Energy and Water, Science and Technology, and Health; KKL-JNF, Israel Nature and Parks Authority, Society for the Protection of Nature in Israel.*

Prof. Tamar Dayan and Dr. Menachem Goren – Directors

Profs. Leon Blaustein, Alan Matthews, Yossi Steinberger, Bella Galil, Yael Lubin – Steering Committee

Dr. Daniella Bar-Yosef – Coordinator



## **Progress in the Steinhardt Museum of Natural History**

Natural history collections are dynamic archives that record biodiversity. As such, they grow annually by new collecting activities and by incorporating smaller private or institutional collections. The collecting activities comprise focused collecting expeditions as well as the products of numerous field studies carried out by scientists and their graduate students. Moreover, the Israel Nature and Parks Authority rangers collect vertebrate carcasses for the museum. Collecting, incorporating the collections, preserving and digitizing them, as well as managing the collections, the data, and the network of collectors and colleagues, is a formidable job that falls upon the shoulders of the curators, and, even more so, on those of the collections managers, technical assistants, and taxidermists. We are fortunate to have a group of active, knowledgeable, and dedicated technical staff members, who do their best, in nearly impossible physical conditions, to preserve and expand this priceless record of biodiversity, and to help promote scientific biodiversity research. Their work is highly specialized, their knowledge priceless; almost all have academic degrees, most have either a PhD or an MSc, and all are the crucial backbone of the Steinhardt Museum at Tel Aviv University.

Our collections managers produced this report, and we are particularly grateful to the work of Revital Ben-David-Zaslow in compiling it and Daniella Bar-Yosef Mayer in editing it. Here they provide a glimpse of the behind-the-scenes of managing the collections: collections news, collecting trips and expeditions, and new collections are reported here in a nutshell.

## **Collections News – A word from our collections managers**

The staff members of the Steinhardt Museum of Natural History continue their activities to promote and preserve the various collections. We continue to collect and preserve new scientific materials, rescue and incorporate important private and institutional collections, maintain the existing collections, ship scientific material and data abroad, and assist graduate students, academic courses, and “Nature Campus” activities.

During the academic year 2014/2015 we received and incorporated many specimens of various taxonomic groups collected worldwide by the collection curators and staff, students, rangers from the Israel Nature and Parks Authority, and others. Almost 30,000 new specimens were added to the various collections during this year.

The collections assembled by Prof. Yehuda Benayahu have been processed. They contain soft corals, sea anemones, sponges, tunicates, nudibranchs, and other invertebrates. As a routine procedure, tissue samples for molecular analysis were taken from most of the soft coral specimens and preserved. Almost 350 new specimens of soft corals were added this year.

We continue the fruitful cooperation with Tel Aviv University students collecting samples in the field. Collections made by students are immediately digitized in order to facilitate easy transfer of specimens to the museum in the near future. Cooperation between students and staff of the collections is excellent. We give the students support in all fields including preservation, identification, labeling, and cataloguing. Students of Tamar Dayan have transferred a very large collection to the museum, containing thousands of specimens of mammals, amphibians, reptiles, and arthropods caught in pitfall traps. An additional collaboration is with the laboratory of Yael Mandelik from the Faculty of Food and Agricultural Environmental Quality Sciences of the Hebrew University, who studies wild bee pollination. All the Hymenoptera

specimens in this research are properly labeled and have a museum catalog number. At the end of this study the items will be incorporated into our collections. Students of Menachem Goren collected fish from the Mediterranean, and transferred their samples together with the collecting data to the museum.

### **Entomology Division (including Arachnids)**

**Netta Dorchin, Amnon Freidberg, Moshe Guershon, Dan Gerling, Vladimir Chikatunov, Vasily Kravchenko, Sergei Zonstein, Michael Mostovsky, Zoya Yefremova, Tanya Novoselsky, Wolf Kuslitzky, Armin Ionescu, Dany Simon, Tirza Stern, Leonid Friedman, Alex Shlagman, Oz Rittner, Liz Morgulis, Avi Keysari, David Furth, Beny Shalmon, Amir Weinstein**

### **General Introduction**

The Israel National Collection of Insects is estimated to contain more than 2 million specimens, constituting Ca. 50% of the total animal specimens in the Steinhardt Museum of Natural History (SMNH) at Tel Aviv University. The main mission of the entomological staff is to study and document the Israeli fauna, but the collections also contain thousands of specimens from other parts of the world, e.g., Africa, Europe, North America and the East Asia, reflecting collecting activities of our personnel according to their taxonomic expertise. The arachnid collection is included and contains mainly spiders, but also other arachnids, such as Solifugae, Scorpiones, Opiliones and Pseudoscorpiones.

Most of the new material that is added to the collection comes from continuous collecting efforts of the museum staff and students, as part of taxonomic, ecological and biodiversity studies in various regions of Israel. Additional material is integrated regularly from donations from professionals, amateurs, and more sporadically from the general public.

## **Main activities**

### New integrated collections

- Beit Usishkin Regional Museum: insect collection
- Dr. Kabir Argaman's collection ( Plant Protection and Inspection Services, Ministry of Agriculture)
- Dr. Ilan Yarom's personal collection

### Preparations for moving:

Beside the routine scientific and managerial activities, the entire team is continuously working on preparing the collection to the future move to the new building. This includes transfer of material to standard conditions (individual unit trays, drawers and cabinets).

### Special species/specimens

Routine maintenance work and minor changes were done in various groups including Neuroptera, Tettigonoidea, Blatodea, Phasmida and other groups.

## **Special projects:**

### The Reich collection.

The transfer of this important and large Lepidoptera collection from old and damaged drawers to standard new drawers and cabinets was finished. The Reich collection holds Lepidoptera from all over the world, with an emphasis on moths of the subfamily Arctiinae. A type catalog of this collection was prepared, including photographs of types that were sent to experts.

### The Rosen Collection

The Rosen collection is being integrated into TAU collection (including database). This collection holds very important representatives of biological control agents.

### Future museum exhibitions

Members of the entomological team participate as active members in the working committees of the future exhibitions, especially the gallery to be dedicated to arthropods.

## **Services, contacts and cooperations**

### Identification services

We keep providing critical identification services to the Plant Protection Services, Ministry of Agriculture (PPIS), the Nature and Park Authority (NPA) - dragonfly collections, and various research institutions Porter School for Environmental Studies - ant collection, Faculty of Agriculture at the Hebrew University - bee collection, Ben Gurion University - beetle collection.

### Education

The live insect collection provides routine services to academic courses (Insect Faunistics, Excursions to the Zoological Garden), to visits in the Entomological Collections, and to Nature Campus, where live insects are used for demonstration of biological phenomena and principles. Material from the general insect collection is also used in these activities.

All collection managers participate in 'ID days' devoted for the personal insect collections of students in the Insect Faunistics Course.

### **Databasing status**

Data of 31,426 new specimens were added to the database in 2015, 27,621 from Israel and 4,225 from abroad, for a new total of 228,379 databased insect specimens.

### Special database projects:

- Digitized mapping of the insect collection is being continuously updated. As part of the mapping a protocol of follow-up of movement within the collection is being prepared.
- Palmoni Collection: The databasing of Palmoni's collection, received several decades ago, proceeds by Dr. Avi Keysari, a volunteer in the insect collection. During the last year 2504 new specimens were added to the database, including Isoptera, Dermaptera, Hymenoptera, Mantodea, Neuroptera, and part of the Coleoptera orders.

- The work on standardizing spelling of locality names for the entire zoological collections was finished and distributed among all collections.
- The preparation of digitized locality coordinates and maps of geographic regions of Israel was completed and distributed among all collections for future use and GIS work on the collection data

#### **Israel Taxonomy Initiation (ITI) supported activities**

- Netta Dorchin continues to collaborate with Prof. Zvi Mendel of the Volcani Center (Bet Dagan) in conducting an ITI survey of predatory gall midges on mealybugs in agricultural areas.
- Tanya Novoselsky and Netta Dorchin continue the survey of the Tingidae (Hemiptera) of Israel.
- Three PhD students (Einat Sachar and Liz Morgulis and Zohar Yanai) continue their ITI supported researchs on different groups of arthropods, supervised by Dr. Netta Dorchin, and Prof. Moshe Inbar, and Drs. Amnon Freidberg and Netta Dorchin, respectively.

#### **New equipment and infrastructure**

- 5 new insect cabinets were added to the collection.

#### **Taxonomy and biology of Torymidae (Hymenoptera: Chalcidoidea) of Israel**

##### **Irina Zonstein**

A survey of the existing taxonomic literature on Torymidae was conducted to gather identification keys, general and species descriptions, biological information. A total of about 490 specimens of Torymidae have been recently collected on flowering plant and reared from hosts throughout Israel (about 300 of Podagrionini and Palachiini and 190 of other Torymidae).

Preliminary keys to the species of some genera (*Podagrion*, *Podagrionella*, *Torymus*, and *Megastigmus*) are being prepared.



A checklist of the Torymidae species of Israel is being prepared, based on the collection, existing literature, internet databases, and expert consultation. The list currently comprises 54 species belonging to 16 genera (plus 13 species identified only to the generic level); 8 genera of Torymidae we found in Israel for the first time.

Some data of the old material (mostly Podagrionini and Palachiini) and most data of the newly collected material have been entered into the data base. A first biological record globally was obtained for the Palachiini (Israel, Lahav, 23.ix.1965 Blondheim S., reared from ootheca of *Ameles* sp.). New material of Podagrionini (five species) was obtained for a molecular study.

#### Work on other projects.

- The manuscript “Revision of the Palaearctic genus *Gonaporus* Ashmead, 1902 of spider wasps (Hymenoptera: Pompilidae)” (Zonstein I. & Wahis R.) was completed and now it is under review in *Zootaxa*.

#### **The genus *Andrena* (Hymenoptera: Apoidea: Andrenidae) in Israel** **Dr. Gideon Pisanty**

The current project deals with taxonomy of the bee genus *Andrena*. This is a genus of solitary ground-nesting bees with about 1450 described species worldwide, more than 160 of them occurring throughout Israel. The genus contains many poorly defined taxa and requires much morphological and molecular studies to decipher taxonomic problems. The project aims to revise and update the knowledge of the Israeli fauna of the genus, and includes the following tasks:

1. Meticulous study of the morphology of known species and their relationships, using the published taxonomic literature and identified material at TAUI and from loans. I am receiving expert training abroad, examining type material from the Oberösterreichisches Landesmuseum in

Linz, which holds the largest collection of western Palaearctic bees, and collaborating with Erwin Scheuchl (Ergolding, Germany), the leading expert in taxonomy of western Palaearctic *Andrena*.

2. Identification of all unsorted material from Israel and re-examination of dubious records.
3. Conducting field trips to collect rare and new species and sexes of *Andrena* throughout Israel.
4. Conducting DNA barcoding (using the mitochondrial CO1 enzyme) to resolve problems of poorly delineated species groups and their phylogenetic relationships.
5. Compilation of a referenced checklist of all the species and subspecies of *Andrena* collected in Israel, including those absent from the TAUI collection.
6. Preparation of detailed and illustrated descriptions of species and sexes identified as new to science.
7. Preparation of an illustrated key to the *Andrena* species of Israel.

The work will be summarized in a publication dedicated to the genus *Andrena* in Israel, which will include an updated checklist and key to the Israeli species of *Andrena*, and the description of new taxa. In a second publication, I will conduct a worldwide revision of one of the subgenera of *Andrena* occurring in Israel (*Camyplogaster*, *Holandrena* and *Lepidandrena* are possible candidates). Poorly described species will be redescribed in detail with illustrations. Literature, ecological and distributional data will be summarized for each species. A key to the species and subspecies of the subgenus will be given.

### **Tetrapod Division**

**Shai Meiri, Roi Dor, Tamar DayanYossi Yovel, Tamar Feldstein, Arieh Landsman, Erez Maza, Igor Gavrilov, Daniel Berkowic, Stanislav Volynchik, Kessem Kazes.**

#### Personnel

There have been few changes to the collection personnel. Igor was helped this year in the taxidermy by several junior assistants (Noam, Ori, Gaya and Chamutal). Kessem Kazes has started an MSc degree and drastically reduced her workload. Snir Halle has worked for a short while in the dry collection helping to assimilate the Beit Ussishkin collections (see below).

Right now we are facing a major change, with Arieh, the 42 year veteran technician of the collection retiring at the end of 2015. Daniel will be leaving us after three years, to obtain a PhD. It will be difficult to maintain the same level of professionalism. Arieh, Daniel and Erez have been working very hard to assimilate the increasing numbers of specimens we have been getting in recent years – at enhanced data and metadata standards. The same amount of work cannot be maintained with a curtailed staff (especially in light of the need to move the collections to the new building next year!), and we are now trying to find suitable replacements.

Postdocs: four postdocs have started working in the collection recently: Sharon Renan is funded by the museum for a work involving the amphibian collection. Sharon has contributed few specimens so far, but only started working at the end of last years' wet season. Meirav Meiri plans to extract DNA out of our oryx, Aharoni's bear, and Bodenheimer's cheetah. She identified Schmitz's cheetah as belonging to the Asian cheetah clade, but could obtain no DNA from 'his' crocodile. Karin Tamar's postdoc has been extended. She has submitted her revision of *Pseudotrapelus* for publication, and is working on revising *Acanthodactylus* and *Rhynchocalamus*. She claims another species of *Pseudotrapelus* likely inhabits Israel than is usually thought – and potentially

we have two species. She is describing a new *Rhynchocalamus* from Israel. Anat Feldman has started a museum-based postdoc aiming at undertaking a functional morphology study of reptiles.

#### Collection growth, assimilation of other collections & active collecting

By far the greatest development of the last year has been the assimilation of the donated Beit Ussishkin collection of hundreds of birds and mammals into our collection. Those collections, perhaps the third largest in the country, are very important for animals of northern Israel, and are still in the process of being catalogued and arranged in the collections.

#### The amphibian collection

Our special ties with the Nature and Parks Authority (NPA) and especially their biologists, rangers and science division personnel continue, and are being helpful. In several occasions this year we were invited, e.g., by the district biologists, to actively collect reptiles in areas that were earmarked for development and we thank them for the thought.

Between November 4<sup>th</sup>, 2014 and October 15<sup>th</sup>, 2015 our amphibian collection has grown by a mere 24 specimens to 2539. Most represent specimens that were part of those housed in the Zoological garden following the draining of the 'Checkpost' pool. Importantly, however, these figures include four specimens of the recently re-discovered Hula painted frog, formerly *Discoglossus nigriventer*, now *Latonia nigriventer* (one adult and 3 tadpoles) – brought by Sarig Gafni and Sharon Renan. So the most elusive of Israeli amphibians is represented in our collection at last. We hope the good cooperation with the Geffen/Gafni team and their museum-funded postdoc will result in enhanced sampling of amphibians. We also hope that Sharon will help resolve the issue of the putative 2<sup>nd</sup> (some would say, 3<sup>rd</sup>) species of the tree frog, *Hyla felixarabica* Gvoždík, Moravec, Klütsch & Kotlík, 2010 in Israel, and whether indeed it is

found in Israel, and in the collection, or not. The same goes for *H. heinzsteinitzi*.

### The bird collection

Over the same period the bird collection has grown by over 1000 specimens (from 18215 to 19296)! About half of those represent specimens that were brought from the Beit Ussishkin Museum (so the number of “new” specimens brought from the wild was actually ~200 fewer than last year). These new birds belong to some 245 species, come from many institutions, mostly Beit Ussishkin, but also the Nature and Parks authority and more minor sources – and from individual collectors. The most common species is the blackcap *Sylvia atricapilla* (30 specimens) followed by last years’ favourites (*Buteo buteo*, 24 specimens, *Falco tinnunculus* 27, *Accipiter nisus* 26, *Asio otus*, 21 and *Tyto alba*: 20). Most of these species are large birds of prey that do not necessarily represent their relative abundance among the Israeli avian fauna, but are probably easier to locate and are more appealing to collectors. An important addition is the Pale Scops Owl (*Otus brucei*), which was discovered recently to have a considerable breeding population in Israel. The Israeli populations of the desert Owl *Strix butleri* were recently split from and elevated to species level as *Strix hadorami*, based, in a major part, on specimens from our collection (Kirwan et al. 2015). Daniel has finished computerizing the egg collection – except the Schimtz egg collection that is still only partially computerized.

### The mammal collection

The mammal collection has grown by 654 new specimens over the same period – from 14193 to 14847 specimens (about 100 fewer overall than last year – despite some 315 specimens arriving with the Beit Ussishkin collection). Only 90 specimens were collected by NPA rangers, or brought from the wildlife hospital (about 1/3 of last years’ tally). Admittedly some specimens may still be in preparation, and our backlogs have extended further this year because of the huge effort by the preparators to prepare the displays for the new building.

We have started what promises to be a very fruitful collaboration with Yoav Motro, from the Ministry of Agriculture – who has started bringing us mammalian pest specimens he is in charge of eradicating, including specimens from species such as *Rattus norvegicus* (ten specimens), that was not collected since 1955(!). We already databased 55 such rodent specimens, and dozens still await treatment. The most common mammals we received from Beit Ussishkin were martens (*Martes foina*, 48 specimens) and otters (*Lutra lutra*, 20 specimens). From other sources, encouragingly, we have received many small mammals this year, the most common of which are mice (*Mus musculus* and *M. macedonicus*, 41 specimens), bats (*Tadarida teniotis*, 31 specimens), and shrews (*Suncus etruscus*, 29). The usual ‘most collected’ mammal, the golden jackals (*Canis aureus*) is represented by ‘only’ 19 specimens this year, compared for example with 72 specimens obtained last year).

We are happy to announce the “birth” of two new mammal species from Israel – Orr Comay positively identified the Macedonian mouse, *Mus macedonicus*, as distinct from *M. musculus* in owl pellets and now helps Arie Landman in identifying mice morphologically – after showing strong connections between some morphological aspects and molecular ones. Georgy Shenbrot, with Tamar Feldstein, have identified two species of the Lesser Egyptian Jerboa, well differentiated by habitat preferences, morphology (fur coloring and glans penis morphology) and genetics, basically splitting *Jaculus jaculus* along previously known sub-specific lines (see Mendelsohn and Yom-Tov 1999) to include both this species and *J. hirtipes* (Lichtenstein, 1823).

#### The bat collection

A pair (mother and pup) of Mexican fish eating bats (*Myotis vivesi*) were collected and two hipposiderid species were given to us on loan by the collection in Hat-Yai Thailand. Overall there was little collection of bats this year – something to take note of and see how we can improve in the future.

Together with the Curator emeritus, Yoram Yom-Tov, we have just embarked on a project to retrospectively document the history of the mammal collection, which will also help in updating the database. We hope this will prove a very successful pilot study to be followed for other collections – vertebrate and invertebrate alike.

### The reptile collection

The reptile collection has grown by 265 specimens, from 16831 to 17096 specimens, much less than last year. The most abundant species collected were sand-dwelling geckos (10 *Stenodactylus sthenodactylus* and 22 *S. petrii*), fringe footed lizards (15 *Acanthodactylus aegyptius* & 15 *A. scutelattus*) and sand-dwelling vipers (12 *Cerastes vipera*) collected from areas destined for “development” in the western Negev, alongside other dune-dwelling reptiles (e.g., 8 *Lytorhynchus diadema* and 8 *Trapelus savignii*). We are very grateful to the NPA Southern Division ecologist, Asaf Tsoar, for notifying us and granting us permits to collect there. As usual, most collecting was done by TAU personnel (179 specimens), and private collectors: the extremely helpful, Aviad Bar and Ofer Shimoni (43 specimens). For comparison, the NPA contributed 10 reptiles belonging to 9 species this year (including 4 species of turtles).

We have confirmed that the gecko found last year, in Kibbutz Ein Gedi, is *Tarentola annularis* using both molecular and morphological tools (Jamison et al., submitted). Several scientists to whom we have sent specimens over the last few years, have suggested that reptile populations in Israel may belong to species hitherto undescribed – while thought to be members of widely ranging. This is the case for *Pseudopus apodus*, *Tropicolotes nattereri*, *Lacerta media*, *Ablepharus rueppellii*, *Trapelus agnetae*, *Hemidactylus turcicus*, and perhaps *Mediodactylus kotschyi*. Current work in the museum by the museum-funded postdoc, Karin Tamar, and by an MSc. Student (Guy Sinaiko) aims to revise the genus *Rhynchocalamus* (see Smid et al. 2015) and the “*Platyceps rhodorachis*

complex” – both may reveal the existence of hidden diversity, as is the case with *Pseudotrapelus* (Tamar et al., submitted).

Overall the tetrapod collections have grown by some 2024 specimens – a number never seen since the early 1970s (and with much more detailed metadata, as well as the collection of tissue samples, and keeping one specimen per jar in the wet collection). This is slightly more than the 1959 specimens reported last year and double the 1069 of two years ago – largely based on the Bet Ussishkin collection. New or old, this huge number represent huge effort and dedication by the staff, Daniel, Kessem, Erez, Arie, Stas, Igor, Snir, Gaya and Chamutal, who worked extremely hard, and produced magnificent results.

#### Connection with other bodies and researchers

We continue our efforts to connect with bird banding stations and private bird banders in Israel, including the International Birding and Research Center in Eilat, The Jerusalem Bird Observatory and Yeruham's Ornithology Center. Two freezers were installed by the museum at the Hula Valley Agmon Center and at the Yeruham's Ornithology Center to promote collection in these areas. The latter connection already made significant contributions to the collections, including species we hardly ever collect otherwise, from the Agmon we mostly get coypu.

The feather identification lab, headed by Avigail Ben-Dov Segal, has continued to provide identifications to the Israeli Air Force, Airport Authority and Nature and Park Authority. Avigail is using the bird collection to identify feathers and with the help of the molecular lab (Tamar Feldstein) provides genetic ID for some of the more complicated cases.

#### Equipment, infrastructure, storage and curation

We are slowly assimilating the Beit Ussishkin collection into existing shelves and cabinets but storage place might run out soon. The new collection managers will look into starting to place specimens in transparent plastic boxes. We hope



to purchase a trial batch the coming year. These boxes, used in the British Columbia Museum, keep specimens safer, and when accessing a drawer allow a researcher to pick only the necessary specimens rather than move a whole bunch – thus minimizing damage. We made no headway in looking into barcoding jars and drawers, so that immediate curation and identification of those specimens present in a cabinet or on a shelf is known.

Igor and Stas continue to improve the infrastructure of the preparation area, following the changes to the structure of buildings in the Zoological Garden itself. Sanitation there can and should benefit from marked improvement in the near future.

Visitors: 18 (17 from Israel, one from Poland, five institutions and several private visitors) visited the dry collections last year. Lending of collections: We had to curtail our connections with prof. Stephen Goldberg (Whittier College, Texas), to whom we have been sending multiple specimens of many species of reptiles for his analyses of reproductive biology (and sometimes parasitology). Prof. Goldberg was publishing multiple papers each year based on specimens from our collection, and we benefited from his identifying specimens to sex. However, as issues with customs multiplied and our shipments (that prof. Goldberg, and others returned our specimens to us in) were delayed, forcing us to spend much time and money to free them. We have thus decided to stop all lending of specimens to other collections and individual researchers until this matter is resolved. Because of problems with customs we have stopped all shipments of specimens – and sent nothing during 2015, except three shipments for destructive sampling (to researchers in the Natural History Museum of Crete, Karl University in Prague, and the University of Antwerp, Belgium), which we do not intend to get back.

## **The systematics of reptile taxa in Israel**

**Karin Tamar**

During the last year I revised the systematics of several reptilian taxa in Israel suspected to represent species complexes or include cryptic species. To study these taxa I used the reptile collections of the Steinhardt Museum of Natural History (SMNH) with reference material from other museums as well (the Hebrew University of Jerusalem [HUI], and collections abroad) using comparative analyses of morphological and molecular markers.

**The genus *Rhynchocalamus* Günther, 1864.** The colubrid snakes of the genus *Rhynchocalamus* Günther, 1864 are very secretive and little known (they have been genetically sampled for the first time only recently; Šmíd et al., submitted). The genus is endemic to south-western Asia, and comprises four species: *R. arabicus* (East Arabia), *R. barani* (Turkey), *R. melanocephalus* (Turkey and southwards to Sinai, including Israel) and *R. satunini* (Turkey to Iran). The population of *R. melanocephalus* in Israel has never been properly examined and preliminary morphological and molecular evidence hinted at cryptic, undescribed diversity.

The results of this project are currently at the midst of processing and writing of a manuscript intended for publication in *Zoologica Scripta* (titled “Systematic revision of the Kukri snakes of the genus *Rhynchocalamus* Günther, 1864 (Squamata: Colubridae)”). I used three mitochondrial (12S, 16S, *cytb*) and one nuclear (*c-mos*) gene fragments, coupled with morphological comparisons mainly from the collection of the SMNH and HUI (n=115), to reveal the phylogenetic relationships within the genus – focusing on the Israeli populations. My results show that the genus includes great genetic and morphological diversity – I am describing a new genus (previously the Turkish endemic species *R. barani*) and a new species in Israel – from the Negev Mountain region.

