

THE STEINHARDT
**museum
& natural
history**
ISRAEL NATIONAL CENTER
FOR BIODIVERSITY STUDIES

Annual Report
2015/2016

**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

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Website: <http://mnh.tau.ac.il/>

For copies please contact: Revital Ben-David-Zaslow 03-6409042
revitbd@post.tau.ac.il

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SCIENTIFIC AND PUBLIC COUNCIL

The Steinhardt Museum of Natural History recognized as a project of national significance. The Scientific and Public Council comprises leaders in their respective fields who represent the public interest, whether in science, education, culture, or tourism.

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SCIENTIFIC AND PUBLIC SUPERVISION

Board of Directors Aharon Fogel, Itamar Borowitz, Ami Federman, Izhar Kanne, Doron Sapir, Dudu Zaken, Motti Kohn, and Neri Azogui.

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), Ronen Kadmon, Ehud Spanier, Menny Kirma

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

STAFF

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Deputy-Chair: Menachem Goren

Director: Alon Sapan

Head of Marketing: Tamar Zadok

Head of Operation: Maya Katorza

COLLECTIONS AND RESEARCH DIVISION

Museum Committee: Tamar Dayan (chair), Menachem Goren, Alon Sapan, Revital Ben-David-Zaslow, Shai Meiri, Roi Dor, Eli Geffen, Yossi Yovel, Yoni Belmaker, Roi Holtzman, Noa Shenkar, Frida Ben-Ami, Micha Ilan, Netta Dorchin, Amnon Freidberg, Moshe Guershon, Gal Ribak, Inon Scharf, Dorothee Huchon, Israel Hershkovitz, Hilla May, Rachel Sarig, Dafna Langgut, Lidar Sapir, Yael Gavrieli

Chief Collections Manager: Revital Ben-David-Zaslow

IT Coordinator: Tirza Stern

Terrestrial Vertebrates

- Shai Meiri – Curator (reptiles, mammals, and birds)
- Roi Dor – Curator (birds)
- Eli Geffen – Curator (mammals, amphibians, and reptiles)
- Tamar Dayan – Curator (mammals)
- Yoram Yom-Tov – Curator emeritus (mammals)
- Yossi Yovel – Associate Curator (bats)
- Amos Belmaker – Collections manager (birds)
- Erez Maza – Collections manager (reptiles)
- Kesem Kazes – Collections manager (mammals)
- Avigail Ben-Dov Segal – Technical assistance (birds, feathers)
- Arieh Landsman – Volunteer technical assistant
- Igor Gavrillov – Taxidermist
- Stanislav Volynchik – Taxidermist
- Hamotal Fridman – Technical Assistant in taxidermy

Fishes

- Menachem Goren – Curator Emeritus
- Jonathan Belmaker – Curator
- Roi Holzman – Curator
- Nir Stern – Associate Curator (IOLR)
- Bat-Sheva Rothman – Technical support

Invertebrates

- Noa Shenkar – Curator (ascidians)
- Micha Ilan – Curator (sponges)
- Frida Ben-Ami – Curator (mollusks)
- Stanislav Pen-Mouratov – Curator (nematodes)
- Yehuda Benayahu – Curator Emeritus (soft corals)
- Bella Galil – Associate Curator (IOLR & TAU) (Crustaceans)
- Henk Mienis – Collections Manager (mollusks)
- Oz Rittner – Collections Manager (mollusks beetles and butterflies)
- Sigal Shefer – Collections Manager (sponges)
- Ya'arit Levitt – Technical Assistant (crustaceans)
- Alex Shlagman – Collections Manager (soft corals)

Entomology

- Netta Dorchin – Chief Curator (flies)
 - Gal Ribak – Curator (beetles)
 - Vladimir Chikatunov – Curator (beetles)
 - Vassily Kravchenko – Curator (moths)
 - Sergey Zonstein – Curator (spiders)
 - Mike Mostovski – Curator (flies)
 - Amnon Freidberg – Curator Emeritus (flies)
 - Inon Scharf – Associate Curator
 - David Furth – Associate Curator (Smithsonian Institution & TAU) (beetles)
 - Yael Mankelik – Associate Curator (Hebrew University of Jerusalem) (bees)
 - Moshe Guershon – Collections Manager (bees) and Staff Director for Entomology
 - Ariel-Leib-Leonid Friedman – Collections Manager (beetles)
 - Armin Ionescu – Collections Manager (ants)
 - Tatyana Novoselsky – Collections Manager (bugs)
 - Zoya Yefremova – Collections Manager (parasitic wasps)
 - Wolf Kuslitzky – Collections Manager (parasitic wasps)
- Avi Keysari – Volunteer (Palmoni Collection)

Molecular systematics

- Dorothee Huchon – Curator
- Tamar Feldstein-Farkash – Collections Manager

Paleontology

- Youri Katz – Curator
- Olga Orlov-Labkovsky – Curator (micropaleontology)
- Sigal Abramovich – Associate Curator (Ben Gurion Univ. of the Negev)
- Daniella Bar-Yosef – Collections Manager

Herbarium

- Bruria Gal – Collections Manager (fungi)
- Nissan Binyamini – Curator Emeritus (fungi)
- Jacob Garty – Curator Emeritus (lichens)
- Ya'akov Lipkin – Curator Emeritus (algae)

Biological archeology

- Dafna Langgut – Curator (palynology and archeobotany)
 - Lida Sapir – Curator (zooarcheology)
- Meirav Meiri – Ancient DNA Lab Manager

Physical Anthropology

- Israel Hershkovitz – Curator
- Hilla May – Curator
- Rachel Sarig – Curator
- Yoel Rak – Curator Emeritus
- Baruch Arensburg – Curator Emeritus
- Julia Abramov – Collections Manager
- Shirly Cohen – Technical Assistant
- Linoy Namdar – Technical Assistant
- Adi Egozi – Technical Assistant

APPLIED RESEARCH DIVISION

Applied research institutes/laboratories/programs operating in the Center have each their own steering committees or boards of directors and academic/professional oversight.

National Center for Aquatic Ecology

- Yaron Hershkovitz, Director
- Tuvia Eshcoly, Biologist
- Adi Weiss, Ofir Hirshberg

HaMaarag – Israel's Nature Assessment Program

- Irina Levinsky, Director,
- Idan Shapira, Alon Lotan, Michal Sorek, Ron Drori, Harel Dan, Hila Shamoon, Noa Zanzuri

The Open Landscapes Institute

- Uri Ramon, Director
- Liron Amdor, Head of the Research Unit
- Gal Kagan, Noa Zanzuri, Amir Perelberg, Eitan Romem, Merav Lebel, Bar Shemesh, Miryam Ron, Amit Mendelson, Idan Talmon, Oren Hoffman, Hila Gil, Uri Shapira

Entomological Laboratory for Ecological Monitoring

- Ittai Renan, Director,
- Lilah Raijman, Naama M Kopelman, Shahar Argaman, Shifra Briga, Ahikam Gera

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.