### **Ongoing and future project - The genus *Pseudotrapelus* Fitzinger, 1843.**

The agamid lizards of the genus *Pseudotrapelus* Fitzinger, 1843 are endemic to mountains and rocky habitats around the Red Sea. Recent new species descriptions within the formerly monotypic genus exemplify its perplexing systematic and biogeographic status. To date five species are recognized Karin Tamar - Post-doctoral proposal for 2015-2016 but their distributional ranges are largely unknown. Only *Pseudotrapelus sinaitus* is currently recognized in Israel, whereas the presence of *P. aqabensis* is uncertain.

The first two goals are currently at the final stages of a manuscript intended for publication in *Molecular Phylogenetics and Evolution* (titled “Molecular phylogeny and phylogeography of the genus *Pseudotrapelus* (Squamata: Agamidae) from Africa and Arabia”). I inferred the phylogenetic relationships and historical biogeography using multi-locus genetic data including gene and species trees and methods for species delimitation. I used partial sequences of two mitochondrial (16S, ND4) and two nuclear genes (MC1R, *c-mos*) from specimens collected from our museum (SMNH; n=5) and museums abroad.

My results support the specific status of the five recognized species and define their current genetically geographic distribution for the first time, including the elevation of a sixth population, endemic to Yemen (previously considered to be *P. sinaitus*), to species status. The results also support the genetic presence of a second species in Israel – *P. aqabensis*.

### **Detecting the presence of the rediscovered Hula painted frog and other threatened amphibians using environmental DNA**

**Sharon Renan, Sarig Gafny and Eli Geffen**

The aim of this study is to use an eDNA toolkit to detect the presence of rare amphibian species in Israel and to examine the potential of this novel ecological-molecular approach to assess wildlife biodiversity.

### Designing and testing four species-specific assays

We designed four species-specific assays (primers and probe) for the four amphibian species: *Pelophylax bedriagae*, *Hyla savignyi*, *Bufo viridis* and *Latonia nigriventer* (naming the assays: Pelophylax, Hyla, Bufo and Latonia, respectively). By sequencing the same sections of 12S and 16S regions of the mitochondrial DNA (~1000bp) in all four species, the assays were designed based on maximum base-pair differences among species in the primer-binding and the probe-binding regions. To test the assays' species-specificity, we conducted qPCR reactions for each assay with tissue samples from the target species and from the three other non-target species.

In all assays, we obtained high amplification of the target species and good separation between the target-species and the non-target species. The Latonia assay did not amplify the *Pelophylax bedriagae* tissue. This significantly reduces the chances of getting non-specific amplifications of the common *Pelophylax bedriagae* in Latonia assays on eDNA samples.

### Testing different collection and extraction combinations for the eDNA methodology

To test the amplification success of the four assays on eDNA samples, we collected water samples from a single aquatic site in the Hula valley (site 1) in which all four target species are known to inhabit. Water samples were taken in two different collection protocols: 1) three tubes of 15 ml of water that were kept frozen and centrifuged before extraction and 2) 1L of water that was filtered using filter funnels and the filter was kept frozen until extraction. Three replicates of each collection method were extracted using DNeasy extraction kit (Qiagene) and three replicates of the filtering method were also extracted using Power water DNA Isolation kit (MOBio), resulting in three replications of eDNA samples for three collection-extraction combinations. All samples from all three combinations were tested using the four assays (Pelophylax, Hyla, Bufo and Latonia assays). In each reaction, we used tissue sample of the target species as positive control and DDW as negative control. To ensure that all four species are currently present in the water,

we also conducted a net sampling of tadpoles immediately after the water collection.

In the tadpoles' sampling, only three out of the four species were found in site 1: *Pelophylax bedriagae*, *Hyla savignyi* and *Latonia nigriventer*, and in the same way, all the eDNA samples were successfully amplified in those three assays (Pelophylax, Hyla and Latonia), indicating on the ability of the eDNA methodology to identify both common and rare species from the water. The filtering collection method had a slightly higher amplification success than the 15 ml tubes method. One sequence of each assay from each collection-extraction combination was sent for sequencing to ensure that only the target species was amplified in each reaction. All sequences were of the target species. The tadpoles that were collected in site 1, including *P. bedriagae* tadpoles, *Bufo viridis* tadpoles and three newly discovered tadpoles of *Latonia nigriventer*, were delivered to the Steinhardt Museum of Natural History for future studies.

### **The Feather Identification Lab**

#### **Avigail Ben-Dov Segal, Roi Dor and Tamar Feldstein**

Military and civilian air traffic has increased dramatically over the last decade in Israel. This heavy traffic shares air space with half a-billion migratory birds that pass through Israel twice a year (as well as resident birds), that hold a tremendous risk of bird strikes which may lead to damage and even loss of lives. Identifying the risks is an important step in order to prevent bird strikes and improve flight safety. Therefore, it is essential to identify the bird species that are responsible for bird strikes.

Since 2011 the Feather Identification Lab is working with the Israeli Air Force, the Israel Airports Authority, the Civil Aviation Authority and the Israel Nature and Parks Authority to identify feather remains. In 2013 an official contract were signed between the Feather Identification Lab (TAU) and the Israeli Air

Force, the Israel Airports Authority and the Civil Aviation Authority to provide all feather identification for bird strikes in Israel. The lab provides over 100 bird strikes identifications annually. In addition we provide feather identification for Israel Nature and Parks Authority, mainly to detect poaching of wild birds.

The Lab's main goal is to identify feather remains (mainly from air strikes) to the lowest possible taxonomic level. Feather identification is conducted through preparation of histological slides for microscopic identification as well as through morphological identification of feathers. We have a comprehensive comparative collection of histological slides of many Palearctic species that is used for microscopic identification, as well as a large comparative feather collection that we continue to expand. Being a part of The Steinhardt Museum of Natural History enables us to take advantage of the largest regional collection of bird specimens (> 18,000), which is an invaluable resource for identifying feathers.

The molecular lab at the museum (headed by Dr. Tamar Feldstein) now routinely provides genetic identifications from bird remains. This additional information compliments our microscopic and morphologic identification. It is particularly important when damage was caused to an aircraft and in cases where the remains do not allow species level microscopic identification.

So far, in 2015, the lab provided identifications for 138 bird strike cases and 10 possible poaching cases. These identifications included 33 genetic analyses.

### **Molecular Laboratory**

#### **Tamar Feldstein**

The molecular laboratory of The Steinhardt Museum of Natural History at Tel Aviv University offers molecular identification services for museum samples for which morphological identification is in question. The resulting molecular

data expand the information available on unique samples and contribute to curation of the museum collections. This year the laboratory was involved in a project intended to barcode the aquatic fish fauna of Israel, coordinated by The Israel Nature and Parks Authority (INPA). In addition, molecular identifications of crustaceans, sponges, insect larvae, polychaetes, tunicates, sea-urchins, lizards, mice and shrews were performed, along with ongoing services we provide to the Feather Identification Lab for the identification of birds that collided with airplanes.

Altogether, during 2015, DNA from 296 tissue samples were extracted and processed, as follows:

- Aquatic fish barcoding for the INPA- 55% of the molecular work.
- Identification of Mediterranean sponges as part of a survey of the Israeli fauna- 12% of the molecular work.
- Identification of birds following collision with airplanes (birdstrike) - 11% of the molecular work.
- The remaining 22% are identification analyses upon request from researches at the Department of Zoology, Tel-Aviv University.

The Molecular Systematic Collection of The Steinhardt Museum consists of frozen or alcohol-preserved tissues of vertebrates and invertebrates. We encourage its use by the international, non-profit, research community.

During 2015, 305 tissue samples from 135 mammals and 1350 tissue samples from 560 birds were added to the museum tissue collection.

This year, tissues from the museum's collections were provided for research purposes, to Roi Dor (Israel, Aves collection) Nicola Saino (Italy, Mammalia collection), Lukas Kratochvil (Czech Republic, Reptilia collection), Nikos Poulakakis (Greece, Reptilia collection), and Dorothee Huchon (Israel, Porifera collection).

## **Mediterranean Fishes**

### **Jonathan (Yoni) Belmaker**

Nowhere is the native biota faced with changes that are more rapid than in the Eastern Mediterranean, where the continual influx of invasive Red Sea species, warming water temperature, overfishing and pollution are transforming fish diversity. The Mediterranean natural history fish collection provides a globally unique resource that is being used to identify how these immense changes influence fish diversity, biogeography and, more generally, marine ecosystem services and function. Such understanding can be used to identify the consequences of these major changes to the integrity of the marine ecosystem and, perhaps more importantly, to mitigate future adverse influences of human activity.

#### **Research:**

- This year we continued to take detailed measurements of Mediterranean and Red Sea fish ecomorphological traits from museum specimens. Research was primarily carried out by a Tel Aviv University undergraduate student (Or Keissar). This data will be used to test for biotic and abiotic constraints on traits diversity associated with fish invasion and will be used by graduate students (Or Givan, Idan Doyev). We estimate that this extensive compilation will be completed by the end of the year.
- We developed species distribution models using (among other data sources) the collection's georeferenced data to identify the geographical and environmental constraints on the distribution of invasive species (Parravicini et al., 2015).
- We are continuing fish sampling based on trawl catch as part of Itai van Rijn's PhD. We performed four sampling trips this spring and four more in the fall. Sampled fish are being used to quantify how mortality and growth differ between invasive and native species based on otolith measurements. Representative samples are deposited in the collections.



- We are continuing fish sampling based on coastal fishermen catch as part of Ori Frid's MSc. The goal of this study is to understand temporal dynamics of catch and by-catch. Representative samples of unique species are deposited in the collections.
- We led an intensive fish survey effort in collaboration with the Israeli Nature and Parks Authority along the Mediterranean coast. The goal is to establish an ecological baseline that can be used to assess the effectiveness of protection efforts such as the establishment of Marine Protected Areas and increased reinforcement. Surveys were conducted in the spring and fall of 2015 and included all lab members, as well as other graduate students affiliated with the museum (e.g. Nir Stren, Bat-Sheva Rotman).
- We led an intensive fish survey effort in collaboration with the Israeli Nature and Parks Authority along the Israeli Red Sea coast. The goal is to establish an ecological baseline that can be used to assess the effect of human disturbance on coral reefs. Surveys were conducted in the fall of 2015 and included all lab members.
- We undertook two fish sampling expeditions in September 2014 to Cyprus and to Turkey. Personnel included two graduate students (Ori Frid, Itai Granot) and a technician (Shahar Malamud).
- Fish samples were sent for genetic analyses to estimate connectivity among Mediterranean populations. The project is headed by David Mouillot (University of Montpellier, France).

### **The Ascidiacea Collection**

#### **Noa Shenkar**

Ascidians (Phylum Chordata, Class Ascidiacea), or sea squirts, are the largest and most diverse class of the sub-phylum Tunicata (also known as Urochordata). They comprise approximately 3000 described species found in all marine habitats from shallow water to the deep sea. The class Ascidiacea

presents fundamental opportunities for research in the fields of development, evolution, ecology, natural products and more. During 2013-2014 the Ascidiacea collection at the National Collections of Natural History has been greatly advanced. The establishment of the new Shenkar lab at the Department of Zoology, Tel-Aviv University in October 2012, dedicated to the study of ecology of ascidians along the coasts of Israel, Mediterranean and Red Sea, has greatly promoted the collection by adding numerous specimens and by sorting the existing material. This year the collection was especially active with student research as the number of graduate students involved at the collection, identification and vouchering specimens has increased significantly. With two resident students at the Inter-University Institute in Eilat (Yaniv Shmuel, Tal Gordon), the collection from the Red Sea continued to progress, and with numerous field trips along the Mediterranean coast of Israel the sampling effort has greatly improved resulting in over 100 new specimens in the collection. During 2015 an underwater field guide to dominant ascidians from the Mediterranean coast of Israel has been produced, to facilitate accurate identification of specimens in the field. During September 2015 we hosted a Turkish researcher, Dr. Sinem Aydin of Dokuz Eylul University's Institute of Marine Sciences and Technology, for taxonomic training. Dr. Aydin is researching the use of ascidians as biological indicators for monitoring heavy metal pollution in the Eastern Aegean waters, and acquiring taxonomical tools is key to the success of this project. Additional international collaborations include the active participation of Dr. Shenkar on the editorial board of the European Aliens Species Information System (EASIN), and serving as an Editor of the Ascidiacea World Database. Two large-scale international projects involving the Ascidiacea collection have been funded this year:

Schulich Ocean Studies Centre Initiative (co PI: Dr. Sarah Stewart-Clarck, Dalhousie University) "Marine bioinvasions of ascidians in tropical and coastal ecosystems" C\$ 75,000.

The U.S.-Israel Binational Science Foundation (co PI: Susanna López-Legentil, UNCW) "Hidden allies: The potential contribution of symbiotic microbes to the ecology and invasive potential of introduced ascidians" \$150,000.

We are continuously investing efforts in sampling new species to the collection, and identifying the arrival and spread of non-indigenous species. Several projects are being carried out by the Shenkar team:

**Arrival and spread of the invasive ascidian *Styela plicata* along the Mediterranean coast of Israel.** The solitary ascidian *S. plicata* forms large aggregations in marinas and ports, and may create severe damage to artificial structures. We are currently documenting its occurrence along the coast with relationship to maintenance procedures of the marinas and ports.

***Eusynstyela latericius* – using molecular tools to distinguish between two morphotypes.** The colonial ascidian *Eusynstyela latericius* is a common encrusting ascidian in Eilat. The ascidian appears in two very distinct morphotypes. However, using phenotypic identification, it has been concluded in the past that both morphotypes belong to one species, despite the vast morphological differences in colony structure. In order to verify that both morphotypes belong to the same species, we conducted molecular analyses using COI and 18S rRNA genes. Surprisingly, results show that although their external morphology is different, their genetic data reveal they are in fact the same species. (Manuscript in preparation).

**New records of *Ascidia* sp. and *Microcosmus* sp.** Our on-going efforts to study vectors of introduction of ascidians resulted in the early detection of two non-indigenous species on boat hulls and aquaculture facilities. Both records are new to the Mediterranean Sea.

**New species of *Ciona* from the Red Sea.** During regular monitoring of Red Sea ascidians a new species of *Ciona* was sampled. Both morphological and

molecular tools indicate it is a species new to science. We are currently working on its description and molecular identification.

### **Porifera collections**

#### **Sigal Shefer**

#### **Collection and field survey of the Porifera community along the Mediterranean of Israel:**

This year samples were collected during two excursions and two scuba dives. The excursions were to the mesophotic sponge ground located at a depth of 100m, off Herzliya (34 specimens). Sponges collected from shallow waters in Eilat (11 specimens) and Sdot Yam (9 specimens) were added to the collection. In addition 23 specimens were accepted from the Under Water Observatory, 6 samples from the Israeli Nature and Park Authority's Bioblitz were added to the collection and 4 specimens were collected by S. Rotman and Y. Levitt, Over all 87 specimens were added to the collection this year.

The sampling excursions to Herzliya mesophotic sponge ground, Sdot Yam and to Eilat's shallow reefs, were part of studies conducted in Prof. Ilan's lab. The sampling of Eilat's mesophotic reef was conducted during the Second International Workshop on Mesophotic Coral Reef Ecology (MCEs).

#### **Identification of newly collected Porifera samples:**

Based on morphological characteristics and molecular analysis, we identified 10 sponge species to family, genus or species level.

#### **Museum Sample loans:**

Two sub samples of 2 specimens of *Pione cf. vastifica* were sent to Prof. Michel Hugues, Institute of Chemistry & Biology of Membranes & Nano-objects, Bordeaux, France: PO25951, PO25952.

**Taxonomic identification service:**

One sample was identified for SeArc Company (Dr. Ido Sella), five samples were identified for Ma'arag, and six as part of the Israeli Nature and Park Authority's Bioblitz.

**Table 1:** Number of Porifera specimens that were collected, and identified during the past year, and number of loans and identification services given.

	Porifera
Specimens added to collection	87
Identified specimens	10
Identification services	12
Loans	2

**Courses and Training:**

Sigal Shefer participated in the course: Environmental genomics, at University of Haifa (Feb. 2015). This course improved her understanding of genomic applications of sponge symbiotic interactions.

**Taxonomic study of the Bryozoa fauna along the Israeli coasts****Noga Sokolover**

The Bryozoa in the Israeli Mediterranean have long been ignored, but now, with the renewal of its study, we detect a major change in the species composition, with almost a quarter of species originating from warm water regions. These findings emphasize the need to continue studying this important phylum.

A manuscript was submitted including full description of 30 Bryozoan species recorded for the first time from Israel, including descriptions of one new genus and species (*Crenulatella levantinensis* gen. et. sp. nov.), a new species (*Licornia vieirai* sp. nov.), and three species that may be new but need to be

further studied (*Electra* sp., *Trematooecia* sp., *Thalamoporella* sp.). In addition, *Conopeum ponticum* is recorded for the first time from the Mediterranean Sea.

A new genus (*Crenulatella*) and two new species (*Crenulatella levantinensis* and *Licornia vieirai*) descriptions were finalized and given names (Submitted paper). A list of non-indigenous species in the region is being prepared (in final stages). Only limited SEM scans of the existing collections has been carried out so far. Free living Bryozoa (collected by SeArc) from sandy bottoms, were identified as belonging to the genus *Cupuladria*. This species was never reported from the Eastern Mediterranean and may be a first record in the Mediterranean (there is only one species of this genus known from the Western Mediterranean). Relevant literature is still being collected to reveal the species name. A species of *Cradoscrupocellaria* has been collected from settlement panels and identified to the genus level. This species is suspected to be a new record in Israel.

Mesophotic sea Bryozoans (100 m) were collected using ROV. The samples were processed for identification and separated to morphological groups, but not yet identified (estimated 10 species).

### **The Echinoderm collection**

#### **Dr. Omri Bronstein**

Accurate assessment of species diversity is essential to nearly all areas of biology: studies of biodiversity, ecology, conservation, and policy-making all necessitate correct species identification. In this context, echinoderms stand out as they are amongst the most conspicuous marine organisms of the benthic community. They are exclusively marine and occur in diverse habitats: from the intertidal down to the bottom of the deep-sea trenches; from sand to coral reefs; and from cold to tropical seas. The echinoderm collection at The

Steinhardt Museum of Natural History and National Research Center is the largest and most comprehensive echinoderm collection in Israel, holding over 2000 records and covering dozens of species collected over more than half a century.

As this was the second year that the Echinodermata collection has been directly and comprehensively studied, priority was still given to the study of the more conspicuous and ecologically significant groups of echinoderms, the Echinoidea and Asteroidea, while field collections and identifications have now been expanded to include all five echinoderm classes (i.e., Echinoidea, Asteroidea, Holothuroidea, Crinoidea and Ophiuroidea).

**The objectives of the year 2015 were therefore:**

- Taxonomic identification of the available museum collection, focusing on regular echinoids, providing a current species list and localities, including a description of the new species and new geographical records.
- Taxonomic identification of the available museum collection, focusing on regular echinoids, including a description of the new species and new geographical records.
- Field surveys and sampling along the Israeli coasts of the Red Sea and Mediterranean Sea from the intertidal to the mesophotic (deep reef), in order to enlarge the current collection - expanding the 2014 sampling to include all Echinoderm classes.
- Incorporation of DNA-based species identification with morphological taxonomic assessments to scrutinise existing echinoderm identifications.
- Prepare an updated check-list of all Echinoderm species along the Israeli coasts including the Red Sea and Mediterranean Sea.
- Create a digital taxonomic identification tool and field guide for Echinoderms from the Israeli waters.
- Complete the taxonomic revision and phytogeographic analysis of the Red Sea genus *Tripneustes*.

## **Progress**

- The first part of the study was dedicated to the preliminary organization of the museum's echinoid collection. From the preliminary examination of this collection several erroneous identifications and many questionable ones have been noted, while some registered specimens have not been located. Based on the scale of the needed re-evaluation, I further focused my efforts on 'regular' sea urchins (that comprise the majority of echinoid specimens in the collection).
- Organisation and classification of the museum's current echinoderm collection. From the preliminary examination of this collection several erroneous identifications and many questionable ones have been noted, while some registered specimens have not been located. Based on the scale of the needed re-evaluation, I further focused my efforts on 'regular' sea urchins (that comprise the majority of echinoid specimens in the collection).
- Field surveys and collections of echinoderms along the Red Sea and Mediterranean coasts of Israel were carried out from the shoreline to the deep mesophotic reef. Surveys were carried out by both regular and technical deep diving to a depth of 60m and assisted by a Remotely Operated Vehicle (ROV) for the greater depths. During the 2015 field surveys and sampling more than 200 new records were added to the collection as follows: 59 echinoids, 32 asteroids, 45 holothuroids, 47 ophiuroids and 22 crinoids.
- The Mediterranean excursions to 100m depth were part of studies conducted at Prof. Ilan's lab and a deep sea survey of the Israeli Nature and Park Authority. The Red Sea 100-150m excursions were performed as part of the Second International Mesophotic Workshop in Eilat. During April 2015 a survey of Mediterranean marine reserves was carried out in collaboration with the Israel's Nature and Park Authority (NPA).



- Further samples have been provided to the echinoderm collection from various locations globally (e.g., Tanzania, Kenya, Hawaii, Jordan and more) as part of active research collaborations (see below).
- Molecular diagnostics have been applied to selected echinoids to facilitate taxonomic evaluations and identification of cryptic species (see also below).
- The reproductive cycle of *Diadema setosum*, one of the most conspicuous and ecologically significant sea urchins along the Israeli Red Sea coast, was studied and described for the first time in the Gulf of Aqaba (*Submitted*).
- Spawning activities of at list 8 species of echinoderms were monitored and recorded between June and August 2015. This data is being prepared for publication for selected species and a comprehensive work plan for the spawning season of summer 2016 is being developed.
- A study focusing of the taxonomic, phylogenetic and fossil aspects of the Red Sea *Tripneustes* sea urchin has been submitted for publication in Molecular Phylogenetics and Evolution journal.
- Participate in field surveys and provide echinoderm identification as part of the “Bioblitz” initiative, a joint monitoring programs of the Mediterranean marine reserves lead by Israel Nature and Parks Authority.

#### **Active collaborations**

- Participate in field surveys and provide echinoderm identification as part of the “Bioblitz” initiative, a joint monitoring programs of the Mediterranean marine reserves lead by Israel Nature and Parks Authority.
- **Re-evaluating the status of Red Sea *Tripneustes gratilla* (Linnaeus 1758).** This collaboration between Dr. Bronstein (Steinhardt Museum), Dr. Kroh and Dr. Haring (Natural History Museum Vienna) is a revision of the taxonomic assessments of *T. gratilla* from the northern Red Sea and Gulf of Aqaba. We utilised both morphological comparisons and molecular diagnostic tools in order to evaluate both historical and newly collected material from the Gulf of Aqaba, Red Sea, and Western Indian Ocean. This allowed the first assessment of the biogeographic relations between

*Tripneustes* of the two former regions and the rest of this genus's global distribution (*manuscript in prep.*). During the first stage of this project and relying on our first stage results this project was expanded to a complete revision and a global scale phylogeography of the genus *Tripneustes*. Due to the scope of this expansion we have established new collaborations with several international partners including: The Florida Museum of Natural History (FLMNH), The University of Queensland (UQ), California Academy of Sciences (CAS) and Muséum National d'Histoire Naturelle (MNHN). Manuscript submitted for publication in the journal *Molecular Phylogenetics and Evolution*.

- **The *Acanthaster planci* species complex: taxonomic and molecular evaluation.** This project, in collaboration with Dr. Gerhard Haszprunar from the Bavarian Natural History Collections aims to assert the existence of at least four species of the crown of thorns starfish based on molecular diagnostics and morphological character analyses- taxonomic evaluation of newly collected material from Eilat (Israel) and Aqaba (Jordan) is in progress.
- **Taxonomic re-evaluation of the Red Sea *Fromia ghardaqana*.** This project, in collaboration with Dr. David Lane from the University of Brunei, aims to re-evaluate the taxonomic status of this supposedly endemic Red Sea asteroid. New material has been collected and molecular diagnostics have been completed.
- **Deciphering starfish nervous system using Magnetic Resonance Imaging (MRI).** This project is a collaboration with Dr. Yaniv Assaf head of Neurobiology Dept. at Tel Aviv University. The radial nervous system of echinoderms is still considered an enigma with very few insights on the arrangement and function of this unique system. Our aim is to provide first insights on how this unique neural system is organised and how it functions, utilising state of the art MRI technology.

- **Develop new tools for digitised photo analysis of histological images.** A collaboration with Eng. Barak Kashi from the faculty of engineering at Tel Aviv University. We aim to develop automated procedures for analysing digital images of histological sections. We focus on developing algorithms for image segmentation, delineation and automated measurements.

### **The Crustacean collection**

#### **Ya'arit Levitt**

The subphylum Crustacea (phylum: Arthropoda) is the only large group of arthropods that is primarily aquatic, with more than 50,000 described species. Most crustaceans inhabit marine, freshwater, and terrestrial environments all over the world, and some species may even be found in extreme environmental conditions of temperature, pressure, and salinity. Crustaceans have a significant economic and ecological value, and they are considered as an important food source to human and marine animals. Since the beginning of my PhD studies on October 2013 on the infraorder Caridea, I have invested much effort in collecting specimens along the coasts of Israel, both Mediterranean and Red Sea and in the reorganization of this group in the collections. During October 2013-November 2015, approximately 100 caridean specimens were added to the collection from the Mediterranean and Red Sea coasts of Israel and from the northern Jordan Valley water system.

During a scientific survey in 2012 along the Mediterranean coast of Israel some specimens have been found as a new alien genus to the Mediterranean Sea from the Indo-pacific Ocean (Levitt et al. 2014).

More than 6000 specimens of Crustacean were computerized, within them approximately 400 new specimens were added to the collection during the last three years. Some of the new materials were contributed by Prof. Yair Achituv from the Biology Department, Bar-Ilan University, from The Israel

Oceanographic and Limnological Research (IOLR), and Beit Ussishkin Museum.

The entire Crustacea collection has been reorganized, and unidentified specimens are being taxonomically studied.

**Algae Collection - Systematic revision of the Galaxauraceae (Nemaliales, Rhodophyta)**  
**Razy Hoffman**

Nearly 50 days of algal surveys, financed by the Israel Taxonomy Initiative, took place along the Mediterranean coast of Israel and the gulf of Eilat. These surveys mainly focused on species of the Galaxauraceae and alien seaweeds. The low subtidal was also scanned in order to detect seagrass beds of *Halophila stipulacea* (alien) and *Cymodocea nodosa* (native species). The national algal and seagrasses collection at TAU was upgraded by the addition of over 1,000 Herbarium specimens! Surveys revealed more than 10 new alien seaweed species and one new crab (*Paracaprella pusilla*) from the eastern basin of the Mediterranean most of them are first record from the Mediterranean and one new to the Red Sea as well as dozens of Mediterranean seaweeds that have never been documented in the Levant shore of Israel before. Seaweeds collected during the Bio-blitz surveys formed by Israel Nature and Parks Authority were identified and listed for publication in their reports.

**Tasks in progress and future plans for 2015-16:**

- During surveys conducted in summer 2014, a new species of the Genus *Padina* was found. A paper representing the genus *Padina* in the Levant shore of Israel and describing *Padina israelica* sp. nov. is in preparation. This paper, (Hoffman, R. et al. Morphological and Molecular study of the Genus *Padina* (Dictyotales, Phaeophyceae) of the Levant Mediterranean coast of Israel with the presentation of *Padina israelica* sp. nov.), is prepared according to the instructions of European Journal of Phycology,

represents four species of the genus by means of morphological and molecular tools. This article is expected to be submitted for publication at the beginning of 2016.

- The fact that not even a single seagrass bed of *Cymodocea nodosa* was found during the surveys is worrisome; however, specimens *were* found and collected from numerous new sites! Moreover, surveys conducted in the last winter revealed the first record of the alien seagrass *Halophila stipulacea* from the Israeli Mediterranean. A short communication indicating this record will be submitted soon in order to be published in the collective article of the Journal *Mediterranean Marine Science*, to be published in December 2015 (see papers in preparation listed in my CV for more details).
- Many new alien algal species were found during the surveys conducted in 2014-15. Therefore, two new papers representing four new species of green species and three Rhodophyta species are in preparation (see papers in preparation listed in my CV for more details). These species are first records in the Mediterranean Sea.
- The molecular-bioinformatics studies concerning the investigation of the source and population genetics of *G. rugosa* along the Israeli Mediterranean coast and the identification of the genetic mechanism of invasiveness of this species (i.e., the specific genomic region or genes that are responsible for the facilitation of invasion) by using the NGS technique was delayed to 2016 and depends on the collection of more specimens of this species from the Indo Pacific origin by the Taiwanese supervisor.
- Algal and seagrasses surveys as well as the maintenance of the collection of TAU will continue until the end of the present Post-Doctoral study.
- Algae growing in the ports of Israel will be collected and identified, during long survey, as part of consultation service given by the Steinhardt Museum of Natural History and National Research Center to Israel Ports Development & Assets Company.

## **Bio-history and Evolutionary Medicine Laboratory**

**Hila May**

The Laboratory is an inter-disciplinary laboratory focusing on two major topics: evolutionary history of anatomical systems and their impact on current populations' health, and reconstruction of ancient populations' daily life, based on their skeletal remains, with emphasis on the interaction between genetic and socio-cultural factors.

During 2015, several research projects, based on the anthropological collection, were carried out in my laboratory. In addition, collaboration with laboratories from foreign universities, based on the anthropological collection, commenced. Moreover, several original papers and abstracts (active participation in conferences) were published.

### **Research activity based on the anthropological collection:**

During 2015 the following projects, which are based on the anthropological collection, were carried out in my laboratory:

- Inflammatory ear disease (otitis media) in the Neolithic: From cave dwelling to constructed houses. The aims of this study are to establish a reliable and valid way to identify otitis media in skeletal remains and to reveal how changing climate, type of habitation, and settlement density affected the prevalence of this pathology in past populations (e.g., Natufian hunter-gatherers, Neolithic early farmers and Chalcolithic farmers). This study is carried out by a Post-Doctoral fellow, Dr. Fluernova, since March 2015. The first six months of Dr. Fluernova's scholarship were funded partially by the VATAT.
- Physical burden and lower limb bone morphology at the origins of agriculture in the Levant. The aim of this study is to reveal the influence of the transition from hunting-gathering to farming economics on the physical burden and daily life activities of the people that were part of the transition. This quest is examined from various aspects (e.g. biomechanical analysis,

3D curvature analysis and 3D shape analysis of the femur), by an MSc student and a PhD candidate.

- Subsistence transition and mandibular morphology. The aim of this study is to examine the differences in diet consistency and food preparation techniques in pre- and post- agricultural revolution populations in the southern Levant based on mandibular characteristics and three-dimensional shape analysis. This study is carried out by a technician and a research fellow.

**Collaborations based on the anthropological collection:**

Several projects based on the anthropological collections are carried out in collaboration with laboratories from foreign universities:

- The origin of the Chalcolithic population from the southern Levant in collaboration with Prof. David Reich, Department of Genetics, Harvard Medical School, USA.
- The origin of the Natufian and Neolithic populations from the southern Levant, in collaboration with Dr. Johannes Krause, Max Planck Institute for the Science of Human History, Jena, Germany.
- Subsistence transition and mandibular morphology in collaboration with Dr. Kornelius Kupczik, Max Planck Weizmann Center for Integrative Archaeology and Anthropology, Leipzig, Germany.

**Activities Related To The Botanical Collection**

**Dafna Langgut**

All the research in the Laboratory of Archaeobotany and Ancient Environments (Institute of Archaeology, TAU) is botanical collection based. The different references collections available in the lab are mainly focusing on the Israeli flora and include the followings:

- Pollen and Spores Collection (a reference collection)
- Wood Collection (a reference collection)

- Charcoal Collection (a reference collection)
- Archaeobotanical collection (finds from archaeological excavations)

**Actions related to the reference collections that have been undertaken during the past year:**

- We collected new samples for the three reference collections, mainly from Tel Aviv Botanical Gardens (with the corporation of Y. Sapir). Additionally, on March 2015 we conducted a field trip to the Negev Highlands in order to collect desert plants for the reference collections.
- We received and digitized the archaeobotanical collections of Uri Baruch from the Israel Antiquity Authorities.
- We lent part of our archaeobotanical collection to the use of the D-REAMS Radiocarbon Dating Laboratory of the Weizmann Institute-Max Planck Center for Integrative Archaeology (Dr. Lior Regev) and to Cornell Tree-Ring Laboratory (Prof. Sturt W. Manning and Dr. Brita Lorentzen).
- Identification of botanical remains for the Israel Antiquity Authority (City of David: three charcoal assemblages from different excavations, and palynological investigation in Henion Givati).

**Participation in archaeological excavations in order to collect samples for research purposes:**

- Timna – Southern Arava (February, 2015); Ein Ziq – Negev Hills (March, 2015); Haroaa rock-shelters (March, 2015); City of David – Jerusalem (June, 2015); Kabri (June, 2015); Manot Cave (July, 2015); Herodium (July, 2015); Tel Azekah (July-August, 2015).

**Ancient DNA**  
**Meirav Meiri**

This year I mainly worked on two main projects; one which studies the mobility and societal change in the eastern Mediterranean in the Late Bronze and Early Iron Ages, and the second, which studies the resilience and collapse on early Christian development of the Negev Desert. The two projects are very different



from one another in many ways (periods, species, materials, extraction methods, etc.), but both are based on archaeological collections and the main aim is similar: to detect genetic changes through time and space by comparing the obtained results to modern and ancient DNA already published from the surrounding regions.

#### Mobility and societal change in the eastern Mediterranean in the Late Bronze and Early Iron Ages

In this project, we are mainly working on humans and domestic animals (pigs and cattle) from Tiryns, Greece and Megiddo, Israel.

*Ancient Humans.* We sent ten human bones from Megiddo and a few bones from other sites in Israel for Next Generation sequencing using capture mitochondrial DNA techniques (e.g. Meyer & Kircher 2010), to Prof. David Reich in Harvard University. Prof. David Reich is one of the leading ancient human DNA researchers in the world. Unfortunately, none of the samples that we sent abroad yielded DNA. In the next batch, we are planning to send petrous bones, since a recent paper (Gamba et al. 2014) showed that this bone gives consistently excellent endogenous DNA yields.

*Ancient pigs.* I extracted DNA from 23 pig samples from Tiryns, Greece according to a method modified from Yang et al. 1998. I amplified small part (155 bp) of the mitochondrial DNA using two fragments. The first one was 74 bp and corresponds to Larson et al. 2007 ANC1 region. The second corresponds to the 3' end of the fragment amplified for the modern samples, and was 79 bp. Seven out of 23 samples yielded DNA. Surprisingly, I identified a unique Near Eastern Haplotype among the pig samples in Late Bronze Age Greece. This Near Eastern haplotype is found in Anatolia, but not in Israel. The results indicate connections between Anatolia and areas to its west in the Late Bronze. However, there is a need for further samples from multiple sites to strength this result.

*Ancient Cattles.* I extracted DNA from 40 cattle samples from Tiryns, Greece, and 31 samples from Megiddo, Israel according to a method modified from Yang et al.1998. I followed Troy *et al.* 2001 and Bollongino *et al.* 2012 and amplified small part of the mitochondrial DNA using two to three fragments (ca. 300bp) depending on the preservation of the samples. Preliminary results show that out of the 40 cattle samples from Tiryns, eight yielded DNA and, out of 31 samples from Megiddo, five yielded DNA. While in Tiryns I found haplotypes that are more common in Europe (T and T3) (Troy et al. 2001), in Megiddo I mainly found a haplotype that is more frequent in Africa (T1) (Troy et al. 2001). The results imply that in contrast to the pigs we see no mobility in the cattle in Late Bronze Age.

#### Resilience and collapse on early Christian development of the Negev Desert

I have extracted DNA from several grape seeds from three excavation sites in the Negev: Haluza, Kesifa and Shivta. The DNA extraction was according to the protocol in Wales et al. 2014. The grape extracts were then screened with microsatellite marker to assess for DNA survival. Unfortunately, I couldn't succeed in extracting DNA from any of the seed samples. I am planning to screen more samples for DNA, and to look through the extraction method, to see if I can adjust it to our badly preserved material.

Beside the genetic work, I was also involved in submitting a large grant to Yad Hanadiv. The grant was for establishing a leading multidisciplinary lab for the study of DNA of past populations in the Steinhardt Museum of Natural History and Israel National Center for Biodiversity Studies, at Tel Aviv University.

## **Laboratory of Archaeozoology**

### **Lidar Sapir-Hen**

During the last year I was engaged in research and published papers in scientific journals, supervised MA students and taught courses, participated in international conferences and in archaeological excavations.

- Advising three MA students, one of them submitted her thesis and will continue to PhD studies in my laboratory. The students' work is based on assemblages from archaeological sites dated from the Bronze Age to the Early Roman period, and relies on the mammals comparative collections of the museum.
- Teaching: Animal remains in archaeology: Human-animal-environmental interactions. BA and MA students. Ben-Gurion University in the Negev (BGU).
- Teaching includes frontal lectures and practical workshop based on recent mammal collections and archaeological assemblages.
- Active participation in three international conferences (San Diego, Groningen, Berlin).
- Active participation in archaeological excavations: Timna (February 2015), Tel Azekah (July-August 2015).
- Participation includes advising site directors on finds retrieval methods, and lectures to students in field school using comparative collections.
- Carrying out research on archaeological assemblages of TAU and Israel Antiquities Authority (IAA), relying on the mammalian and avian collections: Middle and Late Bronze Megiddo, Iron Age Moza, Late Bronze and Iron Age Timna, Late Bronze Azekah, Byzantine Nof-Yam, Late Roman City of David, Persian Kh. Hermas.
- Scholars hosted in the lab and using the collections, June-August 2015: Dr. Natalie Munro, University of Connecticut.

## **Archaeomalacology**

**Daniella E. Bar-Yosef Mayer**

The past academic year was dedicated to several activities that relied on research in the malacological collections, based at the Natural History Collections, Tel Aviv University. Archaeo-malacological shell assemblages of sites in Israel continued, with special emphasis on the following: Manot Cave (directed by Ofer Marder of Ben Gurion University, Omry Barzilai of the IAA, and Israel Hershkovitz of Tel Aviv University), and Tell Bet Yerah (directed by Rafi Greenberg and Sarit Paz of Tel Aviv University) and a re-analysis of the shells from Kebara Cave, studied in the 1990's. Both Manot and Kebara Caves were occupied during the Upper Palaeolithic period, 40-30,000 years ago. Specifically at Kebara Age a Red Sea shell was discovered for the first time in any Palaeolithic site in Israel. In February 2015 I travelled to Morocco to study shells from the Middle Stone Age Cave site of Taforalt.

The cataloguing of the palaeontological collections of the museum began in an intensive way in January 2014 with emphasis on fossil molluscs and in particular ammonites.

## **Progress Report for the Paleontological Collection**

**Olga Orlov-Labkovsky, Daniella E. Bar-Yosef and Henk K. Mienis**

### **Fossil Foraminifera (Olga Orlov-Labkovsky)**

During the past academic year Olga continued to work on:

1. The preparation of the fossil material present in the Paleontological collection;
2. The organization of a Database for fossils;
3. The description of taxa and the detailed documentation of taxonomic lineages.

I continued to work on the collections of foraminifera (thin-sections or slides) of the Carboniferous system (Upper Paleozoic) in the Central and South Tien-Shan (Central Asia, Uzbekistan and Kazakhstan).

In addition I prepared the slide collection of the Fusulinida (originals and type-species) of the Moscovian Stage (Upper Moscovian, part 2) of the Carboniferous system of South Tien-Shan (Takhtatau Mountain, Central Kyzylkum and Dzhilginsai Gorge, Karachaty Range, South Ferghana).

During the past academic year, I prepared and published the “Atlas of Foraminifers of the Carboniferous and Permian (Cisuralian) of Uzbekistan and adjacent regions, Tien Shan”.

The Atlas summarizes known and new data on the foraminifera and stratigraphy. The work consists of several parts. The stratigraphic section briefly reviews the history of study of the Carboniferous and Lower Permian deposits and provides descriptions of main sections, on which the foraminiferal zonation of this interval in the Middle and Southern Tien Shan is based and which have yielded foraminifera shown on the paleontological plates of the Atlas. Our studies have resulted in a significant augmentation and amendment of zonal foraminiferal assemblages for all fine-scale divisions of the Carboniferous and lower part of the Permian, as well as in their taxonomic reassessment according to modern views. Based on the material, the stratigraphic distribution of fusulinoids transition during the Carboniferous/Permian boundary has been analysed in detail, and the boundary itself is drawn provisionally below the GSSP level.

The paleontological section contains descriptions of 109 species and subspecies of Foraminifera belonging to ten families representing three orders, viz. Ozawainellida, Fusulinida and Schwagerinida. A new genus, *Bogushinella* Bensch & O. Orlova, in the family Fusulinellidae and a new species have been described.

The Atlas includes 89 plates arranged in a stratigraphic order of all the Foraminiferal Zones and Regional Substages of the Serpukhovian, Bashkirian, Moscovian, Kasimovian and Gzhelian stages of the Carboniferous and the Asselian and Sakmarian stages of the Permian. The Atlas illustrates 1449 specimens belonging to 34 families, 113 genera and subgenera, and 639 species of foraminifera. The Atlas was published by the publishing house Pensoft (Sofia – Moscow).

I took part in XVIII International Congress on the Carboniferous and Permian, held in Kazan, Russia, August 11-15, 2015.

**Computerization of the Paleontological collection of Bytinski-Salz (Daniella Bar-Yosef)**

The Bytinski-Salz collection is now being computerized. Most fossil molluscs collected in Israel are now included in the database and currently the ammonites, mostly collected in Europe, are being catalogued. To date there are about 1150 records of fossil molluscs.

**Quaternary Molluscs (Henk K. Mienis)**

As part of my work in the Mollusc collection I am occasionally working on fossil molluscs mostly of Pleistocene and Holocene age.

1. With the help of Mrs. Svetlana Vaisman (PPIS, Bet Dagan) numerous samples of Quaternary land and freshwater molluscs from the former Kabara Swamps in the Nahal Tanninim basin collected by Sharon Dishon in 1988-1989 were added to the Paleontological collection.
2. Svetlana Vaisman worked also on the Holocene molluscs of the Mamluk pond near the Crusader dam in En Afeq.
3. Some additional fossil marine molluscs of Eemian age found on the North Sea beach of Terschelling collected in September 2015 were added to the collection.

4. Some fossil molluscs of Plio-Pleistocene age present in the former Derek A. Visker collection found in the Netherlands and Belgium were revised and catalogued.

### **New Acquisitions**

During the past academic year again some fossil material arrived to the Paleontological collection for permanent storage.

<u>Name</u>	<u>Brief description of the material</u>
M. Agren	Fossil land snails from Morocco and Western Sahara
S. Dishon	Quaternary molluscs from Nahal Tanninim
H.K. Mienis	Eemian molluscs from Terschelling, the Netherlands and various fossils from Israel
R. Ortal	Holocene molluscs from the Mamluk pond near the Crusader dam of En Afeq
O. Rittner	Fossil molluscs from the Arava Valley, Israel

### **The Paleontological library**

- Ivanova, R.M., 2008. Fusulinids and algae of the Urals Middle Carboniferous (zonal stratigraphy, paleobiogeography, paleontology). 204 pp. Ekaterinburg. (in Russian)
- Kim, A.I., Salimova, F.A., Abduasimova, I.M. & Meshchankina, N.A. (Eds.), 2007. Palaeontological Atlas of Phanerozoic faunas and floras of Uzbekistan. Volume II Mesozoic and Cenozoic (Jurassic, Cretaceous, Palaeogene). 261 pp. Tashkent.
- Kim, A.I., Salimova, F.A., Kim, I.A. & Meshchankina, N.A. (Eds.), 2007. Palaeontological Atlas of Phanerozoic faunas and floras of Uzbekistan. Volume I (Cambrian, Ordovician, Silurian, Devonian Carboniferous, Permian). 707 pp. Tashkent.
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- Makhlina, M.Kh., Alekseev, A.S., Goreva, N.V. *et al.*, 2001. Middle Carboniferous of Moscow Syncline (southern part), Volume 2. Biostratigraphy. 328 pp. Scientific World, Moscow. (in Russian)
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- Puchkov, V.N., Kulagina, E.I., Nikolaeva, S.V. & Kochetova, N.N. (Eds.), 2009. Carboniferous Type Sections in Russia and Potential Global Stratotypes: Proceedings of the International Field Meeting "The historical type sections, proposed and potential GSSP of the Carboniferous in Russia". Southern Urals Session. Ufa-Sibai, 13-18 August, 2009. 240 pp. Design Polygraph Service Ltd., Ufa. (in Russian)

**Catalogue of the Foraminifera Collection (slides and figures), 2.**  
**Carboniferous, Moscovian Stage – Upper Moscovian**  
**Olga Orlov-Labkovsky**

**Foraminiferal Zone - *Kamaina kamensis* (Akterekian Substage)**

1. **FR0072.1 *Ozawainella vozhgatica* Safonova:** 660/1.1, axial section, x 40, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 38/1**
2. **FR0072.2 *Ozawainella vozhgatica* Safonova:** 660/1.2, paraxial section, x 40, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 38/2.**
3. **FR0072.3 *Neostaffella ex gr. sphaeroidea* (Ehrenberg):** 660-1, axial section, x 35, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 38/9.**
4. **FR0073. *Neostaffella aff. umbilicata* (Putrja & Leontovich):** 0-53-14, axial section, x 35, Takhtatau Mountain, Central Kyzylkum. **Pl. 38/3.**
5. **FR0074. *Neostaffella aff. umbilicata* (Putrja & Leontovich):** 0-53-9, axial section, x 35, Takhtatau Mountain, Central Kyzylkum. **Pl. 38/4**
6. **FR0075. *Neostaffella cf. syzranica* (Rauser & Safonova):** 669-9, nearly axial section, x 35, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 38/5.**
7. **FR0076. *Neostaffella cf. syzranica* (Rauser & Safonova):** 0-50-2(9), nearly axial section, x 35, Takhtatau Mountain, Central Kyzylkum. **Pl. 38/6.**
8. **FR0077. *Neostaffella sphaeroidea* (Ehrenberg):** 660-2, axial section, x 35, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 38/7.**
9. **FR0078. *Neostaffella sphaeroidea* (Ehrenberg):** 0-54-5(12), nearly axial section, x 35, Takhtatau Mountain, Central Kyzylkum. **Pl. 38/8.**
10. **FR0079. *Neostaffella ex gr. sphaeroidea* (Ehrenberg):** 0-50-7(11), nearly section, x 35, Takhtatau Mountain, Central Kyzylkum. **Pl. 38/10.**
11. **FR0080. *Neostaffella ex gr. sphaeroidea* (Ehrenberg):** 0-50-5 (14), nearly axial section, x 40, Takhtatau Mountain, Central Kyzylkum. **Pl. 38/11.**
12. **FR0081. *Neostaffella sp.*:** 0-53-3 (13), axial section, x 40, Takhtatau Mountain, Central Kyzylkum. **Pl. 38/12.**
13. **FR0082. *Fusiella praecursor praecursor* Rauser:** 880-14, axial section, x40, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 38/13.**
14. **FR0083. *Fusiella praecursor praecursor* Rauser:** 0-45-11 (16), axial section, x 40, Takhtatau Mountain, Central Kyzylkum. **Pl. 38/14.**
15. **FR0084.1. *Fusiella praecursor paraventricosa* Rauser:** 0-45-1(10), nearly axial section, x 40, Takhtatau Mountain, Central Kyzylkum. **Pl. 38/15.**
16. **FR0084.2. *Fusulinella cf. vozhgaticensis* Safonova:** 0-45-1, nearly paraxial section, x 20, Takhtatau Mountain, Central Kyzylkum. **Pl. 39/6.**
17. **FR0085. *Fusiella praecursor paraventricosa* Rauser:** 0-45-4(15), nearly axial section, x 40, Takhtatau Mountain, Central Kyzylkum. **Pl. 38/16.**
18. **FR0086. *Moellerites paracolaniae* (Safonova):** 662-4, axial section x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 39/1.**
19. **FR0087. *Moellerites paracolaniae* (Safonova):** 0-45-9, paraxial section, x20, Takhtatau Mountain, Central Kyzylkum. **Pl. 39/2.**



20. **FR0088. *Moellerites cf. paracolaniae* (Safonova):** 0-45-3, paraxial section, x 20, Takhtatau Mountain, Central Kyzylkum. **Pl. 39/3.**
21. **FR0089. *Fusulinella vozhgalensis* Safonova:** 0-45-5, paraxial section, x 20, Takhtatau Mountain, Central Kyzylkum. **Pl. 39/4.**
22. **FR0090. *Fusulinella vozhgalensis* Safonova:** 0-45-6, axial section, x 20, Takhtatau Mountain, Central Kyzylkum. **Pl. 39/5.**
23. **FR0091. *Fusulinella ex gr. vozhgalensis devexa* Rauser:** 0-45-10, nearly paraxial section, x 20, Takhtatau Mountain, Central Kyzylkum. **Pl. 39/7.**
24. **FR0092. *Fusulinella praebocki* Rauser:** 0-53-7, nearly axial section, x 20, Takhtatau Mountain, Central Kyzylkum. **Pl. 39/8.**
25. **FR0093. *Fusulinella bocki bocki* Moeller:** MK 121-6-2, nearly axial section, x 20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 39/9.**
26. **FR0094. *Fusulinella bocki primitiva* O.Orlova:** 0-59-2; tangential section, x20, Takhtatau Mountain, Central Kyzylkum. **Pl. 39/10.**
27. **FR0095. *Fusulinella bocki primitiva* O.Orlova:** 0-59-1, axial section holotype, x 20, Takhtatau Mountain, Central Kyzylkum. **Pl. 39/11.**
28. **FR0096. *Beedeina pseudoelegans* (Chernova):** 0-43, axial section, x20, Takhtatau Mountain, Central Kyzylkum. **Pl. 39/12.**
29. **FR0097. *Beedeina pseudoelegans* (Chernova):** 880-4, axial section, x 20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 39/13.**
30. **FR0098. *Beedeina aff. elegans* Rauser:** 669-3, nearly axial section, x 20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 39/14.**
31. **FR0099. *Beedeina aff. elegans* Rauser:** 669-6, nearly paraxial section, x 20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 40/1.**
32. **FR00100. *Kamaina kamensis* (Safonova):** 0-45-8, axial section, x20, Takhtatau Mountain, Central Kyzylkum. **Pl. 40/2.**
33. **FR00101. *Kamaina chernovi* (Safonova):** 0-45-7, axial section, x20, Takhtatau Mountain, Central Kyzylkum. **Pl. 40/3.**
34. **FR00102.1. *Kamaina* sp.:** 876-4a, tangential section, x 20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 40/4.**
35. **FR00102.2. *Kamaina* sp.:** 876-4b, tangential section, x 20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 40/5.**
36. **FR00103. *Hemifusulina vozhgalica* Safonova:** 0-38-4, axial section, x 25, Takhtatau Mountain, Central Kyzylkum. **Pl. 40/6.**
37. **FR00104. *Hemifusulina vozhgalica* Safonova:** 0-36-3, axial section, x 25, Takhtatau Mountain, Central Kyzylkum. **Pl. 40/7.**
38. **FR00105.1. *Hemifusulina bassaensis* Rumyantseva:** 0-38-1a, axial section, x 25, Takhtatau Mountain, Central Kyzylkum. **Pl. 40/8.**
39. **FR00105.2. *Hemifusulina rhombiformis* O.Orlova:** 0-38-1b, axial section, x 25, Takhtatau Mountain, Central Kyzylkum. **Pl. 40/13.**
40. **FR00106. *Hemifusulina ex gr. rhombiformis* O.Orlova:** 0-18-3, axial section, x 25, Takhtatau Mountain, Central Kyzylkum. **Pl. 40/9.**
41. **FR00107. *Hemifusulina ex gr. rhombiformis* O.Orlova:** 0-38-2, axial section, x 25, Takhtatau Mountain, Central Kyzylkum. **Pl. 40/10.**