- Dr. Menachem Goren and Dr. Frida Ben-Ami – Directors
- Daniella Bar-Yosef^f, Coordinator, the Israel Taxonomy Initiative

PUBLIC DIVISION

- Yael Gavrieli, Head of Education
- Ilil Pratt
- Dafna Lev
- Irit Sidis
- Chen Biton
- ~30 graduate students as guides

EXHIBITIONS TEAM

- Gev Weil – Project Manager
- Eli Gdulin – Project manager
- Adi Malol – Technical Support, Project manager
- Naama Berg – Scientific Curator of Exhibitions
- Hadas Zemer – Curator of Exhibitions
- Hagai Segev – Curator of Exhibitions
- Halina Hamou – Principal Designer
- Eran Yuval – Multimedia Manager
- Gaudeamus Productions – Multimedia Productions
- Exhibition Designers: Nitzan Studio, Studio Amir Zehavi, Design Mill Studio, Tucan Design Studio, Ori Glazer

PROGRESS AT 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 private or institutional collections. The collecting activities comprise focused expeditions as well as 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 other holdings, preserving and digitizing them, as well as managing the collections, data, and the network of collectors and researchers, 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 to Mike Mostovski and Daniella Bar-Yosef Mayer for their editorial input. Here a glimpse over the behind-the-scenes activities pertaining to the collections management is provided: 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 curate and promote the collections. We continue to collect and preserve new scientific material, rescue and incorporate important private and institutional collections, maintain the existing holdings, send scientific material and data abroad, and assist graduate students, academic courses, and educational activities.

During the academic year 2015/2016 we received and incorporated almost 56,000 new specimens of various taxonomic groups collected worldwide by the collection curators and staff, students, rangers from the Israel Nature and Parks Authority, and others.

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 200 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 the collections staff is excellent. We give students support in all fields including preservation, identification, labeling, and cataloguing. Students of Tamar Dayan have transferred a very large collection of mammals, amphibians, reptiles, and arthropods caught in pitfall traps to the museum. Collaboration with the laboratory of Yael Mandelik from the Faculty of Food and Agricultural Environmental Quality Sciences of the Hebrew University of Jerusalem, who studies wild bee pollination, has been fostered. All the Hymenoptera specimens assembled during the latter research are properly labeled and have museum catalog numbers. At the end of the study the material will be incorporated into our collection. 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, Inon Scharf, Gal Ribak, Moshe Guershon, Vladimir Chikatunov, Vasilyi Kravchenko, Sergei Zonstein, Mike Mostovski, Zoya Yefremova, Tanya Novoselsky, Wolf Kuslitzky, Armin Ionescu, Dany Simon, Tirza Stern, Leonid Friedman, Alex Shlagman, Oz Rittner, Liz Morgulis, Miriam Kishinevsky, Avi Keysari, David Furth, Binyamin Shalmon, Amir Weinstein.

Curatorial, sorting and identification

General: all material is being routinely prepared by all curators and collection managers for transfer to the new museum building. This includes transferring to standard drawers and cabinets and labeling them accordingly (individual identifiers, stabilizing specimens, etc.).

Diptera:

M. Mostovski has sorted and databased ca. 500 Asilidae specimens and ca. 400 shoot fly specimens (Muscidae: *Atherigona* s.str.). The Afrotropical Asilidae material has been sent to Dr J. Londt (KwaZulu-Natal Museum, South Africa), who agreed to identify it. In the Phoridae collection, eight genera and 18 species are newly recorded for the country, which increases the Israeli scuttle-fly fauna from 14 to 22 genera and from 56 to 74 species. An identification key to the Israeli genera of scuttle flies and notes on

the identification and/or life history of individual species have been published to facilitate further studies. Two scuttle fly species are recorded in association with commercially grown summer truffles in northern Israel; this prompts further investigation of phorids as potential agricultural pests in the country.

Hemiptera:

- T. Novoselsky sorted and organized the material of three families, Anthocoridae, Cimicidae and Notonectidae.
- Several hundreds of aphids collected on various agricultural crops and forest trees as part of a study supported by the Ministry of Agriculture to N. Dorchin were databased and sent for identification abroad. Identifications were received in January 2017.

Hymenoptera:

- Bees: All unidentified *Andrena* specimens (thousands) that could be located in the museum bee collection were sorted by G. Pisanty to subgenera, and the great majority was identified to the species level. 3574 bee specimens collected this year (by G. Pisanty and students from Yael Mandelik's lab) were sorted to the genus/tribe and identified to species level (mostly *Andrena* spp.) or sent abroad for identification by other experts. 1918 *Andrena* specimens collected in recent years by students from Yael Mandelik's lab were identified to species.
- Parasitic Hymenoptera: W. Kuslitzky sorted all newly collected material to families and subfamilies. Reared specimens (80% of the collected material) were determined to species. Israeli Tersilochinae (120 specimens) were sent abroad for identification.
- Parasitic Hymenoptera (Aphidiinae): Hundreds of specimens reared from aphid hosts as part of a grant from the Ministry of Agriculture to N. Dorchin were pinned, databased and sent for identification abroad.
- Several hundreds of parasitic wasps of various families reared from *Suaeda* species by N. Dorchin and students were pinned, databased and sorted.
- Cynipidae: The growing cynipid collection (several thousand specimens – all reared from known galls on oaks) were sorted to the species level, databased and transferred to new drawers and cabinets.

Arachnida:

S. Zonstein identified a total of 16 new species within the genera *Pionothele* Purcell, 1902 (1 species), *Atmetochilus* Simon, 1887 (3 species) and *Zaitunia* Lehtinen, 1967 (12 species).

Professional work abroad

W. Kuslitzky visited the Schmalhausen Institute of Zoology of the National Academy of Sciences of Ukraine (Kiev) in July, where he worked in the collection. As a result, material sent in previous years to colleagues for taxonomic treatment (including holotypes of new species) has been returned.

Z. Yefremova visited several institutions to work with collections and colleagues: August – Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia; September – Zoologische Staatssammlung, Munich, Germany; November – Smithsonian Institution, Washington, USA.

S. Zonstein made two long-term work visits to the Zoological Museum of Turku University, Finland.

L. Friedman went on a four-day (June 27–30) collecting trip to the Kefalonia Island, the largest of the Ionian Islands, to study its weevil fauna and particularly for collecting the rare and endemic *Brachycerus graecus*. He surveyed a wide range of biotopes: hills covered by Mediterranean maquis, seashore, salt marshes and a forest of the endemic Kefalonian fur-tree at high altitudes (Mount Ainos, 1,600 m a.s.l.), and collected overall 1,656 insect specimens, including 54 species of weevils (more than what had been known

from Kefalonia). Travel expenses were covered by the David Furth Systematic Entomology Fellowship, the Department of Zoology, TAU.

G. Pisanty visited the Natural History Museum (Biologiezentrum) in Linz, Austria, in July, to work with Erwin Scheuchl and to examine specimens in Warncke's collection and compare them to our specimens. Twenty-four *Andrena* species new to science and 10–15 species new to Israel were discovered among our material. The trip was generously funded by the David Furth Systematic Entomology Fellowship, the Department of Zoology, TAU.

Integration of “orphan collections”

The sorting and transfer of the Q. Argaman collection from the Plant Protection Services, Ministry of Agriculture, to standard insect drawers and cabinets of the SMNH was completed.

The Bet Ussishkin Insect collection was transferred to the SMNH standard insect drawers.

We started to integrate the late Yuri Ptashkovsky collection, an amateur entomologist from Haifa (Qiryat Hayyim), which was donated by his family. The collection amounts to ca. 4,000 specimens, comprising mainly specimens from Israel and Ukraine: Coleoptera (23 boxes), Lepidoptera (4 boxes), Dictyoptera (2 boxes), Hemiptera (2 boxes), Hymenoptera (2 boxes), Orthoptera (2 boxes), Diptera (1 box), Odonata (1 box), small orders (Dermaptera, Neuroptera, Trichoptera) (1 box) and 5 boxes with unsorted insects and various arthropods.

We accepted two small but valuable collections of weevils (Curculionoidea) (from Crimea and from Central and Southern Europe), and a small collection of identified tropical clown-beetles (Histeridae), donated by colleagues from Russia and the Czech Republic.

Identification Services

Ministry of Agriculture Plant Protection Services: 88 requests, 372 identified specimens.

Entomology Course: The Insect Faunistics student collections (15 collections, ca. 100 specimens each) were identified by all members of the entomology staff.

Others (TAU and other academics, SMNH Entomological Laboratory for Ecological Monitoring): ca. 400 specimens.

Databasing

Approximately 35,000 new records were added to the database during the reporting period, amounting to a total of 265,368 items.

The Palmoni collection project: Avi Keisari added some 2000 new records from the Palmoni collection to the entomological database, mainly Lepidoptera of the families Noctuidae, Pyralidae, Danaidae, Lycaenidae, Saturniidae, Hesperidae, Sphingidae and Lasiocampidae, as well as beetles of the family Buprestidae.

The genus *Andrena* in Israel

Dr. Gideon Pisanty

The Mediterranean Basin, and Israel in particular, are home to one of the most diverse bee faunas in the world. About 1100 described bee species have been recorded throughout Israel, with new species to the region and to science being continuously found. The current work focuses on the genus *Andrena*, which is represented by more than 170 species in Israel alone. Faunistic and ecological studies throughout Israel

continuously produce new *Andrena* species for the country as well as for science; currently, there are at least eight new species that were collected in Israel and await publication.

I aimed to revise the knowledge on the genus *Andrena* in Israel, including identification of unsorted material (13 full drawers in the SMNH collection), preparation of an illustrated key to the *Andrena* species of the southern Levant, and description of new species. Additionally, a worldwide revision of one of the subgenera occurring in Israel was conducted. The work included field trips to collect rare and new species of *Andrena* throughout Israel. I examined type material from the Oberösterreichisches Landesmuseum in Linz, which holds the largest collection of western Palaearctic bees, and work in collaboration with Erwin Scheuchl (Ergolding, Germany), who is the leading expert in the taxonomy of western Palaearctic *Andrena*. The project aims to revise and update the knowledge of the Israeli members of the genus *Andrena*, and includes the following tasks:

1. Sorting and identification – all unidentified *Andrena* specimens (thousands of specimens) that could be located in the large bee collection of the museum were sorted to subgenera, and the great majority were identified to the species level. 3574 bee specimens collected this year by myself and students of Yael Mandelik, were sorted to genus/tribe and either identified to species level (mostly *Andrena* spp.) or sent abroad for identification by other experts. 1918 *Andrena* specimens collected in recent years by students of Yael Mandelik were identified to species.
2. Collecting trips – 1681 bees and 307 other insect specimens were collected this year throughout the country (collecting locations: Mt. Carmel, Mt. Hermon, Upper Galilee, Judean Foothills, Arava Valley, Judean Desert).
3. Publications – 8 species and one subspecies new to science of the bee genus *Andrena* were described in the following paper: Pisanty, G., Scheuchl, E., & Dorchin, N. (2016). Eight new species of *Andrena* Fabricius (Hymenoptera: Apoidea: Andrenidae) from Israel—a Mediterranean hotspot for wild bees. *Zootaxa*, 4189(3), 485–515.
4. Study travel – In July, I visited the Natural History Museum (Biologiezentrum) in Linz, Austria, to work with Erwin Scheuchl and to examine specimens in Warncke's collection and compare them to our museum specimens. Twenty-four *Andrena* species new to science and 10–15 species new to Israel were discovered among our museum material. The travel was generously funded by the David Furth Systematic Entomology Fellowship, the Department of Zoology, TAU.

Tetrapod Division

Shai Meiri, Roi Dor, Tamar Dayan, Yossi Yovel, Tamar Feldstein, Arie Landman, Erez Maza, Daniel Berkowic, Amos Belmaker, Kessem Kazes, Igor Gavrilo, Stanislav (Stas) Volynchik, Chamutal Friedman.

Personnel

There have been few changes to the collection personnel. Igor and Stas were helped this year in the taxidermy by Chamutal Friedman. Kessem has started working in the collections recently replacing Arie Landman who retired (and still volunteers a couple of times a week), and Amos Belmaker replaces Assaf (who previously replaced Daniel, who started his PhD) in the dry collections.

We have re-structured responsibilities of the collection managers in anticipation of the move to the new building whereby the wet and dry collections will be housed in close proximity (different floors of the

same building). Erez will manage the herpetology and amphibian collections, Kessem will take care of the mammal collection, and Amos will be responsible for the bird collection.

Postdocs: Two museum postdocs will work in the collections this year. Orr Comay will be studying the taxonomy of House and Macedonian mice of the genus *Mus* and Yuval Itescu will study the taxonomy of vipers of the genus *Echis*.

Collection growth, assimilation of other collections & active collecting

We are still incorporating the Bet Ussishkin collection of hundreds of birds and mammals into our collection. There were other, smaller collection donations this year, from Kibbutz Maabarot for example.

The amphibian collection

Between October 15th, 2015 and December 7th, 2015 our amphibian collection grew by 66 specimens, from 2539 to 2606. Most represent specimens that were brought by Sharon Renan and Eli Geffen as tadpoles from the Hula valley. Moreover, Eli Geffen has recently donated to the museum hundreds of amphibian specimens, without doubt the largest contribution to this somewhat neglected collection ever. These are specimens he has collected over the years of his research on amphibians with Sarig Gafny. The specimens are as yet uncatalogued, and, in fact, a backlog in the herpetology collection means it will take a long time for us to process this important contribution, but we will get there, eventually. Most of the amphibians we received are spadefoot toads (*Pelobates syriacus*, 21 specimens), frogs (*Pelophylax bedriagae*, 16) and newts (*Ommatotriton vittatus* 18). No toads entered the collection this year. Interestingly, we have found a caecilian mislabeled as a snake in the reptile collection. It was re-identified by David Gower (NHM, London) as *Typhlonectes natans*.

The bird collection

Over the same period the bird collection grew by a staggering 1319 specimens (from 19503 to 20822)! They represent a very impressive array of 275 species. About 500 of these specimens were brought from the Bet Ussishkin Museum. We have received nearly 260 birds from the Nature and Parks Authority (190 from the wildlife hospital), but actually 360 bird specimens we got this year are still only partially computerized – due to a backlog created by insufficient manpower. About 30 specimens were received from the International Birding and Research Center in Eilat and from Yerucham Center of Ecology and Ornithology, 20 specimens from The Jerusalem Bird Observatory and 27 specimens from individual collectors. The commonest species is the Eagle Owl (*Bubo bubo*) (40 specimens) followed by Black Kite (*Milvus migrans*, 38 specimens), Kestrel (*Falco tinnunculus*, 36 specimens), Sparrowhawk (*Accipiter nisus*, 32 specimens), Common Buzzard (*Buteo buteo*, 29 specimens), Barn Owl (*Tyto alba*, 28 specimens), White Stork (*Ciconia ciconia*, 27 specimens) and Blackcap (*Sylvia atricapilla*, 27 specimens). 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 the collectors. Assimilation of the specimens from the Bet Ussishkin Museum has been almost completed with the hard work of the museum staff. In addition to a heavy load of routine work, the collection staff prepare displays for the new museum building as well as organizing the collections toward their transfer to the new premises (mounted birds are ready and skin cupboards are in preparation). Lately, we received many owl pellets, but we have yet to decide how to incorporate them into the collection.