42. **FR00108.** *Hemifusulina ex gr. rhombiformis* **O.Orlova**: 0-18-4, nearly axial section, x 25, Takhtatau Mountain, Central Kyzylkum. **Pl. 40/11.**
43. **FR00109.** *Hemifusulina rhombiformis* **O.Orlova**: 0-38-3, axial section holotype, x 25 Takhtatau Mountain, Central Kyzylkum. **Pl. 40/12.**
44. **FR00110.** *Hemifusulina sp.*: 0-36-7, axial section, x 25, Takhtatau Mountain, Central Kyzylkum. **Pl. 40/14.**
- Foraminiferal Zone *Fusulina schwagerinoides* (Schunkmazarian Substage)**
45. **FR00111.1.** *Ozawainella ex gr. mosquensis* **Rauser**: 1750-1, axial section, x45, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 41/1**
46. **FR00111.2.** *Ozawainella ex gr. mosquensis* **Rauser**: 1750-1, axial section, x45, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 41/2.**
47. **FR00112.** *Ozawainella ex gr. mosquensis* **Rauser**: 772, tangential section, x45, *ibid*; 3 – 5698-5, nearly axial section, x35, River Bekechal, left bank of River Naryn. **Pl. 41/3.**
48. **FR00113.** *Ozawainella mosquensis* **Rauser**: 5698-1, axial section, x35, River Bekechal, left bank of River Naryn. **Pl. 41/4.**
49. **FR00114.** *Ozawainella mosquensis* **Rauser**: 5693-13, axial section, x35, River Bekechal, left bank of River Naryn. **Pl. 41/5.**
50. **FR00115.** *Neostaffella aff. umbilicata* (**Putrja & Leontovich**): 5692-4, nearly axial section, x35, River Bekechal, left bank of River Naryn. **Pl. 41/6.**
51. **FR00116.** *Neostaffella ex gr. larionovae* (**Rauser & Safonova**): 5698-10, nearly axial section, x35, River Bekechal, left bank of River Naryn. **Pl. 41/7.**
52. **FR00117.** *Neostaffella ex gr. larionovae* (**Rauser & Safonova**): 5693-10, nearly axial section, x35, River Bekechal, left bank of River Naryn. **Pl. 41/8.**
53. **FR00118.** *Neostaffella ex gr. syzranica* (**Rauser & Safonova**): 5698-4, nearly axial section, x35, River Bekechal, left bank of River Naryn. **Pl. 41/9.**
54. **FR00119.** *Fusiella ex gr. typical* **Lee & Chen**: MK-135-3-1, axial section, x45, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 41/10.**
55. **FR00120.1.** *Fusiella ex gr. typical* **Lee & Chen**: 5697-2.1, axial section, x45, River Bekechal, left bank of River Naryn. **Pl. 41/11.**
56. **FR00121.1.** *Fusulinella vohzgalensis* **Safonova**: 769a, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 41/12.**
57. **FR00122.** *Fusulinella vohzgalensis* **Safonova**: 5691-5, axial section, x20, River Bekechal, River Naryn. **Pl. 41/13.**
58. **FR00123.** *Fusulinella bocki bocki* **Moeller**: 692-5, nearly axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 41/14.**
59. **FR00124.** *Fusulinella ex gr. bocki* **Moeller**: 142-3-8, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 41/15.**
60. **FR00125.** *Fusulinella pseudobocki* **Lee & Chen**: 761-12, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 41/16.**
61. **FR00126.** *Fusulinella pseudobocki* **Lee & Chen**: 761-18, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 41/17.**
62. **FR00127.** *Fusulinella mosquensis* **Rauser & Safonova**: 761-3, paraxial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 41/18.**

63. **FR00128.** *Fusulinella mosquensis* Rauser & Safonova *forma minima*: 769-24, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 41/19.**
64. **FR00129.** *Fusulinella mosquensis* Rauser & Safonova *forma minima*: 769-18, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 41/20.**
65. **FR00130.** *Fusulinella rara* Schlykova: 761-14, paraxial section, x 20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 41/21.**
66. **FR00131.** *Fusulinella rara* Schlykova: 769-8, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 41/22.**
67. **FR00132.** *Fusulinella schwagerinoides* Deprat: 692-11, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 42/1.**
68. **FR00133.** *Fusulinella schwagerinoides* Deprat: 142-3-9, paraxial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 42/2.**
69. **FR00134.** *Fusulinella schwagerinoides* Deprat: MK 135-1-10, paraxial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 42/3.**
70. **FR00135.** *Fusulinella adjuncta* Schlykova: 769-9, paraxial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 42/4.**
71. **FR00136.** *Fusulinella adjuncta* Schlykova: 769-10, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 42/5.**
72. **FR00137.** *Fusulinella ex gr. schwagerinoides* Deprat: 698-5, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 42/6.**
73. **FR00138.** *Fusulinella ex gr. schwagerinoides* Deprat: 692-8, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 42/7.**
74. **FR00139.** *Bogushinella altispiralis* (Bogush): 5763, axial section, x20, River Bekechal, left bank of River Naryn. **Pl. 42/8.**
75. **FR00140.** *Bogushinella altispiralis* (Bogush): 5697-11, paraxial section, x20, River Bekechal, left bank of River Naryn. **Pl. 42/9.**
76. **FR00141.1.** *Bogushinella curtissima* (Bogush): MK 135-1-14.1, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 42/10.**
77. **FR00142.** *Bogushinella curtissima* (Bogush): 692-9, paraxial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 42/11.**
78. **FR00143.** *Bogushinella kaledae* (Bogush): 692-6, near axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 42/12.**
79. **FR00144.** *Bogushinella sybcylindrica* (Bogush): 769-12, paraxial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 42/13.**
80. **FR00145.** *Bogushinella sybcylindrica* (Bogush): 761-17, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 42/14.**
81. **FR00146.** *Bogushinella sybcylindrica* (Bogush): 761-20, paraxial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 42/15.**
82. **FR00141.2.** *Bogushinella longiaxialis* (Bogush): MK 135-1-14.2, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 43/1.**
83. **FR00147.** *Bogushinella aff. fluxa* (Bogush): MK 135-1-11, paraxial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 43/2.**

84. **FR00148. *Bogushinella aff. fluxa* (Bogush):** 5696-5, paraxial section, x20, River Bekechal, left bank of River Naryn. **Pl. 43/3.**
85. **FR00149.1. *Hemifusulina truncatula* Rauser:** MK 135-4-3.1, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 43/4.**
86. **FR00149.2. *Hemifusulina graciosa* Lee:** MK-135-4-3.2, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 43/5.**
87. **FR00150.1 *Hemifusulina aff. graciosa* Lee:** 0-1b-1, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 43/6.**
88. **FR00150.2. *Hemifusulina aff. graciosa* Lee:** 0-1b.2, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 43/7.**
89. **FR00151. *Hemifusulina fusiformis* Kireeva:** MK 135-4-2, axial section x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 43/ 8.**
90. **FR00152. *Hemifusulina bocki* Moeller:** MK 135-4-1, nearly axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 43/9.**
91. **FR00153. *Hemifusulina aff. elegantula* Rauser:** 0-1b-3, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 43/10.**
92. **FR00154. *Beedeina paradistenta* (Safonova):** 5681-2, axial section, x20, River Bekechal, left bank of River Naryn. **Pl. 43/11.**
93. **FR00155. *Beedeina paradistenta* (Safonova):** 5682-8, tangential section, x20, River Bekechal, left bank of River Naryn. **Pl. 43/12.**
94. **FR00120.2 *Beedeina paradistenta* (Safonova):** 5681-7, nearly axial section, x20, River Bekechal, left bank of River Naryn. **Pl. 43/13.**
95. **FR00156. *Beedeina paradistenta* (Safonova):** 5697-2.1, nearly tangential section, x20, River Bekechal, left bank of River Naryn. **Pl. 43/14.**
96. **FR00157. *Beedeina ex gr. elegans* (Rauser & Beljaev):** 5681-1, tangential section, x20, River Bekechal, left bank of River Naryn. **Pl. 43/15.**
97. **FR00158. *Beedeina aff. elegans* (Rauser & Beljaev):** 767-5, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 44/1.**
98. **FR00159. *Beedeina consobrina* (Safonova):** 5682-5, axial section, x20, River Bekechal, left bank of River Naryn. **Pl. 44/2.**
99. **FR00160. *Beedeina consobrina* (Safonova):** MK -135-2-1, tangential section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 44/3.**
100. **FR00161. *Beedeina samarica* (Rauser & Beljaev):** 5682-3, paraxial section, x20, River Bekechal, left bank of River Naryn. **Pl. 44/4.**
101. **FR00121.2. *Beedeina samarica* (Rauser & Beljaev):** 769a, axial section, x20, Dzhilginsai Gorge, Karachaty Range, South Ferghana. **Pl. 44/5.**
102. **FR00162. *Fusulina ex gr. rauserae* Chernova:** 5695-4, tangential section, x20, River Bekechal, left bank of River Naryn. **Pl. 44/6.**
103. **FR00163. *Fusulina aspera* Chernova:** 5696-4, axial section, x20, River Bekechal, left bank of River Naryn. **Pl. 44/7.**
104. **FR00164. *Fusulina aspera* Chernova:** 5696, axial section, x20, River Bekechal, left bank of River Naryn. **Pl. 44/8.**
105. **FR00165. *Fusulina aspera* Chernova:** 5693-5, paraxial section, x20, River Bekechal, left bank of River Naryn. **Pl. 44/9.**

106. **FR00166. *Fusulina cf. aspera* Chernova:** 5693-1, tangential section, x20, River Bekechal, left bank of River Naryn. **Pl. 44/10.**
107. **FR00167. *Fusulina lucida* Chernova:** 5692-5, nearly axial section, x20, River Bekechal, left bank of River Naryn. **Pl. 45/1.**
108. **FR00168. *Fusulina mjachkovensis* Rauser:** 5693-8, axial section, x20, River Bekechal, left bank of River Naryn. **Pl. 45/2.**
109. **FR00169. *Fusulina mjachkovensis* Rauser:** 5692-2, tangential section, x20, River Bekechal, left bank of River Naryn. **Pl. 45/3.**
110. **FR00170. *Fusulina mjachkovensis* Rauser:** 5692-8, tangential section, x20, River Bekechal, left bank of River Naryn. **Pl. 45/4.**
111. **FR00171. *Fusulina ex gr. mjachkovensis* Rauser:** 5693, axial section, x20, River Bekechal, left bank of River Naryn. **Pl. 45/5.**
112. **FR00172. *Fusulina ex gr. rauserae* Chernova:** 5696, axial section, x20, River Bekechal, left bank of River Naryn. **Pl. 45/6.**
113. **FR00173. *Fusulina ex gr. rauserae* Chernova:** 5695-1, tangential section, x20, River Bekechal, left bank of River Naryn. **Pl. 45/7.**

### **Pyrite "Disease" in the Collection of Fossil Molluscs**

**Henk K. Mienis and Oz Rittner**

In the we identified cases of Byne's "disease" in shell collections of the Steinhardt Museum of Natural History (Mienis, 2012). In fact we are not dealing here with a disease but with a chemical reaction in which the shell's calcium carbonate ( $\text{CaCO}_3$ ) turns into crystals of calcium acetate  $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$  under influence of acidic vapours. These crystals appear as a white powder on the "infected" shells and if the process is not halted then the shell will turn completely in a heap of powder.

In collections of fossil shells Byne's "disease" usually does not occur. However in shells containing pyrite an unrelated but yet destructive condition may occur.

Pyrite or iron pyrite ( $\text{FeS}_2$ ) which is also named iron disulfide is a fairly common mineral in sedimentary rocks. The mineral may enter shells of molluscs during fossilization, which is often the case in ammonites. When such fossils containing pyrite are exposed to high air humidity this may cause the so-

called pyrite "disease". Other terms used for such a deterioration of the fossils are pyrite rot and pyrite decay.

As a matter of fact the mineral (iron disulfide) starts to oxidize and turns into iron sulphate (FeSO<sub>4</sub>). This oxidation product gets several times the volume of the original mineral and usually the fossil disintegrates completely and loses its original form, a process that may last many years.

In a popular way this event can be compared with a well-known organic reaction occurring in a kitchen. When flour is being mixed with yeast, warm water and sugar, this mixture will also expand and its volume will be raised considerably. While that in the kitchen occurs within several hours, the chemical event which leads to a complete disintegration of pyrite fossils may last many years.

In the ammonite collection of Hanan (Hans) Bytinski-Salz were several examples of small ammonites, with a width of  $\pm 5$  cm and less than 1 cm thick, each of them stored in a round plastic box, which had nevertheless been disintegrated in a "donut"-like mass of which the original form had disappeared completely (Figs. 1-2).



Figs. 1-2: Examples of completely destroyed small ammonites in the former collection of Hanan (Hans) Bytinski-Salz caused by the so-called pyrite "disease".

The only way to prevent the deterioration of such pyrite fossils is to keep them stored in rooms with an air humidity of less than 45%. Specimens which are already slightly damaged should be stored under 30% room humidity. Note that damage caused by pyrite "disease" is irreversible!

### **References**

Mienis, H.K., 2012. Byne's "disease" in the shell collection. In: The National Collections of Natural History Annual Report 2010/2011, Tel Aviv University: 61-66.

### **Mollusc Collection**

**Henk K. Mienis, Oz Rittner and Revital Ben-David-Zaslow**

#### **Research**

During the academic year 2014/15 we continued to carry out research in the fields of taxonomy, systematics, nomenclature, Lessepsian migration, exotic and invasive species among the mollusc fauna of Israel and various aspects of archaeomalacology.

In cooperation with Mrs. Svetlana Vaisman of the Plant Protection and Inspection Services of the Ministry of Agriculture (Bet Dagan) much attention has been given to the exotic land- and freshwater molluscs occurring in Israel during the past academic year. Without doubt this will be a major subject of interest also in the coming years.

#### **Support with identifications**

The following species from the Red Sea were recorded for the first time from the Mediterranean Sea off Israel: *Morula aspera* (Lamarck, 1816) found by Ya'ara Grossmark on the beach of Shiqmona, *Goniobranchus obsoletus* (Rüppell & Leuckart, 1830) was photographed off Tel Aviv by Y. Halevy, D. Barchana, Y. Lavi and E. Ben-Zvi and off Caesarea by K. Twina, while a nudibranch photographed by G. Gat already in 1986 off Ashqelon turned out to

be *Sclerodoris apiculata* (Alder & Hancock, 1864). Reports dealing with these new records have been submitted for publication.

An unknown *Berthelinia* species, a bivalved gastropod, has been collected by Ehud Gilad off Elat.

**Cooperation with the Israel Oceanographic and Limnological Research, National Institute of Oceanography**

Also this year we identified large numbers of littoral Limpet-like gastropods, which had been collected by Yael Segal at permanent stations along the Mediterranean coast of Israel for her research on the presence of residues of heavy metals in the autochthonous species of *Patella* and the allochthonous Lessepsian migrants *Cellana rota* and *Siphonaria crenata*.

From Dr. Bella S. Galil, Dr. Hadas Lubinevsky, Dr. Buki Rinkevich, Lee Shaish and Dr. Gil Rilov and his team we have received from time-to-time voucher specimens of either rare species from the Eastern Mediterranean or material that has been used for DNA research.

**Cooperation with the Plant Protection & Inspection Services of the Ministry of Agriculture**

Mrs. Svetlana Vaisman of the mollusc identification unit of the Plant Protection & Inspection Services (PPIS) at Bet Dagan continued to work 4-5 hours a week in the mollusc collection. Most of the time she is picking and identifying micro-molluscs from leaf litter and soil samples collected at various anthropogenic sites in Israel.

This academic year Mrs. S. Vaisman brought us for identification 20 samples of land and freshwater snails intercepted by inspectors from the Plant Protection & Inspection Services (PPIS) from either agricultural shipments arriving from abroad (15) or found on local material or in nurseries (5).

Due to new restrictions concerning the import, cultivation and trade of Apple snails of the genus *Pomacea* in countries belonging to the European Union



special attention was being paid to the presence of Apple snails in Israel, because any export of aquatic merchandise from Israel to the European Union has to be accompanied by a statement issued by the Ministry of Agriculture that the merchandise was cultivated without the presence of Apple snails. Therefore nurseries of aquatic plants were visited by a joint team of the PPIS (Svetlana Vaisman, Dr. Yo'av Motro and several local inspectors) and the SMNH (Henk Mienis and Oz Rittner) during the last academic year. So far Apple snails were found in one nursery in Tel Mond and in a complex of ponds in a public garden in Ramat HaSharon, Kefar Saba and the Sharon Park on the now closed garbage dump Hiriya. All the infestations in parks turned out to be directly connected with the nursery in Tel Mond because they had provided all the aquatic plants, fish and snails.

#### **Cooperation with the Israel Nature and National Parks Protection Authority**

The phylum Mollusca is protected by law in Israel. The only exception is being formed by a small group of Mediterranean Cephalopods which are of commercial interest. Any malacological fieldwork carried out by the authors of this report is carried out with a proper license supplied on an annual base by the Israel Nature and National Parks Protection Authority (INPA).

The cooperation between the PPIS of the Ministry of Agriculture and the INPA has to solve the Apple snail problem in Israel, for which the staff of the mollusc collection is carrying out the identifications.

In addition few samples were received in the wake of the BioBlitz-project which took place this year in several Marine Nature Reserves along the Mediterranean coast of Israel.

#### **Cooperation with archaeologists**

In the last decades archaeologists became aware of the importance of a proper identification of their archaeomalacological material. Well identified shell material may provide the archaeologist with information concerning such

various subjects as climate, food, trade routes, exploitation of shells as votive objects, utensils, beads, pendants, etc.

During the past academic year we continued working on archaeomalacological material from the following sites:

- Jewish Quarter in the Old City of Jerusalem excavated by the late Prof. Nahman Avigad and Dr. Hillel Geva;
- Horbat Bet Loya excavated by Dr. Oren Gutfeld;
- Shallale excavated by Prof. Shimon Dar;
- Tiberias excavated by the late Prof. Izhar Hirschfeld;
- the Refuse dump of the Temple Mount in Jerusalem studied by Zachi Dvira (Zweig);
- various Chalcolithic and Early Bronze sites excavated by Dr. Edwin van den Brink;
- Tell es-Safi/Gath excavated by Prof. Aren M. Maeir.
- and others.

#### **Cooperation with malacologists abroad**

A Dutch-Swiss team consisting of Prof. R.A. Bank, Mr. Z. Bar and Dr. E. Neubert has recently published the revision of the complex of *Euchondrus "ovularis"* auct. (not Olivier, 1801) occurring in the coastal area of Israel. They reached the conclusion that the shells are inseparable from those of *Euchondrus pseudovularis* Forcart, 1981 living in the Northern Negev. We have the intention to carry out a follow up research in order to see whether their conclusion is confirmed by a comparison of the DNA of specimens collected in these two completely different regions.

The Dutch-German team consisting of Jordy G. van der Beek, Frans de Jong, Dr. Bernd Sahlmann and Dr. Vollrath Wiese continues to revise the scaphopods from the Red Sea.

Jan-Johan ter Poorten and Leo van Gemert (both of the Netherlands) continue their revision of material belonging to the genus *Frigicardium* from the Red Sea. Most probably not one but three different species are living in the waters of the Red Sea including the Gulf of Aqaba.

### **New acquisitions**

New material, not only from colleagues at various institutes but also from private collectors and even from the legacies of deceased collectors, is arriving regularly to the mollusc collection. All these new samples were immediately identified and prepared for permanent storage.

Especially noteworthy are the arrivals of two complete shell collections. The mollusc collection of the late engineer Hillel Yoeli was donated to the Steinhardt Museum of Natural History by his nieces. It consisted of the contents of four large glass showcases. Although the rich material lacked any labels a large part is formed by real show pieces which are extremely useful for exhibitions. The collection contained also some pieces of shell-craft (see below).

A second collection consisting of a small 19<sup>th</sup> Century walnut cabinet containing six drawers was donated to the Museum by Alberto and Emanuela di Castro, antique dealers in Rome, Italy. The drawers contained a large number of small species from various localities. Among these shells were some collected by a person whose initials were M.V.G. in the Sea of Galilee and in the Mediterranean Sea between Haifa and Acre (Akko) in March 1907. Others were brought from the West Indies by D.H. Graeme in March 1905. Among the latter shells are some land snails which are endemic to Jamaica. So far we have failed to find more information concerning both collectors. At the moment we are involved in bringing back this original British collection in its original state. Noteworthy is still the fact that the cabinet arrived with an old wooden box containing seeds of plants from the Holy Land, which was accompanied with a small booklet by the Rev. H.B. Tristram (1897): A short account of the Plants

and Plant Products of the Bible, with references, for use with Southall's Biblical Herbarium! This booklet describes all the specimens present in the box.

For the small shell related ethnographical collection we received an old shell of *Lambis truncata sebae* with a large hole in the penultimate whorl which had been collected somewhere in the interior of Sinai, Egypt. The shell has to be interpreted as the unpalatable remains of a snail meal. The shell had been confiscated by a ranger of the Israel Nature and National Parks Protection Authority from the luggage of a tourist returning to Israel at the Taba border crossing (Mienis, 2015b).

A shell box made of the polished valves of a large Venerid species and several modern shell-craft items were received with the decades of Ing. Hillel Yoeli.

Another shell box made of polished shells of *Cellana testudinaria* from the Indo-Pacific and a napkin-ring made of *Cypraea pantherina* from the Red Sea were received from Henk Mienis.

New acquisitions of the Mollusc Collection 2014-2015:

<u>Name</u>	<u>Brief description of the material</u>
B.A. Abdullahi	Freshwater molluscs from Nigeria
I. Armiach	Land snails from Israel
D.E. Bar-Yosef Mayer	Marine molluscs from Peru
K.H. Beckman	Land snails from Sicily
Bet Ussishkin	Land and freshwater molluscs from Israel
A. & E. di Castro	Small 19th Century shell cabinet
W.J. Clench	Various molluscs from the Museum of Comparative Zoology
O. Cohen	Land snails from Israel
A. Dotan	Marine molluscs from Mediterranean Sea, Israel
E. Elron	Freshwater molluscs from Israel
T. Eshcoly	Freshwater molluscs from Israel
Ch. Feldstein	Marine molluscs from Mediterranean Sea, Israel
L. Forcart	Various molluscs from the Natural History Museum of Basel
B. Gal	Land snails from Israel
Ch. Grasselly	Land snails from Cuba, Cyprus, France, Germany, Greece and Turkey
Y. Hershkovitz	Freshwater molluscs from Israel

W.H. Ho	Molluscs from Singapore and Malaysia
E. Hurwitz	Land snails from Israel
M. & K. Keppens-Dhondt	Molluscs world wide
O. Kolodny	Land snails from Israel
H.K. Mienis	Molluscs from Israel, the Netherlands and Nigeria
C.R. Orcutt	Tropical land snails
R. Ortal	Freshwater molluscs from Nigeria
J. Podani	Various land snails
O. Rittner	Molluscs from Israel
Y. Segal	Limpets from the Mediterranean coast of Israel
F. Seidl	Various land snails
S. Shefer	Marine molluscs from Mediterranean Sea Israel
C. de la Torre	Land snails from Cuba
N. Truskanov	Land snails from Israel
S. Vaisman	Snails and slugs intercepted by inspectors of the PPIS and freshwater molluscs from the Baikal area, Siberia
Z. Yanai	Freshwater molluscs from Israel
H. Yoeli	Molluscs world wide

#### **Computerization of the collection**

The computerization of the mollusc collection is carried out by Oz Rittner (collection of recent molluscs and occasional arrivals of fossil material) and Dr. Daniella E. Bar-Yosef Mayer (the fossil molluscs in the paleontological collection of Hanan (Hans) Bytinski-Salz). At the moment 61,575 samples representing 9581 taxa in the mollusc collection have been computerized. The majority of the new species and subspecies (499) which we could add this year to the collection were mainly from the Paleontological collection of the late Prof. Hanan (Hans) Bytinski-Salz.