The mammal collection

The mammal collection grew by 463 new specimens over the same period, from 14,847 to 15,310 specimens (about 190 fewer overall than last year!). Our backlogs have extended further this year, as they have last year, because of the huge effort by the preparators to organize the displays for the new building, and

because Kesem only started working some months after Arie retired. 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 specimen he is in charge of eradicating. We have catalogued well over 100 rodent specimens this year, and many more await being catalogued. The mammals received this year belong to 56 species, the most common of which are, as last year, mice (*Mus musculus* and *M. macedonicus*, 104 specimens!). The usual ‘most collected’ mammals, the common hedgehog (*Erinaceus concolor*, 35 specimens), golden jackals (*Canis aureus* 31 specimens), mountain gazelles (30 specimens) and wolves (20) still top the lists. We have received the collection’s first *Hypsugo ariel* specimen this year (a tissue sample donated by Eran Amichai). Yossi Yovel’s lab also added to specimens of *Eptesicus fuscus* from the USA, the first in the collections.

The reptile collection

The reptile collection has grown by a very impressive 551 specimens, from 17096 to 17647 specimens, almost twice as many as last year. Just over 200 of these represent Greek specimens of the tree gecko, *Mediodactylus kotschy*. These were sent to us from the University of Athens, where Yuval Itescu and Rachel Schwartz kept them as part of their research into the island biogeography of this species, after collecting them on Greek islands (222 specimens of different species altogether). The second commonest species is the invasive gecko *Tarentola annularis*: 63 specimens were collected by Aviad Bar in Ein Gedi where the species is super-abundant (Jamison et al., in press). Fortunately, the Nature and Parks Authority decided to eradicate this gecko, and we hope the project will succeed, though we doubt the specific avenue they chose to take. The next most abundant species collected were house geckos (*Hemidactylus turcicus*, 22 specimens) and the coin-marked snake (*Hemorrhoids nummifer*). Altogether reptile specimens catalogued this year belong to 75 species, some of them (e.g., *Anatololacerta pelasgiana* and *Hellenolacerta graeca*) new to the collection (mostly again specimens from Greece). Others are just rare (e.g., *Dermochelys*). We are still occasionally collecting specimens from areas destined for “development” in the Negev and Central Israel (Rishon Le Tzion for one). We are very grateful to the Nature and Parks Authority Southern Division ecologist, Asaf Tsoar, and the Central Division ecologist (Yariv Malihi) for notifying us and granting us permits to collect there. As usual, most collecting was done by the TAU personnel (335 specimens) and private collectors, extremely helpful Aviad Bar (76 specimens) and Ofer Shimoni (34 specimens). The NPA contributed 18 reptiles belonging to 11 species this year (up from 10 specimens last year).

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*, *Xerotyphlops vermicularis* and perhaps *Mediodactylus kotschy*. More taxonomic and phylogenetic work is necessary to validate the taxonomic status of these taxa. Karin Tamar, a museum-funded postdoc, has identified a new species of black-headed snakes of the genus *Rhynchocalamus* in Israel, which is named in honour of the museum chair (Tamar et al. in press; see K. Tamar’s report below). On the other hand, work by Guy Sinaiko, an MSc student, on the thin racers of the “*Platyceps rhodorachis* complex” reveals that claims for the existence of two species in this clade are in all likelihood, wrong, and only a single species (*P. saharicus*) occurs in Israel (Sinaiko, MSc thesis).

During the last year the museum has hosted a renowned expert in reptile reproduction, Stephen R. Goldberg (Whittier College, California, USA), who visited us for a week and taught museum personnel and students how to prepare specimens for histological and morphological examination of their reproductive tract.

Overall the tetrapod collections have grown by some 2500 specimens – a whopping number – probably the largest in the history of the collection (except perhaps when we received the Haim Hovel bird

collection). These newly obtained specimens are better curated with more complete data and more detailed metadata, tissue samples being taken, only one specimen per jar in the wet collections, etc. The staggering number is credit to the collection management staff, Erez, Assaf, Daniel, Arieh, Kessem and Amos. It is also a remarkable achievement by the taxidermists, Igor and Stas, who managed to produce this huge amount of high-quality material while in hectic preparations of specimens for the new displays. One must remember, however, that many of the new acquisitions came from the Bet Ussishkin collection (especially in the bird collection), so the number of truly new specimens entering the museum is not as impressive. We hope to continue obtaining specimens through the Nature and Parks Authority, other nature conservation and green bodies, the Jewish National Fund, students and interested members of the public, to monitor the current status of the Israeli fauna.

Collection management: equipment, infrastructure, storage and curation

We are slowly assimilating the Bet Ussishkin collection into existing shelves and cabinets. Existing storage space no longer suffices, and we are reviewing options to procure new collection cabinets. New collection managers will look into option of placing 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 hope that moving to the new building will accelerate the process of barcoding jars and drawers, so that immediate curation and identification of those specimens present in a cabinet or on a shelf is facilitated.

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. That said, much should be done in that area. We are anxiously awaiting the move of the databases to a new platform, and being able to make individual-based records freely available to the public over the Internet.

The systematics and biogeography of the reptile genera *Rhynchocalamus* Günther, 1864 and *Pseudotrapelus* Fitzinger, 1843

Karin Tamar

The unique biota of the arid areas of North Africa and Arabia (i.e., the Saharo-Arabian region) inhabits a diverse array of habitats ranging from rocky plains and sandy deserts to high mountain ranges, high plateaus and low valleys, and has a complex and dynamic evolutionary history. The distinctiveness and diversity of the biota were greatly influenced by the massive tectonic movements and climatic changes which took place during the mid-Cenozoic (Ruddiman et al., 1989; Le Houérou, 1992, 1997; Schandelmeier and Reynolds, 1997; Rögl, 1999; Bojar et al., 2002; Bosworth et al., 2005). The influence of these dramatic geological and climatic events on the biogeography and diversification of the African and Arabian herpetofauna is not well understood. Extensive studies have only recently been carried out, providing important information regarding the origin, diversity, cladogenesis, and biogeography of the regional herpetofauna assemblage (e.g., Pook et al., 2009; Carranza and Arnold, 2012; Metallinou et al., 2012, 2015; Portik and Papenfuss, 2012, 2015; Šmíd et al., 2013; Kapli et al., 2015; Tamar et al., 2016a).

My research goal, as well as a significant portion of my applied and collaborative work, is to test biogeographic hypotheses within a statistical and evolutionary context utilizing molecular systematics and morphological examinations. Within this framework, other related biological processes are also addressed, including

assessing and comparing different patterns of diversification, evaluating species boundaries and phylogenetic relationships, and exploring the processes that facilitated speciation.

During the past year of my post-doctoral studies I have revised the systematics of two reptilian genera in Israel suspected to represent species complexes, include cryptic species, or unclear distribution in Israel. To study these taxa I have used morphological and molecular databases, mainly from the herpetological collection of the Steinhardt Museum of Natural History, Israel National Center for Biodiversity Studies (SMNH) with reference material from other museums (the herpetological collection of the Hebrew University of Jerusalem [HUJ], and collections from other museums).

The genus *Pseudotrapelus* Fitzinger, 1843

The results of this project were published in the journal *Molecular Phylogenetics and Evolution*, titled “Evolution around the Red Sea: Systematics and biogeography of the agamid genus *Pseudotrapelus* (Squamata: Agamidae) from North Africa and Arabia” (Tamar et al., 2016b).

The agamid members of the genus *Pseudotrapelus* are diurnal, arid-adapted lizards distributed around the Red Sea from north-eastern Africa, across the mountains and rocky plateaus of the Sinai and Arabian peninsulas northwards to Syria (Sindaco and Jeremčenko, 2008). Despite recent taxonomic work and the interest in the group as a model for studying biogeographic and diversity patterns of the arid areas of North Africa and Arabia, its taxonomy is poorly understood and a comprehensive phylogeny is still lacking. During my post-doctoral studies I clarified the systematics and phylogeography of *Pseudotrapelus* across its entire distribution range.

The agamid lizards of the genus *Pseudotrapelus* are medium sized, saxicolous and heliophilous, typically active during the hottest time of day (Baha El Din, 2006). *Pseudotrapelus* range throughout the mountainous areas surrounding the Red Sea, from western Eritrea in Africa across the southern Sinai Peninsula and southern Israel to the southern and eastern coasts of the Arabian Peninsula, and northwards to southern Syria (Sindaco and Jeremčenko, 2008). These lizards occupy a diverse array of arid rocky habitats in hilly and mountainous regions, including well vegetated wadis and slopes, barren rocky hillsides, and boulder-strewn plains (Arnold, 1980; Disi et al., 2001; Baha El Din, 2006; Gardner, 2013).

Systematic studies of *Pseudotrapelus* have long been hindered by the morphological similarity among African and Arabian populations. For many years *Pseudotrapelus* was thought to be monotypic, albeit its only species, *P. sinaitus*, was suspected to be a species complex (e.g., Baha El Din, 2006). A recent flurry of studies on *Pseudotrapelus* has left the systematics and biogeography of the genus obscured (i.e., Melnikov et al., 2012, 2013a, 2013b, 2014, 2015; Melnikov and Pierson, 2012; Melnikov and Melnikova, 2013; Melnikova et al., 2015). Descriptions of four new species (i.e., *P. aqabensis*, *P. chlodnickii*, *P. dhofarensis*, and *P. jensvindumi*) were mainly based on single specimens, thus creating much biogeographic uncertainty and taxonomic confusion. Current classifications are predominantly based on external morphology, with no comprehensive comparisons among species. Phylogenetic studies on the genus were all based on extremely low sample sizes, and were mostly based on the mitochondrial *COI* gene only.

In this study, I analyzed 92 *Pseudotrapelus* specimens from across the entire distribution range of the genus (five samples from SMNH represented the Israeli distribution). I included all known species and subspecies, and sequenced them for mitochondrial (*16S*, *ND4* and *tRNAs*) and nuclear (*MC1R*, *c-mos*) markers. This enabled me to obtain the first time-calibrated molecular phylogeny of the genus, using gene trees, species trees and coalescent-based methods for species delimitation. The results revealed *Pseudotrapelus* as a monophyletic genus comprised of two major clades, Eastern and Western, and six independently evolving lineages. These lineages correspond to the five currently recognized species (i.e.,

P. aqabensis, *P. chlodnickii*, *P. dhofarensis*, *P. jensvindumi*, and *P. sanaitus*) and a sixth lineage relating to the synonymized *P. neumanni*. The subspecific validity of *P. sinaitus weneri* needs further assessment as it does not form a distinct cluster relative to *P. s. sinaitus*. The onset of *Pseudotrappelus* diversification is estimated to have occurred in Arabia during the Late Miocene. Radiation has likely resulted from vicariance and dispersal events due to the continued geological instability, sea level fluctuations and climatic changes within the region.

The genus *Rhynchocalamus* Günther, 1864

The results of this project were published in the journal *PeerJ*, titled “An integrative systematic revision and biogeography of *Rhynchocalamus* snakes (Reptilia: Colubridae) with a description of a new species from Israel” by Karin Tamar, Jiří Šmíd, Bayram Göçmen, Shai Meiri & Salvador Carranza (Tamar et al., 2016c).

The colubrid snakes of the genus *Rhynchocalamus* Günther, 1864 are seldom studied and subsequently little is known about their ecology and life history (they have been genetically sampled for the first time only recently; Avci et al., 2015; Šmíd et al., 2015). The genus is endemic to south-western Asia (Sindaco et al., 2013; Bar & Haimovitz, 2013); the Israeli populations are represented by one species, *Rhynchocalamus melanocephalus*, which has never been properly examined and preliminary morphological and molecular evidence hinted at cryptic, undescribed diversity within its southern distribution. During my post-doctoral studies I clarified the taxonomy of *R. melanocephalus* in Israel, and the systematics and biogeography of the whole genus.

Three species of *Rhynchocalamus* are currently recognized, *R. satunini* (from Turkey eastwards to Iran), *R. arabicus* (Yemen and Oman), and *R. melanocephalus* (from the Sinai Peninsula northwards to Turkey). These snakes are slender, secretive, fossorial, mainly nocturnal and rarely observed. This comprehensive study is the first to sample all known *Rhynchocalamus* species in order to review the intra-generic phylogenetic relationships and historical biogeography of the genus.

I revised the systematics of *Rhynchocalamus* using an integrative approach and evaluated its phylogeography. The phylogenetic position of the genus within the Colubridae, and its intra-generic phylogenetic relationships, were inferred using 29 individuals belonging to the three known species, and two closely related genera, *Muhtarophis* and *Lytorhynchus* (from Israel: nine samples from SMNH and 10 samples from HUJ). All specimens were analyzed using three mitochondrial (*12S*, *16S*, *cytb*) and one nuclear (*c-mos*) gene fragments. Phylogenetic trees were generated using maximum likelihood and Bayesian inference methods; the latter method was also used to provide the first time-calibrated molecular phylogeny of the genus. I generated a nuclear network and carried out a topology test and species delimitation analysis to determine the phylogenetic structure within the genus. Morphological comparisons were used to differentiate among species and to describe a new species from Israel. The studied material was comprised of 108 alcohol-preserved specimens (41 specimens from SMNH and 56 specimens from HUJ), 15 photographs and data from the literature for the examination of 33 morphological characters (17 measurements, 14 scale counts, and two categorical variables).