#### **Type Material**

A list of type specimens present in the Mollusc Collection has been published in previous reports (Mienis, 2010, 2011, 2012, 2013, 2014 & 2015a). A collation of additional type specimens located in the collection or received afterwards is given elsewhere in this report.

#### **The Malacological library**

The library is for the Mollusc Collection a most important tool for taxonomic and systematic studies. New books received for the malacological library (2014/2015):

### Recent donations

#### Received from Constantine Mifsud (Rabat, Malta):

Mifsud, C., 2015. Notes on some Marine Invertebrates from the Maltese Islands – A collection of papers. 33 pp.

#### Received from Henk K. Mienis:

Nes, J.G.Th. van, 1957. Schelpen op ons strand. 4de Druk. W.J. Thieme & Cie., Zutphen.

Templado, J., Baratech, L., Calvo, M., Villena, M. & Aparicio, T., 1993. Los 'Ejemplares tipo' de las colecciones malacológicas del Museo Nacional de Ciencias Naturales. Monografías Museo Nacional de Ciencias Naturales. 328 pp. Madrid.

Por, F.D., 2008. Aqaba-Eilat, the Improbable Gulf. Environment, Biodiversity and Preservation. 463 pp. The Hebrew University Magnes Press, Jerusalem.

#### Received from the legacy of Ing. Hillel Yoeli:

Bergeron, E., 1977. How to clean seashells. 32 pp. Great Outdoors Publishing Company, St. Petersburg.

Cameron, R., 1972. Shells. 100 pp. Octopus Books Limited, London.

Dance, S.P., 1974. Seashells. 159 pp. Hamlyn, London.

Gabbi, G., 2000. Shells – Guide to the Jewels of the Sea. 188 pp. White Star Egypt, Luxor.

Heller, J., 1993. [Land snails of the Land of Israel – Natural History and a Field Guide.] 271 pp. Ministry of Defence Publishing House, Israel. [in Hebrew]

Lellák, J., 1975. Shells of Britain and Europe. 235 pp. Hamlyn, London.

Lellák, J., 1985. Muscheln und Wasser-Schnecken. 189 pp. Lingen Verlag, Köln.

Lindner, G., 2000. Muscheln und Schnecken an europäischen Urlaubsstränden. Finden, erkennen, sammeln. 95 pp. BLV Naturführer, München.

Pope, J., 1975. Beachcombing and Beachcraft. 127 pp. Hamlyn, London.

Sandved, K.B. & Abbott, R.T., 1974. Shells in colour. 112 pp. Pelham Books Ltd., London.

Stix, H., Stix, M. & Abbott, R.T., 1973. The Shell. 500 Million years of inspired design. no page numbers. Harry N. Abrams Inc. for Ballantine Books, New York.

Stix, H., Stix, M. & Abbott, R.T., 1978. The Shell. 163 pp. Harry N. Abrams Inc., New York.

#### Received from Uri J. Bar-Zeev:

Heller, J., 1993. [Land snails of the Land of Israel – Natural History and a Field Guide.] 271 pp. Ministry of Defence Publishing House, Israel. [in Hebrew]

In addition we have received many reprints and again numerous journals from Zoological Institutes or Malacological Societies in exchange of 'Triton', a privately malacological journal published in Israel.

**Sixth addition to the catalogue of type specimens in the Mollusc Collection  
of the Steinhardt Museum of Natural History**

**Henk K. Mienis**

Type material of 6 taxa is added to the provisional lists of type specimens present in the Mollusc Collection of the Steinhardt Museum of Natural History – Israel National Center for Biodiversity Studies (SMNH) of the Tel Aviv University (Mienis, 2010, 2011, 2012, 2013, 2014 & 2015). All these type samples were donated to the Mollusc Collection during the academic year 2014/15.

**GASTROPODA**

Family Enidae

*Buliminus (Buliminus) negevensis* Heller, 1970

Paratypes SMNH MO 79920/3: Israel, Ma'ale 'Aqrabbim.

*Buliminus (Buliminus) sinaiensis* Heller, 1970

Paratypes SMNH MO 79921/4: Israel, Negev, Har 'Arif.

Family Clausiliidae

*Muticaria neuteboomi* Beckmann, 1990

Paratypes SMNH MO 79922/4: Italy, Sicily, Cava d'Ispica.

Family Bulimulidae

*Helix (Xenothauma) baroni* Fulton, 1896

Syntype SMNH MO 79775: Peru, Rio Yonan, 4000 feet.

Family Subulinidae

*Opeas elgonense* Connolly, 1942

Paratypes SMNH MO 79774/2: Uganda, Mount Elgon.

Family Camaenidae

*Planispira zebra* var. *kolleri* Bullen, 1905

Syntypes SMNH MO 79918/2: Indonesia, Isle of Gisser, 5 miles S.E. Ceram.

**References**

Beckmann, K.-H., 1990. Beiträge zur Kenntnis der Landmolluskenfauna Siziliens mit der Beschreibung von *Muticaria neuteboomi* spec. nov. (Gastropoda Pulmonata: Clausiliidae). Basteria, 54 (1-3): 75-85.

- Bullen, R.A., 1905. On a new variety of *Planispira zebra*, Pfr., from the Island of Gisser, and a new species of *Chloritis* from Java. Proceedings of the Malacological Society of London, 6 (4): 191-192, plt. 9.
- Connolly, M., 1942. New or little known mollusc from Central Africa. The Journal of Conchology, 21 (11): 328-335.
- Fulton, H., 1896. Descriptions of new species of *Nanina*, *Helix*, *Amphidromus*, and *Porphyrobaphe*. The Annals and Magazine of Natural History, 6 (18): 100-104.
- Heller, J., 1970. Two newly discovered species of the genus *Buliminus* Beck, 1837 (= *Petraeus* Albers, 1850) (Enidae) from Southern Israel. Archiv für Molluskenkunde, 100 (5-6): 279-285.
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- Mienis, H.K., 2011. First addition to the catalogue of type specimens in the mollusc collection of the Tel Aviv University. In: The National Collections of Natural History. Annual Report 2009/2010. Tel Aviv University: 57.
- Mienis, H.K., 2012. Second addition to the catalogue of type species in the mollusc collection of the Tel Aviv University. In: The National Collections of Natural History. Annual Report 2010/2011. Tel Aviv University: 58-59.
- Mienis, H.K., 2013. Third addition to the catalogue of type species in the mollusc collection of the Tel Aviv University. In: The National Collections of Natural History. Annual Report 2011/2012. Tel Aviv University: 55-57.
- Mienis, H.K., 2014. Fourth addition to the catalogue of type species in the mollusc collection of the Tel Aviv University. In: The National Collections of Natural History. Annual Report 2012/2013. Tel Aviv University: 56-59.
- Mienis, H.K., 2015. Fifth addition to the catalogue of type specimens in the mollusc collection of the Tel Aviv University. In: The National Collections of Natural History. Annual Report 2013/2014. Tel Aviv University: 67-68.



## **Collecting trips and expeditions**

A dynamic archive, our Natural History Collections grow annually through donations, research projects, and collecting trips and expeditions. Many research projects have added numerous specimens to our collections, while other collections have benefited from focused collecting trips. Here we report on some of the new collecting activities of our scientists.

### **Collecting trips of the Entomology Department**

#### **Moshe Gershon**

##### **Israel:**

- Several dozens of collecting trips were made along the year. Collecting methods included net sweeping, light and Malaise traps, as well as direct rearing from host plants. Overall, more ca. 18,000 insect specimens from different orders were collected in the current year (based on the digitized database).
- Members of the Entomology team participated in the Ecological Camp by NPA in the Ma'on Nature Reserve (14-15.iv.2015, Amnon, Tanya, Laibale) and in the BIOBLITZ in Park Yeroham (26.iii.2015, Wolf, Tanya, Laibale).

##### **Abroad:**

- Laibale Friedman visited in the Prague National Museum (Prague, Czech Republic) on 8-18 June and worked in the collection of weevils, studying mainly the Mediterranean *Brachycerus* (Curculionoidea: Brachyceridae). On this occasion he made several collecting trips in the vicinity of Prague and Hradec Kralove district, which resulted in 1600 specimens, mainly beetles.
- Dr. Vasiliy Kravchenko made a collecting trip to Mali, visiting also in Liberia and Guinea, and collected insects with light traps, Malaise traps and by fogging.

**Marine biological survey (BioBlitz) 2015 - studying the current status of Israel's marine nature reserves**

**Ruthy Yahel, Israel Nature and Parks Authority, Marine Ecologist, Science division**

Along the Mediterranean coast of Israel exist seven declared nature reserves which cover a very small portion of the sea, and stretches to a distance of up to 2 Km offshore only. Declaration of additional marine nature reserves that will cover larger areas is currently being promoted by the Israel Nature and Parks Authority (INPA). Specifically, a future marine reserve in the area of Rosh-Hanikra, that would stretch from the shoreline to about 16 km offshore, is already in an advanced approval processes, and the INPA is increasing control measures to protect the already-declared marine environment.

The operation of marine nature reserves, as on land, is accompanied by many ecological aspects, ranging from quantitative sampling of the fauna and flora exists within the nature reserves in order to prepare its species inventory, comparison of flora and fauna in the reserves declared areas to similar control areas in order to establish a proper management plan for the reserve and a base line for future comparisons between the status of marine nature reserves that are currently not supervised to their future status, following the implementation of such supervision.

In order to address these ecological issues, we conducted a survey of the marine nature reserves, the first of its kind and scope in Israel. During four consecutive days last spring and autumn (eight days all-together), a substantial underwater effort was applied to survey four of the marine reserves and adjacent control sites. This special operation was named "Marine BioBlitz". Even if the concept of "Blitz" has a negative context at first, the term "Bioblitz" is now used to describe large-scale biological sampling operations that are usually limited to a period of one day, in one predetermined site. Indeed, in the present survey a single working day has been assigned during each season to each of the four

marine reserves and the adjacent control site. During this day we conducted extensive simultaneous documentation of different taxonomic groups: fish, benthic invertebrates and algae.

Following a period of prolonged preparations, due to the complex nature of underwater field work we have established a group of more than forty divers (!), which included researchers from the Steinhardt Museum of Natural History, Israel National Center for Biodiversity Studies and the Department of Zoology, Tel Aviv University, the school of Marine Sciences at University of Haifa, HaMaarag (Israel's Ecosystem Assessment Program), Israel Oceanographic and Limnological Research (IOLR) and the INPA. Together we plunged into the water, carried out observations on fish and invertebrates using unified sampling protocols for the establishment of a common database, admiring some less observed and more reserved spots of underwater beauty.

The survey methodology was established by Israel's leading experts in their field of study. Dr. Jonathan Belmaker and members of his laboratory determined the sampling method of fish on the seabed and in the water body. The protocol of sampling algae and invertebrates was formulated by a group of experts from The Steinhardt Museum of Natural History, Israel National Center for Biodiversity Studies, to encompass a large number of taxonomic groups. These sampling methods were adapted to areas with a rocky bottom; enable us to sample the marine nature reserves of Dor-Habonim, Shikmona, Rosh Hanikra-Achziv and Gador. Marine reserves with sandy bottom (i.e. Avtach & Shikma) will be sampled in the future using different protocols, adapted to the substrate type and biota. We expect to complete the analysis of the huge volume of data collected early this coming year. Detailed description of the results will be published then. So far, many unique and unknown invertebrates that were collected during the Bioblitz were identified by experts from the Steinhardt Museum and from abroad.

## **Malacological fieldwork in Israel**

**Henk K. Mienis and Oz Rittner**

During the Academic year 2014-2015 fieldwork has been carried out during seven days. Four of them were in cooperation with Mrs. Svetlana Vaisman of the Plant Protection and Inspection Services of the Ministry of Agriculture in Bet Dagan (PPIS). Transport to those sites was organized and fully covered by the PPIS.

Abbreviations:

INPA – Israel Nature & National Parks Protection Authority

PPIS – Plant Protection & Inspection Services, Ministry of Agriculture

SMNH – The Steinhardt Museum of Natural History, Tel Aviv University.

### **16 December 2014: Har Rotem**

Participants: Oz Rittner and Henk K. Mienis (both TAU) and Svetlana Vaisman (PPIS).

The purpose of this fieldtrip was to locate living specimens of *Euchondrus pseudovularis* Forcart, 1981, of which the type locality is Har Rotem,  $\pm$  7 km SE of Dimona. These specimens are necessary to clear up a taxonomic problem with the help of DNA research.

A common *Euchondrus* species occurring in the Mediterranean coastal area and the Shefela had been known for quite some time as *Euchondrus ovularis*. However the true *E. ovularis* (Olivier, 1801) has as type locality in Gemlik, Vilayet Bursa, Turkey. It does not occur in the coastal zone of Syria, Lebanon and Israel north of the Qishon. A recent study by a team headed by Prof. R. Bank has shown that the Israeli *E. "ovularis"* are inseparable from *E. pseudovularis* on shell characters (Bank, Bar & Neubert, 2015). However it is most unlikely from a zoological and climatological point of view that we are dealing with a single species. Therefore the proposition was made to carry out a DNA research of these and other *Euchondrus* species living in Israel.

During the fieldwork we sampled that part of Har Rotem which is separated from the main part of that mountain by the railway-track to the Oron Phosphate Mine.

Only seven different species were collected: *Buliminus glabratus*, *Buliminus therinus*, *Euchondrus albulus*, *Sphincterochila prophetarum*, *Sphincterochila zonata zonata*, *Xerocrassa seetzenii seetzenii* and *Levantina spiriplana lithophaga*.

In other words we failed to locate a single *Euchondrus pseudovularis*. It is however possible that the species is living on the main part of Har Rotem, west of the railway. Unfortunately it is impossible to get more information concerning the exact location of the type-material, because that had been collected by the late Dr. Hermann Zinner.

**29 December 2014: Kefar Saba and Ramat HaSharon**

Participant: Henk Mienis (SMNH) Svetlana Vaisman (PPIS).

The purpose of this fieldtrip was to evaluate the infestation of public ponds in those cities by Apple snails (*Pomacea* species), exotic freshwater snails which are outlawed in Israel.

In Kefar Saba an extensive pond system exists near Yad Lebanim. The two upper ponds were fairly recently built and equipped with plants and fish by a gardener in Nordiyya who acquired the aquatic plants and fish from the "Tropical Fish" company in Tel Mond. The lower ponds and canals are older and their water-system does not seem to be connected with the upper ponds. The pond-complex had been visited by Svetlana Vaisman already on 23 December 2014.

In the upper ponds we found: *Filopaludina martensi martensi*, *Pomacea maculata*, *Physella gyrina*, *Planorbella duryi* and *Radix luteola*. In the lower ponds and canals we found only *Physella acuta* and *Planorbella duryi*.

Interestingly all the freshwater molluscs are of foreign origin. According to the gardener of the upper ponds he did not stock the ponds with snails. However so far only at "Tropical Fish" in Tel Mond, where the gardener bought the plants and fish, we have seen both *Filopaludina martensi martensi* and *Pomacea maculata*. The latter was also for sale in that nursery.

In Ramat HaSharon we visited again the complex of ponds in "Gan HaNetzach" in HaNetzach Street, where Apple snails of the species *Pomacea maculata* had been found during various occasions in the summer of 2014. It may be pointed out that these ponds had been stocked with plants, fish and snails by gardeners of the "Tropical Fish" nursery in Tel Mond. They had been warned afterwards that the breeding and sale of Apple snails is forbidden in Israel and that they have to rid the ponds in Ramat HaSharon from all the Apple snails and their egg masses.

During our current visit it was obvious that the ponds had been cleaned. Initially we did not find any egg mass on the walls or on the vegetation above the water level. Also the tall Lotus plants, a favoured place for the bright red or rose coloured egg masses, had been trimmed. Yet after a thorough search we found two egg masses and five adult snails. More cleaning operations have therefore to be carried out in the near future until the ponds are completely devoid of any Apple snails.

### **8 January 2015: Palmahim and Yavne-Yam**

Participants: Oz Rittner and Henk Mienis (both SMNH).

The purpose of this fieldtrip was to check the beaches for molluscs washed ashore after the stormy weather of the previous days.

The sea was still very rough and the waves covered almost the entire beach. The beach between Palmahim and Yavne-Yam was almost clean except for large numbers Water hyacinths *Eichhornia crassipes* and root-clumps of a reed-like plant which had been washed ashore. Such accumulations were also

encountered at the high tide watermark south of Yavne-Yam. These plant remains originated most probably from the river Nile in Egypt and are a returning phenomenon after storms in the winter (Galili & Weinstein-Evron, 1989; Ortal & Cohen, 1989). In one of the clumps of Water hyacinth a nice, but dead specimen of the Nilotic gastropod *Pila ovata* was found with its operculum still closing the aperture.

Just south of the promontory of Yavne-Yam the beach was covered by huge amounts of valves of *Glycymeris nummaria*, better known by its junior synonym *G. insubrica*. Such a *Glycymeris* beach is a typical feature of the Mediterranean coast of Israel. Among the millions of *Glycymeris* valves empty shells were found of the gastropods *Conomurex persicus*, *Murex forskoehlII forskoehlII* (including a single living one), a large *Hexaplex pecchiolianus*, loose valves of the bivalves *Spondylus spinosus*, *Chama pacifica* and *Acanthocardia tuberculata* and still several complete specimens of *Brachidontes pharaonis*. In addition numerous cuttlebones of *Sepia* species were found in the beach drift among them also three specimens of *Sepia pharaonis*, a species from the Red Sea.

### **3 February 2015: Apollonia**

Participants: Oz Rittner, Henk Mienis (SMNH).

In the wake of our study of archaeomalacological material collected by Prof. Oren Tal (Tel Aviv University) during his excavations at Apollonia, we visited the National Park by that name in order to have a better idea which land snails and slugs are currently living among the ruins of that ancient site after the intensive restorations which had been carried out in the National Park during the past 10 years.

Twenty different snail species were encountered of which four: *Calaxis saulcyi*, *Cecilioides acicula*, *Paralaoma servilis* and *Prietocella barbara*, had not been recorded before from Apollonia. No slugs were found although we do not rule

out the possibility that this will change in the near future because of the intensive irrigation of the green plots between the ruins. An article dealing with the 25 species now known from this National Park has been published by Mienis & Rittner (2015).

**11 February 2015: Yagur**

Participants: Svetlana Vaisman (PPIS) and Henk Mienis (SMNH).

The purpose of this visit was to verify the presence of land snails and slugs in a nursery for export, however to our surprise such a company does not exist anymore and part of the area had been used already for a new housing project. The following snails and slugs were found in the area which was occupied once by the nursery (\*= invasive species): *Oxyloma elegans* (near a ditch), *Euchondrus septemdentatus*, *Deroceras berytensis*, *Caracolina lenticula*, \**Prietocella barbara*, *Monacha obstructa*, *Xeropicta vestalis joppensis* and \**Xerotricha conspurcata*.

**1 June 2015: Sede Nizzan**

Participants: Svetlana Vaisman (PPIS) and Henk Mienis (SMNH).

The purpose of the visit to the hothouse complex of the 'Isaacson Flowers for Export' firm in Moshav Sede Nizzan was the worrying report of a local inspector of the PPIS that the Wax flower (*Chamelacium*) cuttings grown in the Quarantine hothouse were heavily infected by snails. The Wax flower plants had been received from Australia. Photographs of the snail invasion showed us numerous specimens of various sizes of the Amber snail *Novisuccinea ovalis* (Say, 1817) (PPIS 350), a species of North-American origin, which is not known to occur in Australia, but is a well-known invasive hothouse and nursery species in Israel. The visit to the Quarantine and other hothouses of the Isaacson firm had to show whether infected Wax flower material had been imported or the infestation had been caused by local snails. Ten hothouses belonging to the firm were surveyed for the presence of land snails and slugs.



1. The Quarantine hothouse is still being used for rooting the Wax flower cuttings (*Chamelacium* species) from Australia. The material had been received in the form of unrooted branches, which had been cut into pieces of about 10 cm length in Sede Nizzan. Each cutting had been planted in a cylindrical growing medium and all were placed in so-called "Hishtil" plastic trays. These trays were standing on iron-rod tables about 120 cm above ground level. A careful inspection of the interior of the hothouse and the growing trays showed that numerous empty shells of *Novisuccinea ovalis* were on the floor especially near a partially covered gutter. Empty shells and several living snails were found in the trays containing the cuttings. No other snails, slugs or other invertebrates were found in the Quarantine hothouse.

2. The large hothouse next to the Quarantine hothouse is not being used at the moment. All the openings of the hothouse had been closed hermetically in order to raise the temperature as high as possible within the closed area. The accumulated heat has to kill among others all the snails and slugs present in the closed area. Because of the heat we were able to stay only for 10 minutes within that hothouse during which period we found only numerous dried out specimens of *Novisuccinea ovalis*.

3. A similar large hothouse next to no. 2 is being used for growing plants under more or less quarantine conditions on tables for export to the U.S.A. (as mentioned on a poster near the entrance). The only snails we found were numerous living specimens of *Novisuccinea ovalis*.

4. Another large hothouse is situated near no. 3. Various plants are being grown for export. Again *Novisuccinea ovalis* was the most common species, but in addition another Amber snail species was found living in one of the corners of the hothouse under very wet conditions: *Oxyloma elegans*. The latter is known to occur under natural conditions in the northern and central part of Israel near streams or lakes, but in Sede Nizzan it has to be considered an exotic species.

Besides these two Amber snails still a third snail species was found *Zonitoides arboreus*, like *Novisuccinea ovalis* a species of North American origin, which has become an extremely common hothouse and nursery species in Israel. In addition two slug species were encountered: *Lehmannia valentiana* and *Deroceras laeve*. Both are again well-known hothouse and nursery species which are easily spreading to areas in Israel which receive regular irrigation like gardens, parks and orchards.

5-7. Three large hothouse with open sidewalls are standing opposite the hothouses mentioned under nos. 2-4 at the other side of the road. No. 5 is used for growing garden plants on the ground; no. 6 is currently not in use, while in hothouse no. 7 only a few trays with garden plants (*Petunia*, and similar popular species) are still standing on the growing tables. Here we found near the side walls intrusions of the local snails *Theba pisana* and *Monacha syriaca* and here and there on wet places *Novisuccinea ovalis*.

8-10. Three additional hothouses were visited in another part of Sede Nizzan. These hothouses are being used for growing cut flowers (especially various species of *Chrysanthemum* and Liliaceae) and herbs (Fennel *Foeniculum vulgare*). The sides are open all along the hothouses and here we encountered only intrusions from outside in the form of *Theba pisana* and *Monacha syriaca*.

Since *Novisuccinea ovalis* is the dominant snail species in the closed hothouses (nos. 2-4 above), most probably it had been inadvertently introduced in one way or another to the Quarantine hothouse in the past. The latter building should be thoroughly cleaned before new material is being grown in it. In addition the gutter, which has hardly any function in draining the floor, should be filled up with cement.

### **13 July 2015 Hiriya**

Participants: Svetlana Vaisman (PPIS) and Henk Mienis (SMNH).

On 9 July 2015 Dr. Dany Simon showed to one of us (HM) a picture of a bright pink egg mass typical for a species of Apple snails *Pomacea* supposed to have been taken in Hiriya, the former waste dump of the Dan agglomerate. Since all the *Pomacea* species, large freshwater snails from South America, are blacklisted in Israel, we went to the former Hiriya waste dump in order to look whether in the wetland area of the Ariel Sharon Park any Apple snails are living.

All the basins of the wetland on the former waste dump turned out to be heavily infected by *Pomacea maculata*. All the emerging aquatic plants showed a heavy infestation of egg masses and numerous adult snails were seen and collected. Other snails collected at Hiriya were *Melanoides tuberculata*, *Planorbella duryi* and *Radix luteola*.

The ponds were supplied with aquatic plants and fish by "Tropical Fish" in Tel Mond. This firm was also responsible for the introduction of Apple snails in ponds in Ramat HaSharon and Kfar Saba (Mienis, Vaisman & Rittner, 2015).

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## **Malacological fieldwork in the Netherlands**

**Henk K. Mienis**

In the period 9 September – 11 October 2015 I visited again my native the Netherlands. Some malacological fieldwork was carried out in the provinces Friesland and North-Holland. This fieldwork was carried out with the following objectives:

### North-Holland:

- a. A further survey of the presence of freshwater molluscs near the inundation sluice in S.E.-Beemster;
- b. Freshwater molluscs on the leaves of water-lilies in Monnickendam;
- c. A follow up survey of the terrestrial mollusc fauna of a Jewish graveyard in Monnickendam;
- d. A follow up survey of the terrestrial mollusc fauna of a Catholic graveyard in Purmerend;
- e. A check of the situation of *Eobania vermiculata* in a park in Purmerend, the only known population of this Mediterranean land snail in the Netherlands.