The molecular results support *Rhynchocalamus* as monophyletic, and as having split from its sister genus *Lytorhynchus* during the Late Oligocene. The molecular results reveal that the genus began to diverge during the Middle Miocene and that the three recognized species of *Rhynchocalamus* comprise four independently evolving groups. The findings from this study display a discrepancy from the known systematics of the genus *Rhynchocalamus* and, within it, from the taxonomy of *R. melanocephalus* – in suggesting a separation between the populations of *R. melanocephalus* in Israel. This species is separated into two lineages: one from the Negev region in Israel northwards to Turkey (including the lectotype of

R. melanocephalus), and the other southern, limited to the Negev Mountain region. These results are evident in both the genetic analyses (using three mitochondrial and one nuclear gene fragments), and the morphological comparisons. The population from the Negev Mountain area in southern Israel is phylogenetically closer to *R. arabicus* from Oman than to the northern populations of *R. melanocephalus* from Israel, Syria, and Turkey. I described this population as a new species: *Rhynchocalamus dayanae* **sp. nov.** (the holotype and one paratype are from the HUJ collection, two paratypes are from the SMNH collection).

Four species are identified within *Rhynchocalamus*: *R. satunini*, *R. arabicus*, *R. melanocephalus*, and *R. dayanae* **sp. nov.**, the latter is endemic to southern Israel. The onset of *Rhynchocalamus* diversification is very old and estimated to have occurred during the Middle Miocene, possibly originating in the Levant region. Radiation probably resulted from vicariance and dispersal events caused by persistent geological instability, sea-level fluctuations and climatic changes within the Levant region.

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-billion migratory birds that pass through Israel twice a year (as well as resident birds), which hold a tremendous risk of bird strikes that 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 official contracts 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 identifications annually. Working with the Israel Nature and Parks Authority we help detect poaching of wild birds and identify bird species collected in new surveys on the effects of wind turbines and electric lines on wildlife.

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 2016, the Lab provided identifications for 95 bird strike cases and 30 cases for the Israel Nature and Parks Authority. These identifications included 22 genetic analyses.

Molecular Laboratory

Tamar Feldstein

The molecular laboratory of The Steinhardt Museum of Natural History at the Tel Aviv University (SMNH) offers a molecular identification service for museum samples for which morphological identification is in question. The resulting molecular data expands the information available on unique samples and contributes to curation of the museum collections. This year we completed a project coordinated by The Israel Nature and Parks Authority (INPA), during which we barcode the aquatic fish fauna of Israel. In addition, molecular identifications of sponges, polychaetes, tunicates, mice and lizards were performed, along with ongoing services we provide for the Israeli Air Force and to the Israel Airports Authority for the identification of birds that collided with airplanes.

Altogether, during 2016, DNA from 130 tissue samples was extracted and processed, as follows:

- Aquatic fish barcoding for the INPA – 36% of the molecular work.
- Identification of birds following collision with airplanes (birdstrike) – 36% of the molecular work.
- Identification of Mediterranean sponges as part of a survey of the Israeli fauna – 13% of the molecular work.
- The residual 15% are identification analyses upon request from researchers at the Department of Zoology, Tel-Aviv University and miscellaneous identifications for the INPA and for CSA Ocean Sciences Inc.

The SMNH Molecular Systematic Collection SMNH consists of frozen or alcohol-preserved tissue samples of vertebrates and invertebrates. We encourage its use by the international non-profit research community.

This year, snake tissue samples from the collections were provided, for research purposes, to Prof. Eli Greenbaum, University of Texas.

During 2016, 803 tissue samples from 372 mammals and 1982 tissue samples from 752 birds and 264 tissue samples from 159 reptiles were added to the museum tissue 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 finished taking detailed measurements of Mediterranean and Red Sea fish ecomorphological traits from museum specimens. Research was primarily carried out by Or Keissar, a Tel Aviv University undergraduate student. 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 and Ori Frid.

- We are developing models using (among other data sources) the collection's georeferenced data to identify the geographical and environmental constraints on the distribution of invasive species (Givan et al., 2016).
- We are continuing fish sampling based on trawl catch as part of Itai van Rijn's PhD and Hezi Buba's MSc. 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 collection.
- We are continuing fish sampling based on recreational fishermen catch as part of Ori Frid's PhD. The goal of this study is to understand temporal dynamics of catch and by-catch. Representative samples of unique species are deposited in the collection.
- 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 of 2016 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 2016 and included all lab members.

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 2015–2016 the Ascidiacea collection at The Steinhardt Museum of Natural History was significantly advanced with the addition of samples from both the Mediterranean and Red Sea coasts of Israel. This year the collection was especially active with student research, as the number of graduate students involved at the collection, identification and vouchering specimens increased significantly. Through efforts of Yaniv Shmuel and Tal Gordon, two resident students at the Inter-University Institute in Eilat, the collection from the Red Sea continued to progress, including the discovery of a highly invasive species, *Ciona robusta* (*Ciona intestinalis* type A) in Eilat marina. Together with the Nature and Parks Authority we continue to monitor the distribution of this species. During 2016 we conducted numerous field trips along the Mediterranean coast of Israel, including both natural and disturbed habitats. The increased sampling effort resulted in over 50 new specimens in the collection, and included the early detection of a new non-indigenous species in the Mediterranean, *Ascidia* aff. *curvata* on sea-chests of marine vessels arriving to Israel international ports (Gewing and Shenkar, under review). Timna Devir, MSc student, has started her thesis on the ascidian fauna along the Mediterranean coast of Israel, with the support of the Israel Taxonomy Initiative. Her active sampling and monitoring of the coast will certainly advance the collection in the upcoming year. We continued our activity as professional taxonomic identifiers of ascidians to several researchers and organizations in Israel and abroad. International collaborations include material exchange with Prof. Rosana Moreria de Rocha from the Universidade Federal do Paraná,

Curitiba, Brazil, Dr. Shane T. Ahyong from the Australian Museum, Sydney, and Prof. Kwang-Sik Albert Choi from Jeju National University, South Korea.

Ongoing international collaborations include active participation of Dr. Noa Shenkar at 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 are currently funded in addition to the Israel Scientific Foundation, Regular research program (PI: Dr. N. Shenkar) "Ascidiacea (*Chordata, Ascidiacea*) as bio-indicators of the marine environment – from ecological, physiological, and cellular perspectives" 250,000 NIS per year (2015–2019):

Schulich Ocean Studies Centre Initiative (co-PI: Dr. Sarah Stewart-Clarck, Dalhousie University, Canada) "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" US\$150,000.

Porifera collection

Sigal Shefer

Collection and field survey of the Porifera community along the Mediterranean of Israel:
This year 142 specimens were added to the collection. Most of them were collected during four excursions to the mesophotic sponge grounds located at depth of 80–100 m, off Herzliya, Rosh Karmel and the mesophotic reef in Eilat. These specimens were collected as part of studies conducted at Prof. Ilan's lab. The rest of the specimens are from various sources such as Ma'arag, Bioblitz, and CSA Ocean Sciences Inc.

Taxonomic identification service:

Four samples were identified for CSA Ocean Sciences Inc. Company (Elad Mills), seven samples were identified for Ma'arag, and 19 as part of the Bioblitz.

Museum sample loans:

Fourteen specimens were used (sub samples were taken for DNA analysis) by Adam Weisman, a PhD student from the lab of Prof. Tchernov, School of Marine Sciences, University of Haifa.

Collections organization:

The sponge collection is going through an archiving process. This includes updating scientific names at various taxonomic levels, printing new labels, replacing fixative solutions and arranging samples on the shelves according to their systematic affiliation.

Courses and Training:

I participated in the course Vertebrate Faunistics – Birds and amphibians. I participated in the 13th Annual Conference of the Israeli Association of Aquatic Sciences and presented a talk on "Illuminating an East-Mediterranean mesophotic sponge ground community and the regional sponge fauna".

Bryozoa collection

Noga Sokolover

Collection and field survey of the Bryozoa community along the Mediterranean of Israel: Ten specimens were collected during excursions to the mesophotic sponge ground located at depth of 100 m, off Herzliya. This was done as part of studies conducted at Prof. Ilan's lab.

Identification of newly collected Bryozoa samples:

Based on morphological characteristics, 3 bryozoans were identified to the genus or species level: *Discoporella* sp.; *Cellaria salicornioides* (?); *Thallamoporella hermalini*.

Courses and Training:

I have received formal training to use the Environmental Electron Microscope at the Wolfson Applied Materials Research Center. The training allows me to create SEM micrographs that are crucial for the identification and publication of Bryozoa specimens.

Taxonomic identification service:

One sample was identified for CSA Ocean Sciences Company (*Licornia vieirai*). One sample was identified as part of the Bioblitz (*Exechonella* cf. *antillea*).

Museum Sample loans:

Scanning Electron micrographs of the species *Exechonella* cf. *antillea* were sent to Dr. Andrei Ostrovsky, University of Vienna.

The Crustacean collection

Ya'arit Levitt

The subphylum Crustaceans (Phylum Arthropoda) is the only large group of arthropods that is primarily aquatic, with more than 50,000 described species. 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 economic significance and ecological importance, and they are considered an important food sources to humans 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 reorganization of this group. During October 2013 – November 2015, approximately 150 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 several specimens of a new alien genus from the Indo-Pacific Ocean was found along the Mediterranean coast of Israel (Levitt et al., 2014).

More than 6000 specimens of Crustacean were computerized, within them approximately 450 new specimens were added to the collection during the last three years. Some of the new material were contributed by Prof. Yair Achituv from Bar-Ilan University, by the Marine Biology department, students from the Zoology Department, The George S. Wise Faculty of Life Sciences, Tel Aviv University, and from the Bet Ussishkin Museum.

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

Algae Collection

Razy Hoffman

Aims achieved (June 2016–present):

- Algal surveys along the Mediterranean coast of Israel and the gulf of Eilat continued. Since the beginning of the present postdoctoral study, the national algal and seagrasses herbarium at the TAU was upgraded by the addition of over 6,700 samples distributed in ca. 2,400 wet (preserved in alcohol) and dried herbarium specimens. Surveys revealed dozens of alien and indigenous seaweeds that had never been reported from the Levant shore of Israel before. Most of the new alien recently found species are first records from the Mediterranean Sea.
- Results of some ecological, biogeographical, taxonomical and morphological studies conducted in 2016 were published in two articles.
- Seaweeds were collected during the continual Bioblitz surveys conducted by the Israel Nature and Parks Authority during autumn 2016, along a gradient of depth in MPA Achziv, and listed in order to be published in their reports.
- As an expert of Algal taxonomy and ecology, I reviewed two papers in 2016 for *Botanica Marina* and *Marine Ecology Progress Series*.

Tasks in progress and plans for 2017:

- Paper presenting the occurrence of the seagrass *Halophila stipulacea* from the Levant Mediterranean shore of Israel was sent to the journal *Marine Biodiversity*, and is now under review. This short article indicates the first record of this alien species from the Israeli Mediterranean.
- Manuscript discussing the ecological meanings of the invasion of *Halophila stipulacea* to the shores of Israel is now at the final stage of preparation *Botanica Marina*.
- Morphological and molecular study describing the new species *Codium pulvinatum* Razy Hoffman & M.J. Wynne is now in preparation. This study, done by taxonomists from Israel, USA, Australia and Guam, represents a new species from Oman and Israel and discusses the Lessepsian migration of green seaweeds.
- Paper representing the genus *Padina* from the Levant shore of Israel including description of a new species *Padina israelica* is in preparation for the Journal of Phycology. This paper treats five species of the genus by morphological and molecular tools. The article is expected to be submitted for publication in mid 2017.
- First paper (chapter published at the beginning of this postdoctoral study in the scientific book *The Mediterranean Sea; Its History and Present Challenges* (published by Springer in 2014) showed that there are ca. 20 alien seaweeds species along the Mediterranean shore of Israel. However, surveys conducted in 2013–16 revealed that there are over 60 nonnative algal species along our shore with many records of new alien species from the Mediterranean Sea. Therefore, two new reviews manuscripts representing all the alien species found so far are in preparation. The first review deals with the alien species of the Chlorophyta, Phaeophyta and Angiospermae. The second review reports the non-indigenous species of the Rhodophyta, with more than 40 alien seaweeds found so far! These reviews are expected to be submitted for publication during 2017. The article of *Padina*, *Codium pulvinatum* and these two reviews are the main focus of this postdoctoral study.
- A quantitative study of the algal drift, started in 2005 at the Haifa Bay, and continued during this postdoctoral study, along the northern shores of Israel shows that the natural local marine flora was

depressed by alien seaweeds invaders, and also suggests shifts in the domination of alien seaweeds along the northern shore of Israel. This research studies the domination of alien seaweeds and shows that three invasive alien species replaced each other during a period of no more than 11 years. This study continues in 2017.

- Algal and seagrasses surveys as well as the maintenance of the collection of TAU will continue until the end of the present postdoctoral study.

Terrestrial, Freshwater Aquatic and Marine Free-living Nematodes

Dr. Stanislav Pen-Mouratov

The Nematodes (Phylum Nematoda), or roundworms, are the most abundant metazoans on Earth. Many are free living and abound in soils and sediments in terrestrial, freshwater, and marine habitats. Nematoda is, in all probability, the second largest group in the animal kingdom following Arthropoda (Andrassy, 2005). Although over 25,000 species have been described, of which more than half are parasitic, the total number of nematode species has been estimated to be about 1 million. It means that merely 2.5% of the extant nematode species have been described to date. The free-living nematodes are one of the most numerous groups among the multicellular animals, participating in fundamental ecological processes, such as decomposition, and nutrient cycling (Chew, 1974; Bongers and Ferris, 1999). Nematodes are recognized as a major consumer group in different ecosystems devouring bacteria, fungi, algae, yeasts, and diatoms; they are also predators of several small invertebrate animals, including other nematodes (Yeats et al., 1993). Due to nematodes sensitivity to ecosystem disturbances (Wardle et al., 1995), they can be used as stable indicators for understanding processes in the soils of different ecosystems, including the Mediterranean area (Pen-Mouratov et al., 2000–present).

Despite considerable efforts of scientists who dedicate their activity to the study of nematodes in Israel, this research is far from complete.

Major organizational and research goals and objectives and their solutions

Terrestrial, Freshwater and Marine Free-living Nematodes is a new collection at the Steinhardt Museum of Natural History. Since November 2015 at the beginning of my scientific activity in Tel-Aviv University as a Senior Lecturer and a Curator of the Division of Free-Living Nematodes at the Steinhardt Museum of Natural History, Israel National Center for Biodiversity Studies, my first and most difficult problem was, and still is, the organization of the basic equipment. With the support of Prof. Tamar Dayan, Dr. Menachem Goren and Dr. Revital Ben-David-Zaslow we are trying to solve this problem.