### Friesland:

- a. A survey of the mollusc fauna of an open private garden in Oosterend, Terschelling;
- b. The freshwater molluscs of the Doodemanskisten near West-Terschelling;
- c. The presence of large non-local mussels in a broad ditch north of Baaiduinen, Terschelling;
- d. Gastropods in drift lines encircling dunes on the Boschplaat, east Terschelling;
- e. A further look at the land- and freshwater molluscs of Heeremastate, an old park in Joure;
- f. Various additional observations concerning inland molluscs in the Netherlands.

Special attention has been paid to the presence of invasive species. A selection of typical European species has been collected in order to compare them with

similar introduced species found over the years in Israel (especially members of the genera *Vallonia*, *Aegopinella*, *Nesovitrea* and some slugs).

## **Results**

### Fieldwork in the province North-Holland.

a. On 17 September 2015 some ditches connected with a small lake in a normally closed area of the inundation sluice could be briefly surveyed for the presence of freshwater molluscs. Among the encountered material were four species: *Valvata cristata*, *Hippeutis complanatus*, *Musculium lacustre* and *Dreissena bugensis*, which had not been observed in previous years. Of the Quagga mussel *Dreissena bugensis*, an aggressive invasive species, only a single juvenile species was obtained. I don't rule out the possibility that it arrived to the area of the inundation sluice by means of faeces of aquatic birds like waders or ducks. The nearest living population of the Quagga mussel is present in the North-Holland Canal at a distance of only 50 m from the site.

b. In water of the Vesting in Monnickendam 10 leaves of *Nuphar lutea* were checked for the presence of aquatic molluscs. Nine different species were found, all in small numbers: *Bithynia leachii* (6), *Bithynia tentaculata* (4), *Acroloxus lacustris* (3), *Lymnaea stagnalis* (1), *Physa fontinalis* (1), *Physella acuta* (1), *Anisus vortex* (5), *Ferrissia clessiniana* (3) and *Dreissena polymorpha* (7).

c. The Jewish cemetery in Monnickendam. This graveyard was visited on 10 September 2015. The visit lasted only for 10 minutes, but during that short period 16 different species were encountered of which four turned out to be new records for that graveyard: *Vallonia pulchella*, *Deroceras invadens* (formerly *Deroceras panormitanum* auct.), *Arion circumscriptus* and *Arion hortensis*. So far 26 species have been recorded from this tiny, but ancient graveyard.

d. The Catholic cemetery at the Overweersepolderdijk, Purmerend. During previous visits to this graveyard I had found 15 different species among them some interesting invasive slugs like *Lehmannia valentiana* and *Boettgerilla*

*pallens*. The first mentioned is still commonly encountered not only on the ground but also on the smooth trunks of several large trees especially after rain (6 October 2015). Two species were recorded for the first time: *Oxychilus cellarius* and *Oxychilus draparnaudi*. Of the non-local dune snail *Candidula intersecta* a single specimen was found adhered to one of the tombstones.

e. *Eobania* in the Kooimanpark in Purmerend. *Eobania vermiculata* is a typical circum-Mediterranean land snail. In the Netherlands it has been found occasionally in cauliflower and other vegetables imported from Italy or elsewhere in the Mediterranean area. However during the past five years I have found numerous living ones in a plot characterized by Liliaceae in the Kooimanpark in Purmerend. In order to check the situation in the autumn of 2015 I visited the park on 6 October 2015. The species is still commonly encountered on the leaves of several species of Liliacea including *Hosta*. Interestingly is the fact that also the invasive slug species *Lehmannia valentiana* was creeping around on the leaves of *Hosta* in numbers.

#### Fieldwork in the province Friesland.

a. The open private garden in Oosterend, Terschelling. This year I have surveyed the presence of aquatic molluscs in the 'Open garden' in Oosterend. Freshwater molluscs were found in only two small localities: a pond in the centre of the garden and an almost dry ditch forming the southern border of the garden. During nine successive days (21-29 September 2015) I have visited these localities in order to check the wet cartons, which I had spread near and even in the water. Occasionally the water in the pond was sampled with a kitchen-sieve for snails and small mussels living in its deeper parts. Four species were encountered in the pond: *Anisus vortex*, *Gyraulus crista*, *Pisidium milium* and *Pisidium obtusale*, while five species were found in the ditch: *Galba truncatula*, a dwarf form of *Radix balthica*, *Anisus septemgyratus*, *Pisidium nitidum* and *Pisidium obtusale*. Especially *Anisus septemgyratus* and *Pisidium obtusale* are characteristic for temporary drying out habitats.

b. The aquatic molluscs of the Doodemanskisten near West-Terschelling. The Doodemanskisten in the dunes near West-Terschelling is a small lake which has been entirely reshaped during the period Autumn 2013 – Spring 2015. Its former mollusc fauna is fairly well known but shows many sudden changes in the composition of the various species. On 1 October 2015 I have briefly sampled the shallow water along the banks of the newly created lake. This has resulted in the find of 10 different species: *Bithynia leachii*, *Bithynia tentaculata*, *Physella acuta*, *Radix auriculata*, *Stagnicola palustris*, *Anisus vortex*, *Ferrissia clessiniana*, *Gyraulus albus*, *Planorbarius corneus* and *Planorbis planorbis*.

Among these ten species are and least two: *Radix auriculata* and *Planorbarius corneus*, which have never been found before in the Doodemanskisten. Most likely they have been introduced to the lake with aquatic plants which were transferred to the lake after the reshaping of the Doodemanskisten

c. Large non-local mussels in a broad ditch north of Baaiduinen, Terschelling. The Pond mussel *Anodonta piscinalis* is known to occur in a broad ditch north of the village Baaiduinen on Terschelling. Most likely this non-local mussel species was introduced to that ditch with the release of fish species infected with glochidia of the Pond mussel brought over from the mainland of the Netherlands. On 28 October 2015 I bought a short visit to the ditch and indeed I found several damaged but fresh looking valves and a few complete specimens of *Anodonta piscinalis* on the banks of the ditch. However, to my surprise I found also a still living specimen of *Anodonta cygnea* with a length of 14 cm. This means that not one but two species of large mussels have been introduced to the island Terschelling.

d. Gastropods in drift lines encircling dunes on the Boschplaat, Terschelling. The Boschplaat is a large European Nature Reserve forming the eastern part of the island Terschelling. It is an important marine wetland which is not

completely flat but shows here and there some low dunes. From time to time the whole area is covered by water of the Wadden Sea for several hours during extreme high tide. Anything capable of floating is being concentrated by the water around the protruding parts of the dunes i.e. walls of organic debris is left behind around these dunes. Such walls consist mainly of grasses and other dry plants but more inside these walls one can find hundreds of empty shells of terrestrial and brackish water snails living on the Boschplaat. A representative sample of about 5 kg of such material was collected by me near pole 23 on the Boschplaat on 2 October 2015.

Most of the hundreds of shells found in that material were separated already from that sample when I was still on the island, but a small part of very fine material was sorted by Mrs. Svetlana Vaisman in the Mollusc Collection of the Steinhardt Museum of Natural History at the Tel Aviv University.

The material yielded 13 different species. Most common turned out *Pupilla muscorum*, *Vertigo pygmaeum*, *Vertigo antivertigo*, *Vallonia pulchella*, *Vallonia excentrica*, *Succinella oblonga*, *Vitrina pellucida*, *Cochlicopa lubrica* and *Phytia myosotis* and less common or even single shells were found of *Nesovitrea hammonis*, *Punctum pygmaeum*, *Perigia ulvae* and *Littorina saxatilis*.

e. A further look at the land- and freshwater molluscs of Heeremastate, an old park in Joure. On 5 October 2015 I brought an additional visit to the park of the former mansion Heremastate in Joure. New for the terrestrial malacofauna were *Carychium tridentatum*, *Deroceras invadens*, *Lehmannia marginata* and *Tandonia budapestensis*.

A first look at the freshwater molluscs living in the ponds of the park revealed at least the presence of 10 species: *Bithynia leachii*, *Bithynia tentaculata*, *Valvata piscinalis*, *Physa fontinalis*, *Lymnaea stagnalis*, *Anisus vortex*, *Bathyomphalus contortus*, *Ferrissia clessiniana*, *Gyraulus albus* and



*Planorbarius corneus*. More aquatic species are still expected to be discovered in the future.

f. Various additional observations concerning inland molluscs in the Netherlands:

-10 September 2015: In the Purmerbos, a relatively new forest in the Purmer near Purmerend, North-Holland, large numbers of the Amber snail *Succinea putris* were found on *Urtica dioica*. Four of them showed upper tentacles infected by the parasite *Leucochloridium paradoxum*. In three specimens a pulsating parasite was present in both upper tentacles, one snail had one tentacle infected. While gently touching such an infected tentacle the parasite left it spontaneously, a reaction already once before observed at the same site. The final host of these parasites are birds, which are attracted by the pulsating actions of the parasite in the tentacle of the snail.

-21 September 2015: The invasive land snail *Hygromia cinctella* was seen actively crawling on some shrubs at the south-side of the cemetery of Hoorn, Terschelling.

-26 September 2015: In the garden of the Oeral-office in Midsland, Terschelling, two very large specimens of *Limax maximus* were encountered in a gutter. One specimen was preserved with an inverted penis. Also present in the garden was *Deroceras invadens* (which is better known as *Deroceras panormitanum* auct.).

-26 September 2015: Both *Arion rufus* and *Deroceras reticulatum* were seen feeding on various species of mushrooms in the Hoornse Bos, a forest north of Hoorn on Terschelling.

-1 Oktober 2015: The invasive land snail *Ceriuella virgata* is still commonly encountered on the Dellewal in West-Terschelling. This population shows an immensely polychromic pattern of its shell.

A large part of the mentioned material has been lodged permanently in the Mollusc Collection of the Steinhardt Museum of Natural History.



## **Outreach - Nature Campus**

Some highlights of Nature Campus activities:

### **1. On-line outreach**

- Teaching Evolution became a major focus in our activities, on-line and on-campus. On September 2015 we launched "Gate to Evolution" - a satellite website which is a new member in Nature Campus websites family. "Gate to Evolution" is a portal to:
  - On-line textbook – "Understanding Evolution", an adaptation of the Museum of Paleontology – University of California – Berkeley website by the same name.
  - Teaching resources
  - Studying evolution at nature campus
  - Multimedia resources
  - Evolution research at TAU
  - Evolution Library
  - Gallery

For more information <http://evolution.campusteva.tau.ac.il/>

- We have begun to develop additional website in our content EarthWeb portal: "Gate to Eco-agriculture". This website will join "Gate to Conservation Biology" and "Gate to Evolution". The project is funded by Nekudat Hen program, 90,000 NIS.

### **2. Outreach educational programs**

- We have added a several new programs to our rich menu:
  - a. Bio-inspiration. The program explores Phenomena in the natural world that became inspiration or a foundation for technological inventions.
  - b. Seasonal cycles in the world of plants. This is a 4 sessions program for elementary school's groups.
  - c. Evolution of plants for high school students.

d. Evolution of communication for high school students.

**Other activities**

- Nature Campus is part of the development team of SMNH exhibitions.
- Nature Campus is also part of the development team of the Zoological Garden redesign.

**Grants & Gifts**

- 90,000 ILS from Nekudat Hen program for the development of Eco-agriculture website.

## **The Israel Taxonomy Initiative**

Conservation of biodiversity – the variety of life forms on earth – depends on scientific knowledge and expertise. Government agencies, research institutes, and conservation organizations around the globe have identified an alarming gap between existing taxonomic knowledge of biodiversity and the need for this information to guide conservation practices. Taxonomic research is essential in order to identify the great majority of living organisms, to understand the evolution of life, and to halt the loss of species; but the state of the discipline is presently inadequate. Many sophisticated tools and models – morphological, biochemical, and genetic – as well as advanced software, are available for taxonomists; however, basic research lags seriously behind needs. The Millennium Ecosystem Assessment – a UN taskforce to review the trends and implications of changes in global ecosystems - identifies the lack of knowledge of species and their geographic distributions as one of the impediments to sustainable development; the international treaty of the Convention on Biological Diversity initiated the Global Taxonomy Initiative in an effort to remedy this situation.

In Israel, where geographic, topographic, and climatic conditions have produced amazing and unique diversity of life, taxonomic research is declining. A recent report submitted to the Israel Academy of Sciences and Humanities demonstrated that within 10 years, the average period required to train a young taxonomist, Israel would have no scientists in research or teaching positions who can train the next generation of taxonomists. Thus, a major and urgent effort is required to salvage this field and to ensure the continuation of a critical discipline.

In addition to nature and environmental conservation, taxonomic research has applied implications for agriculture, the economy, human welfare and health; it is therefore crucial that it remains viable in face of fleeting fashions in scientific research.

The Israel Taxonomy Initiative is a consortium of government ministries and agencies, research universities and higher education institutions that aims to promote training of taxonomists and basic knowledge of Israel's biodiversity by

- Providing doctoral and post-doctoral fellowships;
- Providing funding for overseas training for graduate students;
- Providing funding for biodiversity surveys;
- Inviting taxonomists from the international scientific community to teach short courses on local species groups.

Our goal is to resurrect Israeli taxonomy and increase our knowledge of biodiversity, thus promoting the contribution of science to conservation of Israel's ecosystems and developing the sustainable use of the country's natural assets.

**The following grants have been awarded to date:**

**Doctoral Scholarships:**

2009/10: Malkie Spodek, scale insects; Ittai Renan, beetles; Noga Sokolover, moss animals.

2010/11: Karin Tamar, reptiles; Nir Stern, fish.

2011/12: Anna Halasz, corals; Shevy Rothman, fish parasites.

2012/13: Einat Schachar, Gall wasps; Elizabeth Morgulis, fruit flies; Gal Eyal, corals.

2013/14: Zohar Yannai, dragonflies and damselflies; Yaarit Levitt, Decapod crustaceans.

**M.Sc. Scholarships:**

2012/13: Igor Armiach, spiders; Shlomi Aharon, spiders.

2014/15: Michael Kolker, larval fishes.

**Post-Doctoral Fellowships:**

2009/10: Noa Shenkar, ascidians; Efrat Gavish-Regev, spiders.

2010/11: Noa Shenkar, ascidians; Efrat Gavish-Regev, spiders; Alla Alster, blue-green algae.

2013/14: Achik Dorchin, eucerine bees.

**Biodiversity surveys:**

- 2009/10: Dorothee Huchon, sponges; Menachem Goren, fish; Leonid Friedman and Amnon Freidberg, Entiminae beetles; Amit Dolev, bats.
- 2010/11: Nehama Ben-Eliahu, serpulid worms; Jean-Jacques Itzhak Martinez, ants; Frida Ben-Ami, flukes; Vasiliy Kravchenko, moths; Amnon Freidberg and Elizabeth Morgulis, flies; Ariel Chipman, centipedes.
- 2011/12: Oz Barazani, crucifer plants; Guy Bloch, bees; Leonid Friedman and Amnon Freidberg, snout beetles; Netta Dorchin, gall midges; Dotan Rotem and Ittai Renan, insects; Shai Meiri, reptiles; Sigal Shefer, demosponges; Yossi Loya, stony corals.
- 2012/13: Ada Alamaru, Yossi Loya & Dorothee Huchon, Ctenophores; Leonid Friedman, Red Weevils; Netta Dorchin and Zvi Mendel, midges; Sigal Shefer, Tamar Feldstein & Micha Ilan, demosponges; Ehud Spanier & Jason Goldstein, decapods; Yossi Loya, Mesophotic corals.
- 2013/14: Elad Chiel, housefly parasitoids; Eric Palevsky, soil dwelling predatory mites; Guy Yehuda and Ofer Ovadia, Charopytes; Shlomi Aharon and Yael Lubin, spiders in caves; Netta Dorchin and Tatyana Novoselsky, lace bugs; Razy Hoffman, seaweeds and seagrasses; Gil Koplovitz and Noa Shenkar, ascidians.

**Overseas training for students:**

- 2010/11: Karin Tamar, reptiles; Ittai Renan, beetles.
- 2011/12: Anna Halasz, corals; Achik Dorchin, bees; Ittai Renan, beetles; Rebecca Biton, reptiles and amphibians; Noga Sokolover, Moss animals; Naama Kimmerling, coral reef fish larvae.
- 2012/13: Haggai Wasserstrom, acarology; Yonathan Guttel, freshwater mollusks; Achik Dorchin, bees; Karin Tamar, reptiles; Philip Nemoy, Sponges;

2013/14: Igor Armiach, spiders; Shlomi Aharon, spiders; Ittai Renan , beetles; Gal Eyal , corals; Elizabeth Morgulis, fruit flies; Einat Shachar, Gall wasps; Nir Stern, sardines; Shevy Rothman, parasitic worms.

**Visiting Scholars:**

2010/11: David Furth, leaf beetles; Dmitry Apanaskevich, ticks; Gregory Evans, mites; Krzysztof Szpila, flies; Christophe Praz, bees; John Heraty, parasitoid wasps.

2011/12: Rony Huys, crustaceans; Roman Romanov, green algae; Marco Bologna, blister beetles; John Ascher, Bees; Torsten Dikow, flies; Edward Ueckermann, mites.

2012/13: Robert Raven, spiders; Philipp Wagner, reptiles; Olof Biström, diving beetles; Lorenzo Prendini, scorpions.

2013/14: Edward Ueckermann, Soil dwelling acarine predators; Ms. Gretchen Lambert, Ascidians.

**Proposals for 2014/15:**

Due to the near-ending of the program, the only call for proposals was for an M.Sc. student. Two proposals were submitted and one was granted.



## **The Israel National Center for Aquatic Ecology**

**Yaron Hershkovitz, Tuvia Eshcoly**

Israel represents an extreme case of a water-stressed region that results from its semi-arid climate, the geophysical topography, the dense population, and the regional complex political situation. Over the last century, ensuing agricultural and urban development led to augmented human demand for land and to an overwhelming exploitation of freshwater resources. Many perennially flowing streams became intermittent, temporary streams dried out completely, while naturally dry channels (Wadies) were transformed into perennially-flowing conduits of waste waters. These conditions have led to the loss of numerous aquatic and semi-aquatic species, while facilitating the establishment of exotic fauna and flora. As a result, for the past three decades, the Israel Ministry of Environmental Protection (IMEP) has put tremendous efforts in stream restoration projects to enhance ecological functionality and integrity. Although in some cases these efforts seem to be fruitful, the change in ecological state has nevertheless been rarely confirmed. Although Israel is a non-EU country and therefore is not obliged to implement the Water Framework Directive, there is a strong agreement among Israeli decision makers on the need to develop a comparable framework for biologically monitoring the ecological state of streams and rivers as a management tool.

The Israel National Aquatic Ecology Center (INAEC) is a joint initiative established by the Israel Nature and Parks Authority, The Ministry of Environmental Protection and the Steinhardt Museum of Natural History (SMNH). The goal of the INAEC is to function as a centre of ecological and taxonomical knowledge about aquatic ecosystems in Israel to support decision making on applied and ministerial levels.

The specific targets of the INAEC are as follows:

- To gather and analyse all available information concerning aquatic biodiversity
- To establish and manage a taxonomic collection of aquatic organisms as part of The Steinhardt Museum of Natural History
- To develop and implement a nation-wide biomonitoring program for streams, based on type-specific indices.
- To use the collective data for indicating existing knowledge gaps and advising the authorities on proper management measures.

The work of the INAEC comprises five interrelated steps for achieving these goals:

- Collection of existing and first-hand data through extensive literature reviews and field work.
- Fulfilling taxonomical knowledge-gaps, particularly on the larval stages of key aquatic species.
- Analysing ecological and biological data for a integrated synthesis
- Applied management for assessing ecological status and suggesting possible measures.
- Publishing of scientific papers, reports and position papers.

#### **Achievements of the INAEC in 2015 (1st year of activity)**

In 2015 the INAEC have began its activity under the scope of the Israel National Center for Biodiversity Studies. Here are some of the main achievements

- We initiated a broad literature review including peer-reviewed, academic works and “grey literature” that contain data concerning aquatic fauna and flora of Israel.
- The INAEC is taking part in a German-Israeli project (supported by the German-Israeli Foundation for Scientific Research and Development and by

the IMEP) aimed to develop a national river basin biomonitoring programme, using Lake Kinneret (Sea of Galilee) as a model catchment. Under this scope we have collected aquatic invertebrates at 53 sites across the Lake Kinneret basin. Concurrently we have been analysing preserved material collected from seven coastal streams (spring and autumn, 2010).

- Invertebrate samples from both campaigns have sorted, counted and now being identified to the lowest taxonomical level. Taxonomical identification of different aquatic groups was assisted by the staff at SMNH and the zoology department:
  - Molluscs - Henk K. Mienis and Oz Rittner
  - Crustaceans - Ya'arit Levitt Barmats
  - Heteroptera - Dr. Tania Novoselsky
  - Ephemeroptera - Zohar Yanai
  - Coleopterans - Dr. Vladimir Chikatunov

Trichoptera were identified by Dr. Armin Lorenz and Laura Uekötter from the University of Duisburg-Essen, Germany. Coleopterans are also being identified by Thomas Horren (University of Duisburg-Essen, Germany). Other taxonomic groups were identified by Tuvia Eshcoly and Yaron Hershkovitz (INAEC).

- The biological data will be used to calculate relevant biotic indices and for the determination of the “ecological status” of each site. This will be reported and later on used to recommend on measures to be taken in order to preserve or enhance species diversity and ecosystem functionality.

### **Academic corporations**

The INAEC encourages cooperation between scientists, within and outside Israel. We are currently working with several researches on different aspects:

- Prof. Daniel Hering and colleagues at the Aquatic Ecology Department, University of Duisburg-Essen, Germany. The ESSESMENT project

- (“Ecological Status, Ecosystem Services and Management of the Lake Kinneret Catchment”: 2015-2017).
- Dr. Gideon Gal and colleagues at the Y. Allon Kinneret Limnological Laboratory, Israel Oceanographic & Limnological Research, Israel. The ESSESMENT project (“Ecological Status, Ecosystem Services and Management of the Lake Kinneret Catchment”: 2015-2017).
  - Dr. Neta Dorchin and Zohar Yanai (PhD student) from the Zoology Department, Tel Aviv University: revision of mayflies (Ephemeroptera) in Israel.
  - Dr Frida Ben Ami and Liron Goren (PhD student): parasites in Gammarus sp. Shrimps.
  - Ya'arit Levitt Barmats: non-native freshwater crustaceans.

## **The Entomology Lab for Ecological Monitoring**

### **Ittai Renan**

Arthropods are the most diverse group in terrestrial systems, accounting for over 85% of all known organisms. Arthropods inhabit a tremendous variety of niches across wide spatial scales and exhibit a variety of feeding habits and life forms that form, after the plants, a basis for most terrestrial food webs. Because of their high and fast reproduction rate, arthropod communities are sensitive to short and long term environmental changes. Large numbers of arthropod species and specimens can be efficiently collected. For these reasons the group is utilized as a rich data source for ecological monitoring and ecosystem management.

Current researches in the lab focus on conservation and ecological management questions, utilizing arthropods as a sensitive tool for the assessment of ecological quality and ecosystem response to anthropogenic activities. Assessment includes multivariate analysis of community structure and composition, integrating various ecological indices and experimental approaches. The taxonomic identification is in the basis of the analysis in each research. The identifications rely on the insects in The Steinhardt Museum of Natural History and its experts as well as worldwide experts of different insects groups. The large scale arthropod sampling from different sites, seasons and methods, supplements the collection with valuable specimens: rare, new to Israel fauna and new species for science.

The lab's activity spans geographically from Ramot Yissakhar in the north to Sedom in south of the Dead Sea. The current lab researches deal with monitoring of arthropod communities in borders between agricultural and natural landscapes and ecological corridors, providing operational recommendations for management restoration in national parks, estimating

impacts of local anthropogenic pressure on sensitive ecological systems and monitoring population of a rear butterfly.

Researches are in collaboration with the Ministry of Environmental Protection, the Ministry of Agriculture & Rural Development, Israel Nature and Parks Authority, The Society for the Protection of Nature in Israel, Israel's national Ecosystem Management Assessment Program, Ramat Hanadiv and regional councils.

This year we ran 14 different researches and projects, published nine reports and presented our studies at three conferences in Israel and one in France. The lab employs two workers in a full-time job and 13 workers on a pay per hour basis.

The Entomology Lab for Ecological Monitoring aims to provide a high resolution tool for understanding ecological systems in order to contribute to the conservation efforts of Israel's biodiversity.

## Publications

The Steinhardt Museum of Natural History is an important research infrastructure, used by scientists within and outside of the university. Here we list the 2014/2015 publications, that includes all publications of TAU members affiliated with the collections (whether they are directly collections-based or not). It under-represents publications of individuals from other institutions, since our follow-up is far from complete.

## Refereed articles

1. Alcalay Y, Ovadia O, Scharf I 2014. Behavioral repeatability and personality in pit-building antlion larvae under differing environmental contexts. Behavioral Ecology & Sociobiology 68:1985-1993.
2. Ashkenazy H., Cohen O., Pupko T. and Huchon D. 2014. Indel reliability in indel-based phylogenetic inference. Genome Biology and Evolution. 6:3199–3209.
3. Assmann, T., E. Boutaud, J. Buse, V. Chikatunov, C. Drees, A.-L.-L. Friedman, W. Härdtle, K. Homburg, T. Marcus, I. Renan & D. W. Wrase, 2015. The ground beetle tribe Cyclosomini s. l. in Israel (Coleoptera, Carabidae). Spixiana 38 (1): 49-69.
4. Azzurro E, Goren M, Diamant A, Galil B, Bernardi G. 2015. Establishing the identity and assessing the dynamics of invasion in the Mediterranean Sea by the dusky sweeper, *Pempheris rhomboidea* Kossman & Räuber, 1877 (Pempheridae, Perciformes). Biological Invasions 17: 815-826.
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## **Books**

1. Orlov-Labkovsky O. and Bensch F.R., 2015. Atlas of Foraminifers of the Carboniferous and Permian (Cisuralian) of Uzbekistan and adjacent regions, Tien Shan. 302 pp. Pensoft, Sofia & Moscow.

## **Papers presented in scientific meetings**

- 2014 Diversity, phenology and specificity of mealybug preying Cecidomyiidae (Diptera) in the agricultural landscape of Israel. 8<sup>th</sup> International Congress of Dipterology. Potsdam, Germany (Hayon I., Dorchin N., and Mendel Z.).
- 2014 First appearance of *Citrus medica* in the southern Levant International workshop on the History and Archaeology of Citrus fruits in the Mediterranean: introductions, diversifications, uses. Pompeii, Italy, (D. Langgut).
- 2014 New ATSB applications and active ingredients: field experiments in Israel and Mali with several mosquito species in a variety of habitats. Annual Meeting of the American Mosquito Control Association (AMCA), Seattle, WA, USA. (Muller, G.C., Beier, J., Kravchenko, V.D., Revay, E., Xue, R.D. & Schlein, Y.).
- 2014 The eastern Mediterranean: new biota – new food web. “Marine Bioinvasion in the Mediterranean: toward large-scale studies” 23-25 November Herzlia, Israel (Goren M., Galil B.S., Diamant A., Yokes M. B., Stern N., Rothman S., Levitt Y., Gilad R-L.).
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- 2015 4<sup>th</sup> International Entomophagous Insects Conference. Torre del Mar, Malaga, Spain, 4-9 October 2015 (Köszeg, Hungary; Z. Yefremova J.M. Perilla-López, E. Yegorenkova, P.J. Johnson).
- 2015 Aerodynamic stabilization of take-off jumps in *Bemisia tabaci*. Annual meeting, Society of Experimental Biology (Ribak G, Dafni E, Gerling D)

- 2015 An invited Discussant in a Round Table on Loss, Preservation and Natural History Museum. An International Conference on Loss and Preservation in Biotechnologies and the Life Sciences, The Edmond J. Safra Center for Ethics, Tel Aviv University, Israel, (D. Langgut).
- 2015 Approaches in paleovegetation and paleoecological investigations. Annual Conference of IGRG (Israel Geomorphology Research Group) – “Transition Between Nature to Environment Along the Southeastern Mediterranean Coast”: Tel Aviv University, (D. Langgut).
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- 2015 Efficacy of a commercial formulation of attractive toxic sugar baits (ATSB) against *Aedes albopictus*. American Mosquito Control Association (AMCA). 81-st Annual Meeting (Junnila Amy, Vasiliy Kravchenko, Edita Revay, Yosef Schlein, Whitney Qualls, Rui-de Xue, John Beier and Gunter Muller).
- 2015 Exceptional homogeneous populations uncover the world's most widespread sardine, *Sardinella aurita* Valenciennes, 1847. The XIV European Congress of Ichthyology (ECI XV). Porto, September, 7 –11, Portugal (Stern N., Douek Y., Goren M.I, Rinkevich B.).
- 2015 Exotic and prestigious elements in the Persian Royal garden at Ramat Rahel. Three Thousand Years of History in Ramat Rahel – a Workshop of Tel Aviv University and Yad Yitzhak Ben-Zvi, Tel Aviv, (D. Langgut).
- 2015 Exotic and prestigious elements in the Persian Royal garden at Ramat Rahel. Three Thousand Years of History in Ramat Rahel – a Workshop of Tel Aviv University and Yad Yitzhak Ben-Zvi, Tel Aviv (Langgut D.).
- 2015 Identifying the historical earthquake which caused the collapse of the Byzantine kilns complex in Yavneh by pollen seasonality. The 41<sup>th</sup> Archaeological Congress of Israel, Bar Ilan University, (D. Langgut).
- 2015 Identifying the historical earthquake which caused the collapse of the Byzantine kilns complex in Yavneh by pollen seasonality. The 41<sup>th</sup> Archaeological Congress of Israel, Bar Ilan University, (Langgut D.).
- 2015 Invasive fishes in the Levant Sea (eastern Mediterranean) re-constructing the food web. The XIV European Congress of Ichthyology (ECI XV). Porto, September, 7 –11, Portugal (Goren M., Galil B.S., Diamant A., Stern N., Levitt Y.).
- 2015 Like it dark and do not mind having nosy neighbors. Annual Meeting of the German Zoological Society. Graz, Austria, (Adar S, Katz N, Dor R, Scharf I. Wormlions).
- 2015 Modelling ecosystem dynamics: beyond boundaries with ewe". Barcelona, Spain, 4 - 14 november (Shtern N. and Goren M.).
- 2015 Non-evolutionary issues in aDNA studies. International Research Conference on Studying Human Evolution from Ancient DNA, the Hebrew University, Jerusalem, Israel, (May H.).

- 2015 Recent advances in archaeomalacological research in the Levant. University of Rennes I, France (Bar-Yosef Mayer, D. E)
- 2015 Revisiting the generic concepts of *Afronurus* and *Electrogena* (Ephemeroptera: Heptageniidae): morphology, genetics and distribution. XIV International Congress on Ephemeroptera. Aberdeen, Scotland. (Yanai Z., Sartori M., Dor R., and Dorchin N.).
- 2015 Subsistence transition and mandible morphology: a case test from the advent of agriculture in the Levant. 5<sup>th</sup> annual meeting of the European Society for the study of Human Evolution, London, UK. (H May, K Kupczick, E Schultz-Kornas, R Sarig).
- 2015 Symposium "Bees in the Service of Food Security: Challenging the Crisis", Tel Aviv University, Tel Aviv, Israel (Pisanty, G.).
- 2015 The 43<sup>rd</sup> Annual meeting of the Ecology and Environmental Sciences Society of Israel, Hebrew University, Israel (Roi D.).
- 2015 The environmental drivers of the annual reproductive cycle of the Red Sea urchin *Echinometra* sp. AutReef, Vienna, Austria (O. Bronstein, Y. Loya).
- 2015 The kinematics and power output of flight in an insect flight-mill. Meeting Entomological Society of America.(Ribak G, Barkan S, Soroker V).
- 2015 The parasitoids of two leaf miners on the castor bean in central Israel. Presentation on 30<sup>th</sup> Meeting of the Entomological Society of Israel. Tel Aviv University, Tel Aviv. (Kuslitzkiy W, Yefremova Z, Kravchenko V).
- 2015 The Temple city and its country side in the 8-6<sup>th</sup> c BCE. In: New Horizons in Jerusalem Excavations annual meeting. Jerusalem, Israel. (Sapir-Hen L).
- 2015 Tooth wear analysis in molar samples from Natufi an to modern human populations in the southern Levant using the 3D surface texture approach. 5<sup>th</sup> annual meeting of the European Society for the study of Human Evolution, London, UK (E Schulz-Kornas, R Sarig, H May, K Kupczik).
- 2015 Use of inundated lakeshore vegetation by Cichlids for reproduction in Lake Kinneret (Israel). The XIV European Congress of Ichthyology (ECI XV). Porto, Portugal (D, Zohary T, Gsith A., Goren M.).
- 2015 What femoral bone morphometry can tell us about the physical burden of early farmers at the advent of agriculture in the Southern Levant? The 84<sup>th</sup> Annual Meeting of the American Association of Physical Anthropologists, St. Luis, USA (May H and HersHKovitz I.).
- 2015 Wing deformations during maneuvering flight of the flower chafer, *Protaetia cuprea*: An overlooked aspect in the ecology and evolution of

- insect flight. Annual meeting Entomological Society of America (Meresman, Y, Husak JF and Ribak G).
- 2015 Wood Economy in Jerusalem during the Early Roman Period: A Dendroarchaeological Investigation (Poster and oral presentation, together with Helena Roth and Yuval Gadot). Where Are We Going? Limes Research in Germany and Israel, Mainz, Germany, (Langgut D.).
- 2015 Wood Economy in Jerusalem during the Early Roman Period: A Dendroarchaeological Investigation. Where Are We Going? Research in Germany and Israel, Mainz, Germany, (D. Langgut, H. Roth, Y. Gadot).
- 2015 13<sup>th</sup> International Congress on the Zoogeography and Ecology of Greece and adjacent regions. Heraklion, Greece (Meiri S.).
- 2015 Advances in research of weevils in Israel – the tribe Anthonomini in Israel (Curculionidae: Curculioninae). 34<sup>th</sup> Conference of the Entomological Society of Israel (Friedman, A.-L.-L.).
- 2015 Approaches in paleovegetation and paleoecological investigations. Annual Conference of IGRG (Israel Geomorphology Research Group) – “Transition Between Nature to Environment Along the Southeastern Mediterranean Coast”: Tel Aviv University, (Langgut D.).
- 2015 Interproximal wear patterns of the Middle Pleistocene (420-200 kyr). 5<sup>th</sup> annual meeting of the European Society for the study of Human Evolution, London, UK. (R Sarig, A Gopher, R Barkai, GW Weber, C Fornai, K Kupczik, E Schulz-Kornas, H May, I Hershkovitz.).
- 2015 Jerusalem animal economy in the Iron Age: the relationship between the central city and its hinterland. In: 12<sup>th</sup> meeting of the International Council of Archaeozoologists - Archaeology of South West Asia Working Group. Groningen, Holland (Sapir-Hen, L.).
- 2015 Late Bronze/Iron Age animal remains from Wadi Araba.: new perspectives. In: The Southern Levant and Arabia –Transitions and contacts in Late Bronze to Iron Age Periods workshop. Berlin, Germany (Sapir-Hen, L.).
- 2015 Society for Integrative and comparative Biology (SICB) annual meeting, West Palm Beach, Florida (Holzman R.).
- 2015 The 7<sup>th</sup> Meeting of the International Biogeography Society, Bayreuth, Germany (Meiri Shai and Daniel Simberloff).
- 2015 The coral reefs of Eilat: 45 years of coral community studies. One Ocean: Achieving Sustainability through Sanctuaries. Israel’s scientific representative at the United Nations: (Loya Y.)

## **Graduate students**

Much active scientific research is conducted by graduate students. Here we list the graduate students of faculty members affiliated with the the Steinhardt Museum of Natural History at Tel Aviv University. We list also a few graduate students from other institutions of higher education, but names and affiliations of many others from Israel and abroad who used the collections are unknown to us.

## **PhD students**

- 2005- Tal Levanony (T. Dayan)  
Patterns of biodiversity in natural and cultural landscapes: a model Mediterranean forest ecosystem.
- 2007-2015 Ronit Justo-Hanani (T. Dayan)  
Legal and administrative aspects of genetically modified organisms in Israel.
- 2008-2015 H. Cohen (I. Hershkovitz)  
Fracture characteristics
- 2008- Ariella Gotlieb (T. Dayan and Y. Mandelik)  
Agriculture and conservation in the Arava Valley
- 2008-2015 D. Stein (I. Hershkovitz)  
3D-Reconstruction of the vertebral
- 2009- Ittai Renan (A. Freidberg)  
Taxonomy and ecology of dune insects in the western Negev.
- 2009- Doron Shulz (Y. Benayahu)  
Sport fishing: ecological and economic implications.
- 2010-2015 Nir Stern (Goren M.)  
Systematic and phylogenetic of the family Clupeidae (Pisces).
- 2010- Anna Halaz (Y. Benayahu)  
Phylogeny of octocorals, family Xeniidae.

- 2010- Liron Goren (F. Ben-Ami)  
The evolutionary ecology of *Daphnia* and its microparasites in Israel.
- 2010- T Tunis-Sella (I. Hershkovitz)  
The chin.
- 2011- Itay Berger (T. Dayan).  
The influence of invasive Common Myna (*Acridotheres tristis*) on foraging and nesting behaviors of local *House Sparrow* (*Passer domesticus*)
- 2011- Victor China (Holzman R.)  
Hydrodynamics and Kinematics of prey capture in fish larvae
- 2011- 2015 A. Lavi (M. Ilan)  
Interactions within sponge microbial community.
- 2011- Rony Izhar (F. Ben-Ami)  
The evolution of virulence under conditions of frequent multiple infections.
- 2012- Orr Comay (T. Dayan).  
Owl pellet taphonomy and the paleoecology of Qesem Cave
- 2012- Laurent Davin, (D.E. Bar-Yosef Mayer, Boris Valentin, Francois Valla, and Anna Belfer-Cohen).  
At the dawn of the Neolithic, societies of the southern Levant through their ornament acquisition, manufacture and use on Natufian sites.
- 2012- Or Givan (Belmaker J.)  
Commonness and rarity in Mediterranean fishes.
- 2012- Boaz Grous (Langgut D. and O. Lipschits and Y. Gadot)  
The Carrying Capacity of Ella Valey during Historial Periods
- 2012- Roe Maor (T. Dayan).  
Evolutionary Trends in the Activity Patterns of Carnivores (Mammalia: Carnivora)
- 2012- Elizabeth Morgulis (Dorchin, N. and A. Freidberg).  
Phylogenetic classification of the genera *Acanthiophilus* Becker and *Tephritomyia* Hendel (Diptera: Tephritoidea: Tephritidae)



- 2012- Maria Novosolov (S. Meiri and D. Orme).  
Global lizard diversity.
- 2012- Einat Shachar (Dorchin, N.).  
Taxonomy and Ecology of oak gall wasps in Israel  
(Hymenoptera: Cynipidae)
- 2012- Itai van Rijn (Belmaker J.)  
The Seasonal growth and mortality in indigenous and invasive  
Mediterranean fishes.
- 2012- Bat-sheva (Shevy) Rothman (Goren M.)  
The phylogeny of Monogenea (Platyhelminth) fish parasites.
- 2013- Enav Vidan (Belmaker J. and Meiri S.)  
Functional diversity drivers – Palaearctic lizards at multiple  
scales..
- 2012- Zohar Yanai (Dorchin, N.).  
The mayflies (Insecta: Ephemeroptera) of Israel: taxonomic and  
ecological aspects
- 2012- Mey-Tal Yaniv (Shenkar, N.)  
Early detection of non-indigenous ascidians along the  
Mediterranean coasts of Israel.
- 2013- Aviv Avisar (DayanT.)  
Managing visitor impacts in the open landscapes of Israel.
- 2013- Maya Saar (Scharf, I.).  
Foraging behavior and personality of Messor ants under field  
conditions.
- 2013- Gal Eyal (Y. Loya)  
Biodiversity of Mesophotic (30-60 m depth) scleractinian corals  
in the Gulf of Eilat/Aqaba.
- 2013- Lee Eyal- Shacham (Y. Loya)  
Legislation of Marine Protected Areas in Israel: Mediterranean  
and Red Sea Reproductive strategies of deep reef (60 m depth)  
corals.

- 2013- Yuval Itescu (S. Meiri and P. Pafilis).  
Is evolution on islands special? Evolutionary pathways in an island lizard.
- 2013- Ya'arit Levitt (Shenkar N.)  
Diversity and spatial distribution of *Caridea* species along the coasts of Israel
- 2013- Opher Mendelssohn (Dayan T.)  
Regional management of pest control.
- 2013- Sigal Orlansky (F. Ben-Ami)  
The costs and benefits of resistance to parasites: The case of *Daphnia similis*.
- 2013- Tom Schlesinger (Loya, Y.)  
Recruitment of stony corals at the coral reefs of Eilat.
- 2013- Hilla Shamoun (Dayan T.)  
Anthropogenic effects on the carnivore guild in an agro-rural-natural landscape.
- 2013- Oliver Tallowin (S. Meiri and A. Allison).  
Evolution of reptiles along elevation gradients in a tropical island.
- 2013- Gadi Zeira (F. Ben-Ami)  
The influence of invading snails and their trematodes on freshwater habitats.
- 2014- Leigh Kroeger (Belmaker J.)  
Fish vulnerability to climate change and invasion.
- 2014- Tali Magoty Cohen (Dor R.)  
Ecology and genetics of a recent avian invasive species in Israel
- 2014- Liat Koch (Holzman R.)  
Functional morphology of the suction feeding mechanism in larval fishes
- 2014- Yonatan Meresman (Ribak G.)  
Evolution of wing elasticity in beetles (Coleoptera)
- 2014- Alex Slavenko (S. Meiri and A. Allison).  
Macroevolution and macroecology of mountain reptiles.

- 2014- Dayana Yahalomi (D. Huchon)  
Evolution of Myxozoan mitochondrial genomes.
- 2014- Stan Yavno (Holzman R.)  
Functional morphology of the suction feeding mechanism in larval fishes
- 2015- Daniel Berkowic (Dor R., Sapir N. and Leshem Y.).  
Movement ecology of overwintering black kites (*Milvus migrans*) in the North-West Negev.
- 2015- Noa Katz (Scharf, I.).  
Expression of AgRP in hydrodynamically-starved fish.

### **MSc students**

- 2007-2015 Thehila Nagar (M.Goren)  
Feeding habits in some freshwater fishes in Israel.
- 2009- Dolev Kastin (M. Goren)  
reproductive and growing biology of the cyprinid fish *Garra rufa*.
- 2010- Levona Bodner (A. Freidberg)  
The Tephritoidea (Diptera) of Israel
- 2010- Ariel Kedem (T. Dayan with N. Kronfeld-Schor)  
Snake predation risk on spiny mice.
- 2010-2015 Vivian Slone (I. Hershkovitz)  
Vertebral hemangiomas.
- 2011-2015 Ofir Gilad (Y. Benayahu and R. Haj Ali)  
Biomechanical properties of an octocoral collagen fibers
- 2011 -2015 Miriam Pines (Sapir-Hen L. and O. Tal)  
Crusader Diet: *Arsur* (*Apollonia-Arsuf*) as a Case Study in War and Peace.
- 2011- Yehala Roterman (Y. Benayahu and U. Gofna)  
Bacteria in invasive and indigenous bivalves.
- 2011-2015 Schwartz, I. (M. Ilan)  
Ecology and biotechnological application of the Red Sea sponge *Crella cyatopho*.

- 2011- Iris Wiseman (S. Meiri and M. Goren).  
Overfishing in Israel.
- 2012-2015 Gilad Danon (Dorchin, N.).  
Behavioral and ecological evidence for host associated  
differentiation in *Dasineuriola* sp. (Diptera: Cecidomyiidae).
- 2012-2015 Idan Hayon (Dorchin, N.).  
Taxonomy and biology of predatory gall midges (Diptera:  
Cecidomyiidae) on *citrus mealybugs* (Hemiptera: Pseudococcidae)  
in Israel.
- 2012- Yoni Alcalay (Scharf, I. and O. Ovadia).  
Behavioral syndromes of pit-building antlion larvae.
- 2012- Mark Cavanagh (Langgut, D. and E. Ben Yosef)  
Identifying the Wood Fuel that was used for Metalurgical  
Activity in Timna
- 2012- Farovich, Y. (M. Ilan)  
Antimicrobial natural products from sponge-associated bacteria
- 2012- Ehud Gilad (Benayahu, Y. and Y. Edelman-Furstenberg).  
Bivalve assemblages as environmental indicator.
- 2012- Idan, T. (M. Ilan)  
Sponges and corals of the Mediterranean mesophotic reefs
- 2012- Ohad Mass (S. Meiri).  
Latitudinal diversity of Israeli Mediterranean biome mammals.
- 2012- Naim, A. (M. Ilan Wageningen University)  
Analysis of steady state cell proliferation and shedding in a  
selection of Red Sea sponges.
- 2012- Noga Perry (Benayahu, Y. and U. Gofna).  
Bacteria induce metamorphosis of coral polyp larvae.
- 2012- Jonatan Reberger (F. Ben-Ami)  
Parasite-Mediated Determinants of Coexistence between Sexual  
and Asexual Host Snails.
- 2012- Erez Shoham (Benayahu, Y.).  
Soft corals of the mesophotic zone at Eilat (northern Red Sea).

- 2012- Ximena Velasquez Pedrosa (Benayahu, Y.).  
Flat worms (Platyhelminthes) of the Israeli Mediterranean and Eilat shallow habitats.
- 2012- Miri Zilka (Holzman R. and Eisenberg E.)  
The hydrodynamic basis of prey capture in low Re numbers
- 2013-2014 Alex Slavenko (S. Meiri and Panayiotis Pafilis).  
Evolution of life history in an Aegean-islands lizard.
- 2013-2015 Amir Lewin (S. Meiri ).  
Biogeography of the lizards of Africa.
- 2013-2014 Tal Amit (Loya, Y.)  
Microbial populations on corals in shallow and deep (mesophotic) coral populations.
- 2013- Yuval Baar (Scharf, I. and S. Meiri).  
The effect of climate on body size and shape of insects in Israel.
- 2013- Or Ben-Zvi (Loya, Y.)  
Fluorescence in shallow vs. deep water (mesophotic) corals.
- 2013- Davud Cumings (M. Goren)  
The impact of water level and habitat composition and structure on reproduction of cichlids in Lake Kinneret.
- 2013- Ori Frid (Belmaker J.)  
Ecological impacts of coastal fishing .
- 2013- Camelia Gochev (Benayahu, Y. and G. Zilman).  
Settlement of coral planulae in response to hydrodynamic conditions
- 2013- Itai Granot (Shenkar, N. and Y. Belmaker)  
Processes structuring the assembly of fouling communities.
- 2013- Ziv Kassner (Ribak G.)  
Sensory and mechanical constraints on target interception and flight control in Odonata
- 2013- Yanir Klein (Dayan T. and Kronfeld-Schor N.)  
Interspecific effects on spiny mouse reproduction

- 2013- Olga (Dayan T. and Kronfeld-Schor N.)  
Lead contamination in bats
- 2013- Renanel Pickholtz (Belmaker J.)  
Landscape ecology of invasive herbivorous fishes.
- 2013- Chen Piller (Benayahu, Y.).  
Environment friendly antifouling paints: efficiency and toxicity
- 2013- Margarita Pogorelov (Dayan T.)  
Economic aspects of crane management at the Hula wetland.
- 2013- Hanna Rapuano (Loya, Y.)  
Reproductive effort in fungiid corals.
- 2013- Yaniv Shmuel (Shenkar N.)  
Ecology and reproduction of *Halocynthia spinosa* in the Red Sea
- 2013- Erez Shpirer (D. Huchon)  
Identification of nematocyst-restricted genes in Myxozoa.
- 2013- Alex Slavenco (Meiri, S. and P. Pafilis)  
Evolution of life history in an Aegean-islands lizard.
- 2013 - 2015 Abra Spiciarich (Sapir-Hen L., O. Lipschits and Y. Gadot)  
Dietary Habits and Identity of Early Roman Jerusalem as Reflected in the Kidron Garbage Dump.
- 2013- Hadas Urca (F. Ben-Ami)  
The effects of temperature and food availability on multiple infections and virulence evolution.
- 2013- Michal Zeitzov (Dayan T.)  
Barn owls as biological control agents in the northern Negev
- 2014- Shay Adar (Scharf I. and Dor R.)  
Foraging behavior, habitat selection and intraspecific interactions of pit-building wormlions
- 2014- Ariel Akron (Dayan T.)  
Ecosystem services of Israeli wetlands
- 2014- Lior Avidan (Holzman R.)  
Assessment of fish community in the Northern Gulf of Aqaba (Eilat)

- 2014- Assaf Ben-David (Dayan T. and Itzhaki I.)  
The effect of encroaching pine forests on birds in Ramat Hanadiv
- 2014- Roy Ben Bezalel (F. Ben-Ami)  
Parasite-mediated determinants of coexistence between sexual and asexual host snails.
- 2014- Shachar Ben Cohen (Dor R.)  
Morphological, genetic and behavioral aspects with emphasis on invasive populations of the House Sparrow in Israel.
- 2014- Stav Brown (Ribak G.)  
Effect of larval growth on scaling of dispersal flight in beetles
- 2014- Lior Davis (Dayan T. and Meiri S.)  
Community-wide character displacement in shore birds.
- 2014- Liran Dray (D. Huchon)  
The complete mitochondrial genome of *Rhopalaea idoneta*.
- 2014- Bar Feldman (Loya, Y.)  
Reproductive strategies of selected mesophotic corals vs. shallow corals .
- 2014- Inbal Goldshtein (Dor R.)  
Breeding ecology of terns in Isra
- 2014- Tal Gordon (Shenkar N.)  
Ecological aspects of the tropical ascidian *Polycarpa cryptocarp*
- 2014- Mila Grinblat (Loya, Y.)  
Connectivity between mesophotic corals and shallow corals .
- 2014- Ophir Hirschberg (F. Ben-Ami)  
Sinkholes as a source of life in the Dead Sea.
- 2014- Ophir Hirschberg (F. Ben-Ami)  
How biotic and abiotic factors affect the infectiousness and development of *Pasteuria ramosa*.
- 2014- Yuval Jacobi ((Shenkar N. and G. Yahel)  
Ascidian filtration rates

- 2014 - Christina Jones (Sapir-Hen L., O. Lipschits and Y. Gadot)  
The Persian period at Azekah
- 2014- Noa Keidar (N. Dorchin)  
The role of enemy reduced space in host-associated differentiation of gall inducing midges
- 2014- Michaela Kolker (Holzman R.)  
morphological disparity in larval fishes
- 2014- Tzlil Labin (Dayan T. and Kronfeld-Schor N.)  
Light pollution in a desert community.
- 2014- Liraz Levi (Holzman R.)  
Quantifying suction flows in larval fishes
- 2014- Hadas Levin (May H.)  
3D geometric-morphometric analysis of the proximal femur: Shape as a risk factor for degenerative changes of the hip and hip fracture
- 2014- Nadine Santana-Magal (N. Dorchin)  
Development of a molecular barcode for identification of immature stages of bark and wood beetles
- 2014- Meoded, R. (M. Ilan and J. Piel)  
Sponge secondary metabolite pathways
- 2014 - Lee Oz. (Sapir-Hen L. and I. Finkelstein).  
The Iron IIA in the Ophel excavations
- 2014- Rachel Schwartz (S. Meiri and Panayiotis Pafilis).  
Island traits and the evolution of traits in the gecko, *Mediodactylus kotschy*.
- 2014- Weinberger, A (M. Ilan)  
Bacterial symbionts the Red Sea sponge *Theonella swinhoei* and their role in Arsenic (As) metabolism
- 2014- Yonatan Wexler (Scharf I.)  
Personality and the effect of stress on personality in the red flour beetle as a model
- 2014- Hanan Arafat (D. Huchon)  
The complete mitochondrial genome of *Rhopalaea idoneta*.



- 2014- Gila Hanuca (D. Gerling)  
Instar-related development of *Cales noacki*.
- 2015- Adi Ashkenazi (M. Ilan)  
Mediterranean Stryphnus from the deep sponge garden
- 2015 - Mordechai Benzaquen (Langgut D. and I. Finkelstein).  
The Archaeological Wood Remains of Tel Megiddo:  
Interpreting Environmental Conditions and Cultural Preferences  
Through the Analysis of Botanical Remains.
- 2015- Hezi Buba (Belmaker J.)  
Functional response in Mediterranean fishes.
- 2015- Mark Cavanagh (Langgut D. and E. Ben Yosef)  
An Anthracologic Investigation into Fuel Sources at the Iron  
Age Copper Smelting Site of Timna 34
- 2015- Idan Doyev (Belmaker J.)  
Comparing traits of invasive fishes in introduced and native  
ranges.
- 2015 - Iris Hershko (Sarig R.).  
Characterization of hunter-gatherers, early farming communities  
and modern populations in the Levant based on dental  
morphological traits and micro CT analysis.
- 2015 - Roni Hofein (D.E. Bar-Yosef Mayer, Oded Lipschits)  
The beads from Tel Azekah as a tool for dating and  
understanding the cultural, economic and trade connections at  
the site.
- 2015- Corrine Jacobs (Holzman R.)  
The evolution of suction flows in ray-finned fish
- 2015- Simon Jamison (S. Meiri and R. Dor)  
Natural history of little-known Israeli reptiles.
- 2015- Ben Laugomer (Langgut D, M. Bar-Matthews and I. Finkelstein)  
Paleoclimate in the southern Levant during the Bronze and Iron  
Ages based on isotop composition in Soreq Cave speleothems
- 2015- M Levi (M. Ilan)  
Mediterranean Irciniids from the deep sponge garden

- 2015- Nir Netanel (D. Gerling)  
Symbiosis in Lepidoptera.
- 2015 - Helena Roth (Langgut D. and Y. Gadot).  
Wood economy and botanical reconstruction of Early Roman  
Jerusalem
- 2014- Tal Rubin (Dayan T. and Kronfeld-Schor N.)  
Urban Bats.
- 2015- Guy Sinaiko (S. Meiri and R. Dor)  
Taxonomy and phylogeny of slender racers of the *Platyceps  
rhodorachis* complex.

## **Post-doctoral fellows**

2011-	Razi Hofman
2015	Achik Dorchin
2014	Rachel Sarig
2013-2015	Omri Bronstein
2013-	Meirav Meiri
2013-	Noga Sokolover
2014 -	Karin Tamar
2014-	Gidi Pizanty



## Visiting scientists at the Steinhardt Museum of Natural History

The attached list includes visitors from institutions **other than** Tel Aviv University who came personally to use the natural history collections of Tel Aviv University in the past academic year. Much use is made of the collections by additional scientists who did not visit them in person. Some scientists get identification services for their research projects and others have lists of specimens and locations mailed to them for various types of research. Moreover, during this period numerous parcels containing scientific materials were mailed abroad for researchers in their home institutions.

Date	Name	Institute	Country	Taxonomic group
2014 Oct	S. Vaisman	Ministry of Agriculture	Israel	Molluscs
2014 Oct	A. Dotan	Beit Berl	Israel	Molluscs
2014 Oct	Y. Segal	Israel Oceanographic and Limnological Research	Israel	Molluscs
2014 Oct	Maya	Israel Oceanographic and Limnological Research	Israel	Molluscs
2014 Oct	H. Shirihai		Israel	Birds
2014 Oct	V. A. Krassilov	Haifa University	Israel	Fossils
2014 Oct	S. Barinava	Haifa University	Israel	Fossils
2014 Oct	S. Freidline	Max Planck Institute for Evolutionary Anthropology in Leipzig	Germany	Anthropology
2014 Oct	I. Bergmann	Max Planck Institute for Evolutionary Anthropology in Leipzig	Germany	Anthropology
2014 Nov	S. Freidline	Washington University in Saint-Loui	USA	Anthropology
2014 Nov	S. Vaisman	Ministry of Agriculture	Israel	Molluscs
2014 Nov	Y. Achituv	Bar Ilan University	Israel	Crustacea
2014 Dec	S. Vaisman	Ministry of Agriculture	Israel	Molluscs

Date	Name	Institute	Country	Taxonomic group
2014 Dec	D. Zelig		Israel	Corals
2014 Dec	R. Gilad	Israel Nature and Parks Authority	Israel	Molluscs
2014 Dec	R. Keheti		Israel	Molluscs
2014 Dec	T. Guy-Haim	Israel Oceanographic and Limnological Research	Israel	Molluscs
2014 Dec	M. Segoli	Ben-Gurion University	Israel	Entomology
2014 Dec	Y. Marusik	Inst. For Biological Problems of the North, Magadan	Russia	Entomology
2014 Dec	E. Głowska	Faculty of Biology ,Umultowska	Poland	Mammals
2015 Jan	S. Vaisman	Ministry of Agriculture	Israel	Molluscs
2015 Jan	E. Heyfetz		Israel	Molluscs
2015 Jan	E. Stelzer	Tel Aviv Performing Arts Center	Israel	Mammals and Birds
2015 Jan	Y. Marusik	Inst. For Biological Problems of the North, Magadan	Russia	Entomology
2015 Jan	T. Assman	Institute of Ecology, Leuphana University	Germany	Entomology
2015 Feb	S. Vaisman	Ministry of Agriculture	Israel	Molluscs
2015 Feb	S. Levy	Haifa University	Israel	Entomology
2015 Feb	B. Sandler	Haifa University	Israel	Entomology
2015 Feb	R. Shapir	Haifa University	Israel	Entomology
2015 Feb	G. Ballantyre	University of St. Andrew	Ukraine	Entomology
2015 Feb	M. Mandelshtam	St. Petersburg State Forest Technical University	Russia	Entomology
2015 Feb	N. Khabarova	St. Petersburg State Forest Technical University	Russia	Entomology
2015 Feb	M. Spodek	Museum Basel	Switzerland	Entomology
2015 Mar	S. Vaisman	Ministry of Agriculture	Israel	Molluscs
2015 Mar	G. Wagner	Hamburg	Germany	Entomology

Date	Name	Institute	Country	Taxonomic group
2015 Mar	C. Wagner	Hamburg	Germany	Entomology
2015 Mar	C. Drees	Institute of Zoology, Hamburg	Germany	Entomology
2015 Mar	C. Raevsky	KKL	Israel	Entomology
2015 Mar	N. Gishon	University of Texas Southwestern, Dallas	USA	Entomology
2015 Apr	S. Vaisman	Ministry of Agriculture	Israel	Molluscs
2015 Apr	Y. Shomrony	Israeli Educational Television	Israel	Entomology
2015 Apr	D. Cohen	Israeli Educational Television	Israel	Entomology
2015 Apr	P. A. Eyer	University of Brussels	Belgium	Entomology
2015 Apr	N. Gishon		USA	Entomology
2015 Apr	T. Assmann	Institute of Ecology, Leuphana University	Germany	Entomology
2015 May	S. Vaisman	Ministry of Agriculture	Israel	Molluscs
2015 May	R. Friuke	State Museum Stuttgart	Germany	Fish
2015 Jun	S. Vaisman	Ministry of Agriculture	Israel	Molluscs
2015 Jun	J. Costa	Instituto Oswaldo Cruz	Brazil	Entomology
2015 July	S. Vaisman	Ministry of Agriculture	Israel	Molluscs
2015 July	Z. Amar	Bar Ilan University	Israel	Mammals and Birds
2015 July	N. Alon	Israel Ornithology Center	Israel	Birds
2015 Aug	S. Vaisman	Ministry of Agriculture	Israel	Molluscs
2015 Aug	Y. Segal	Israel Oceanographic and Limnological Research	Israel	Molluscs
2015 Aug	Y. Deks	The Society for Protection of Nature in Israel	Israel	Birds
2015 Aug	Y. Rand	Israel Ornithology Center	Israel	Birds
2015 Sep	S. Vaisman	Ministry of Agriculture	Israel	Molluscs
2015 Sep	D. Benyamini		Israel	Entomology
2015 Sep	N. Shamir	Hebrew University	Israel	Entomology

Date	Name	Institute	Country	Taxonomic group
2015 Sep	Y. Chiat	Israel Ornithology Center	Israel	Birds
2015 Sep	A. Ben-Dov	Israel Ornithology Center	Israel	Birds
2015 Oct	S. Vaisman	Ministry of Agriculture	Israel	Molluscs
2015 Oct	E. Zchori-Fein	Newe Ya'ar Research Center	Israel	Entomology



## Support for academic and other courses

The natural history collections are university-based and as such, their role is also to promote higher education. Some courses are TAU courses, several of which are our compulsory first and second year courses, taught to hundreds of students; however, other universities (Technion, University of Haifa, Open University) use our facilities for their specialized courses, as does the Avshalom Institute. Many Nature Campus activities also take place using the collections for varied audiences.

Purpose	Name	Institute	Taxonomic group
Faunistics of Aves (academic course)	Y. Yom-Tov and E. Geffen	Tel Aviv University	Birds, Taxidermist and Museum Class
Insects the Flagship of Biodiversity (academic course)	A. Freidberg, Dorchin, N. and D. Simon	Tel Aviv University	Entomology
Parasitoids (academic course)	D. Gerling	Tel Aviv University	Entomology
Macroecology (academic course)	S. Meiri	Tel Aviv University	Birds, Mammals and Reptilia
Introduction to animal life – vertebrates (academic course)	S. Meiri	Tel Aviv University	Birds, Mammals and Reptilia
Zoological garden and Natural History Museum tours (academic course)	S. Meiri	Tel Aviv University	Birds, Mammals and Reptilia
Introduction to Animal Kingdom: Invertebrates and Vertebrates (academic course)	A. Abelson and S. Meiri	Tel Aviv University	Mammals
Introduction to Archaeozoology	L. Sapir Chen	Tel Aviv University	Mammals
Archaeozoology workshop	L. Sapir Chen	Tel Aviv University	Mammals, Fish and Museum Class

Purpose	Name	Institute	Taxonomic group
Animal remains in archaeology	L. Sapir Chen	Tel Aviv University	Mammals
Vertebrates Anatomy (academic course)	D. Eilam, M. Ovadia and U. Oron	Tel Aviv University	Reptilia, Mammals and Taxidermist
The Invertebrates: Comparative Functional Biology (academic course)	M. Ilan, Y. Benayahu and N. Shenkar	Tel Aviv University	Invertebrates, Entomology and Histology
Ichthyology (academic course)	M. Goren	Tel Aviv University	Fishes and Museum Class
Trips in the experimental zoo and Natural History Museum (academic course)	T. Dayan	Tel Aviv University	Birds, Mammals and Reptilia
Biology and Systematic of Marine Invertebrates: (academic course)	Y. Benayahu	Interuniversity Institute for Marine Sciences	Invertebrates
Topics in Fish Biology (academic course)	R. Holzman and M. Kiflawi	Interuniversity Institute for Marine Sciences	Fishes
Osteology And Anthropology (academic course)	I. Hershkovitz	Tel Aviv University	Anthropology
Physical Anthropology (academic course)	Y. Rak	Tel Aviv University	Anthropology
Chapters in Human Evolution (academic course)	Y. Rak	Tel Aviv University	Anthropology
Human Evolution: fossil evidences (academic course)	Y. Rak	Tel Aviv University	Anthropology
Dental Anthropology (academic course)	R. Sarig	Tel Aviv University	Anthropology
From gatherers to eradicators? (academic course)	D. Langgut	Tel Aviv University	Palynology and Archaeobotany
Plants of the Bible (academic course)	D. Langgut	Tel Aviv University	Palynology and Archaeobotany

Purpose	Name	Institute	Taxonomic group
Reconstruction of past environmental conditions and site's environs (academic course)	D. Langgut	Tel Aviv University	Palynology and Archaeobotany
Faunistics (academic course)	Z. Arad	Technion	Birds, Mammals and Museum Class
Faunistica (academic course)		Open University	Birds, Mammals and Museum Class
Bird-Watching		Israeli Air Force	Birds and Museum Class
Bird-Watching		The Society for the Protection of Nature in Israel	Mammals, Birds and Museum Class
Various seminars	Nature Campus	Tel Aviv University	Mammals, Birds, Entomology and Museum Class
Guided tours to schoolchildren	Nature Campus	Tel Aviv University	Mammals, Birds, Entomology and Museum Class



## Support for various individuals and organizations

The Steinhardt Museum function as a national collection, by providing services to the scientific committee, as well as to other organizations and, to the best of our abilities under currently constrained conditions, also to the general public. Here we list a **sample** of the services provided by the collections in the past academic year. We apologize that the list is not full, but in the current conditions of under-staffing we are unable to dedicate the human-power to monitor and record all such activities.

Purpose	Name	Institute	Taxonomic group
Taxonomy Identification		Israel Antiquity Authority	Archaeobotanica
Taxonomic guidance (learning the procedure)	V. Sepliarsky	Plant Protection and Inspection Services	Entomology
Taxonomy Identification		Plant Protection and Inspection Services	Entomology
Taxonomy Identification		Israel Nature and Parks Authority	Entomology
Taxonomy Identification		Ministry of Environmental Protection	Entomology
Taxonomy Identification		Ministry of Health	Entomology
Taxonomy Identification		Ministry of Agriculture	Entomology
Taxonomy Identification		Israel Defense Forces	Entomology
Taxonomy Identification		Hebrew University	Entomology
Taxonomy Identification		Porter School for Environmental Sciences	Entomology
Taxonomy Identification	I. Renan	Israel Nature and Parks Authority	Entomology
Taxonomy Identification		Ben Gurion University	Entomology
Taxonomy Identification		The Israel National Aquatic Ecology Center	Entomology
Taxonomy Identification		Ministry of Agriculture	Arachnidae

Purpose	Name	Institute	Taxonomic group
Taxonomy Identification	S. Vaisman	Plant Protection and Inspection Services	Molluscs
Taxonomy Identification	E. van dan Brink	Israel Antiquity Authority	Molluscs
Taxonomy Identification	A. M. Maeir	Israel Antiquity Authority	Molluscs
Taxonomy Identification	O. Tal	Israel Antiquity Authority	Molluscs
Taxonomy Identification	Z. Dvira	Israel Antiquity Authority	Molluscs
Taxonomy Identification	I. Hirschfeld	Israel Antiquity Authority	Molluscs
Taxonomy Identification	S. Dar	Israel Antiquity Authority	Molluscs
Taxonomy Identification	O. Gutfeld	Israel Antiquity Authority	Molluscs
Taxonomy Identification	N. Avigad	Israel Antiquity Authority	Molluscs
Taxonomy Identification	H. Geva	Israel Antiquity Authority	Molluscs
Taxonomy Identification	E. Sheffer	IOLR - Haifa	Molluscs
Taxonomy Identification	H. Lubinevsky	IOLR - Haifa	Molluscs
Taxonomy Identification	B. Rinkevitch	IOLR - Haifa	Molluscs
Taxonomy Identification	D. Milstein	Israel Nature and Parks Authority	Molluscs
Taxonomy Identification	Enforcement Distric	Israel Nature and Parks Authority	Molluscs
Taxonomy Identification	North Distric	Israel Nature and Parks Authority	Molluscs
Taxonomy Identification	R. Yahel	Israel Nature and Parks Authority	Molluscs
Taxonomy Identification	A. Dotan		Molluscs
Taxonomy Identification	E. Elron	DHV MED	Molluscs
Taxonomy Identification			Molluscs

Purpose	Name	Institute	Taxonomic group
Taxonomy Identification			Molluscs
Taxonomy Identification	I. Sella	SeArc Company	Molluscs
Taxonomy Identification	Y. Achitov	Bar Ilan University	Invertebrates: Stony Corals
Taxonomy Identification		IOLR - Haifa	Fishes
Taxonomy Identification	I. Sella	SeArc Company	Fishes
Taxonomy Identification	D. Milstein	Israel Nature and Parks Authority	Crustacean
Taxonomy Identification	H. Lubinevsky	Israel Oceanographic and Limnological Research	Crustacean
Taxonomy Identification	I. Sella	Searc-consulting	Crustacean
Taxonomy Identification	E. Elron	DHV MED	Crustacean
Taxonomy Identification	R. Yahel	Israel Nature and Parks Authority	Spong
Taxonomy Identification		Ma'arag	Spong
Taxonomy Identification	I. Sella	SeArc Company	Spong
Taxonomy Identification	R. Yahel	Israel Nature and Parks Authority	Bryozoa
Taxonomy Identification	I. Sella	SeArc Company	Bryozoa
Taxonomy Identification	I. Sella	SeArc Company	Echinodermata
Taxonomy Identification	R. Yahel	Israel Nature and Parks Authority	Algea
Taxonomy Identification		Israeli Air Force	Mammals
Taxonomy Identification		Israel Nature and Parks Authority	Mammals
Taxonomy Identification		Israeli Air Force	Birds
Taxonomy Identification		Israel Airport Authority	Birds
Taxonomy Identification		Israel Nature and Parks Authority	Birds
Molecular identification	D. Milstein	Israel Nature and Parks Authority	Fishes
Molecular identification		Israel Airport Authority	Birds

Purpose	Name	Institute	Taxonomic group
Molecular identification	G. Shenbrot	Ben-Gurion University	Reptilia
Molecular identification	D. Milstein	Israel Nature and Parks Authority	Crustacean
DNA Shipment	N. Saino	Italy	Mammalia
DNA Shipment	L. Kratochvil	Charles University in Prague, Czech Republic	Reptilia
DNA Shipment	N. Poulakakis	The Natural History Museum of Crete, Greece	Reptilia
Electronic Data	E. Elron	DHV MED	Invertebrates
Electronic Data	D. Milstein	Israel Nature and Parks Authority	Fishes
Electronic Data	B. Rinkevitch	IOLR - Haifa	Fishes
Electronic Data	N. Poulakakis	The Natural History Museum of Crete, Greece	Reptilia
Electronic Data	I. Agarwal	NCBS, Bangalore	Reptilia
Electronic Data	S. Carranza	Institute of Evolutionary Biology, Spain	Reptilia
Electronic Data	R. Zidon	Hebrew University	Reptilia
Electronic Data	I. Tsurim	Achva Academic College	Mammals
Electronic Data	E. Hadad	Israel Nature and Parks Authority	Mammals
Electronic Data	T. Iwamura	Stanford University, USA	Amphibians, Mammals, Birds, Reptiles
Shipment of Specimens	S. Goldberg	Whittier College, USA	Reptilia
Shipment of Specimens	S. Baeckens	The University of Antwerp, Belgium	Reptilia
Shipment of Specimens	D. Zelig	Hilversum, the Netherlands	Molluscs
Shipment of Specimens	M. Hugues	Uppsala University, Sweden	Sponges



Purpose	Name	Institute	Taxonomic group
Shipment of Specimens	O. Grauby	Campus Luminy, France	Soft Corals
Shipment of Specimens	A. Cabrinovic	Cromwell Road, England	Soft Corals
Shipment of Specimens	C.S. McFadden	Harvey Mudd College, USA	Soft Corals
Shipment of Specimens	L. van Ofwegen	National Museum of Natural History , Leiden The Netherlands	Soft Corals
Shipment of Specimens	A. Zitek	University of Natural Resources and Life Sciences, Vienna (BOKU-UFT), AUSTRIA	Soft Corals
Shipment of Specimens	M.M. Gilis	Ecole Polytechnique Fédérale de Lausanne, Switzerland	Soft Corals
Shipment of Specimens	D. Burckhardt	Naturhistorisches Museum	Entomology
Shipment of Specimens	G. Japoshvili	Agricultural University of Georgia, Ukraim	Entomology
Shipment of Specimens	M.R. Wilson	Department of Natural Sciences, National Museum of Wales, England	Entomology
Shipment of Specimens	J. Ziegler	Museum für Naturkunde, Germany	Entomology
Shipment of Specimens	P. Sprick		Entomology
Shipment of Specimens	G. Alziar		Entomology
Shipment of Specimens	C. Germann	Abteilung Wirbellose, Naturhistorisches Museum der Burggemeinde Bern, Germany	Entomology
Shipment of Specimens	C. O'Toole		Entomology

Purpose	Name	Institute	Taxonomic group
Shipment of Specimens	T. Keasar	University of Haifa - Oranim	Entomology
Shipment of Specimens	R. Borovec		Entomology
Shipment of Specimens	J. Hájek	National Museum, Natural History Museum	Entomology
Shipment of Specimens	J. Skuhrovec	Group Function of Invertebrate and Plant Biodiversity in Agrosystems, Crop Research Institute	Entomology
Shipment of Specimens	R. Beck	Institut für Ökologischen Landbau, Bodenkultur und Ressourcenschutz, Humushaushalt, , Denmark	Entomology
Shipment of Specimens	P. Sehnal	Naturhistorisches Museum Wien, Austria	Entomology
Shipment of Specimens	H.P.. Tschorsnig	Museum für Naturkunde, Germany	Entomology
Shipment of Specimens	K. Schön		Entomology
Shipment of Specimens	M.Y. Mandelshtam	Zoological Institute Russian Academy of Sciences, Russia	Entomology
Shipment of Specimens	Kostal	Pau France	Entomology
Shipment of Specimens	J. Růžička	Faculty of Environmental Sciences, Czech University of Life Sciences, Czech Republic	Entomology
Shipment of Specimens	J. Bezdek	Mendel University, Dept. of Zoology, Czech Republic	Entomology
Shipment of Specimens	I. L. Fiorini de Magalhães	División Aracnología, Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Argentina	Entomology

Purpose	Name	Institute	Taxonomic group
Shipment of Specimens	S. Salata	Department of Biodiversity and Evolutionary Taxonomy, University of Wroclaw, Poland	Entomology
Shipment of Specimens	S.V. Triapitsyn	Department of Entomology, University of California, USA	Entomology
Shipment of Specimens	E.M. Davidian	All-Russian Institute of Plant Protection, (FSBSI VIZR), Lab of biological control, Russia	Entomology
Shipment of Specimens	O. Bistrom	Zoological Museum, University of Helsinki, Finland	Entomology
Shipment of Specimens	H.-Y. Han	Department of Life Science, Yonsei University, Korea	Entomology
Shipment of Specimens	C. J. Barros de Carvalho	Departamento de Zoologia, Universidade Federal do Paraná, Brazil	Entomology
Shipment of Specimens	E. Scheuchl		Entomology
Shipment of Specimens	S. Risch	Austria	Entomology
Shipment of Specimens	M. Terzo	Université De Mons, Belgique	Entomology
Shipment of Specimens	C. Praz	Eth Zurich, University of Neuchatel, Switzerland	Entomology
Shipment of Specimens	F. Dathe	Deutsches Entomologisches Institut, Leibniz-Zentrum für Agrarlandschaftsforschung Germany	Entomology
Shipment of Specimens	N. Nieser	Naturalis Biodiversity Center, Netherlands	Entomology
Shipment of Specimens	A. Mueller	Entomological Collection, ETH Zurich, Switzerland	Entomology

Purpose	Name	Institute	Taxonomic group
Shipment of Specimens	A. Pauly	Institut royal des Sciences naturelles de Belgique, Departement Entomologie, France	Entomology
Shipment of Specimens	Schwarz	Austria	Entomology
Shipment of Specimens	T. Assmann	Institute of Ecology, Leuphana University Lüneburg, Germany	Entomology