Study goals

There are at least five main goals in the study of free-living nematodes in Israel:

- To study the species diversity, abundance, and distribution of free-living nematodes that inhabit the terrestrial ecosystems;
- To study the species diversity, abundance, and distribution of free-living nematodes that inhabit the freshwater aquatic environments;
- To study the species diversity, abundance, and distribution of free-living nematodes that inhabit the marine environments;
- To study an anthropogenic impact on the free-living nematodes in terrestrial, freshwater and marine environments;

- Prepare monographs on the ecology, abundance, diversity and taxonomy of the terrestrial, freshwater and marine nematodes of Israel.

Research projects

There were two research projects that I concentrated on during the last year1 :. The effect of *Eucalyptus camaldulensis* and *Ceratonia siliqua* on the microbial activity, abundance and distribution of soil free-living nematode communities in shifting sands of the coastal plain of Israel; 2. The impact of the Israeli avifauna on the soil microbial activity, abundance and distribution of soil free-living nematode communities.

A total of 364 soil samples were collected last year. Subsamples were taken from each sample for the assessment of the nematode and microbial biomasses, and soil abiotic parameters. Nematodes were collected from each sample and identified to the order, family, and genus levels using a compound microscope. To date 81 (1st project) and 85 (2d project) nematode genera were identified in the soil samples collected during the study period.

International collaborations

During the year, I actively tried to establish collaboration with scientists of different universities and organizations, who study free-living nematodes. Some links turned to be very fruitful, and colleagues provided invaluable methods and assistance for accomplishing our research goals. Moreover, I visited the Hungarian Natural History Museum and participated in the 32nd European Society of Nematologists (ESN) Symposium (28 August – 1 September 2016, Braga, Portugal).

Cooperation with students and staff members of the Tel-Aviv University and The Steinhardt Museum of Natural History, Israel National Center for Biodiversity Studies. Students of Prof. Tamar Dayan's lab provided assistance in many ways: Hila Shamoon, a PhD student and the Lab Coordinator, put forth great assistance in the ordering all necessary lab equipment; Orr Comay, a PhD student, and Michal Zaitzove-Raz, an MSc student, provided information and help with soil sampling during the Bird-Nematodes project; Aviv Avisar, a PhD student, was helpful and provided guidance during sampling days and graciously shared information regarding the *Eucalyptus* project in the study area. Igor Gavrilov, a taxidermist at the museum, collected soil samples for nematode analysis during his trip to Mali.

Bio-history and Evolutionary Medicine Laboratory

Hila May

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

During 2016, several research projects, based on the anthropological collection, were carried out in my laboratory. Collaboration with laboratories from foreign universities, based on the anthropological collection, either commenced or continued. Several original papers and conference abstracts were published.

Research activity based on the anthropological collection:

During 2016 the following projects based on the anthropological collection were under way:

- Inflammatory ear disease (otitis media, OM) in the Neolithic: From cave dwelling to constructed houses. During the past year, we developed a reliable method for identifying pathological processes associated with OM in skeletal remains (middle ear and ossicles). In the coming year we plan to reveal how changing climate, type of habitation, and settlement density affected the prevalence of this pathology in the past populations (e.g., Natufian hunter-gatherers, Neolithic early farmers and Chalcolithic farmers). This study is carried out by Dr. Fluernova, a postdoctoral fellow, since March 2015 (in her first half year she received 50% scholarship from VATAT), and Efrat Gilat, an MD student.
- Changes in the proximal femora shape following changes in 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 Hadas Levine, an MSc student, and Victoria Roul, a PhD candidate.
- Subsistence transition and the mandibular morphology. The aim of this study is to examine the differences in the diet consistency and food preparation techniques in pre- and post-agricultural revolution populations in the southern Levant based on the mandibular characteristics and 3D shape analysis. This study is carried out by Ariel Pokhojaev, a technician, and Gidi Arbel, a research fellow.
- Brain cooling mechanism and its adaptation to environmental condition. One of the most significant processes in the human evolution was the increase of the brain size. This process resulted in the enhancement of the brain metabolic rate, which consumes 20–25% of the body's energy budget and produces a high thermal load. Nevertheless, the thermal load cannot easily be dissipated to the environment due to enclosure within the cranial vault. The brain's thermoregulation system is not fully understood, but is known to comprise of several mechanisms for heat dissipation and temperature control, one of which is the diploic vein complex. This study is aimed to shed light on the variation of diploic vein pattern in modern humans, as well as on the factors that influenced their development during the human evolution. This study is conducted by Tal Drori, an MSc student.

Collaborations based on the anthropological collection:

Several projects based on the anthropological collections were 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.
- The effect of the diet on the mandibular morphology using finite element analysis in collaboration with Dr. Ekaterina Stansfield and Prof. Paul O'Higgins, Centre for Anatomical & Human Sciences, Department of Archaeology and Hull York Medical School, University of York, York, UK.
- Diploic vein pattern and its association to environmental conditions in collaboration with Dr. Alexandra Buzhilova, Research Institute and Museum of Anthropology, Moscow State University, Russia.

Activities Related to the Botanical Collection

Dafna Langgut

All the research at the Laboratory of Archaeobotany and Ancient Environments (Institute of Archaeology, TAU) is based on botanical collections. Different holdings available in the Lab are mainly focusing on the Israeli flora and include the following:

- 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 were undertaken during the reporting period:

- We collected new samples for the three reference collections, mainly from the Tel Aviv Botanical Gardens (with the collaboration of Y. Sapir).
- We received and digitized the pollen collections of the late Prof. Yoav Waisel from the Department of Plant Sciences, Tel Aviv University.
- We received part of the equipment of the Ted Arisson Airborne Pollen Allergens Monitoring Laboratory, Tel Aviv University (with the cooperation of Prof. Amram Eshel).
- We hosted two visiting scholars who used our collections: Dr. Brita Lorentzen (Cornell Tree-Ring Laboratory) and Dr. Isabel Vilanova (Museo Argentino de Ciencias Naturales).
- Identification of botanical remains for the Israel Antiquity Authority – Charcoal assemblages and wooden implements: Greezim Mountain, Ze'elim Cave Palynological investigation: Mordot Malha – Jerusalem, Ashkelon, Tel Yarmuth.

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

- Timna – Southern Arava (February, 2016); Shivta and Halutza (February, 2016); Herodium (July–August, 2016); Megiddo (July–August, 2016), Jordan River Dureijat (September, 2016).

Ancient DNA

Meirav Meiri

This year I concentrated on two main projects, one dealing with the mobility and societal change in the eastern Mediterranean in the Late Bronze and Early Iron Ages, and the second covering the resilience and collapse of the early Christian development in the Negev Desert. The two projects differ in many ways (periods, species, materials, extraction methods, etc.), but both are based on archaeological collections and their main aims are similar and confined to detecting genetic changes through time and space by comparing the obtained results to modern and ancient DNA already published from the surrounding region.

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

In this project, I work mainly on domestic animals (pigs and cattle) from Greece (Tiryas, and Asine) and Israel (Megiddo, and Azekah). I sampled in total 52 and 136 ancient pig and cattle bones and teeth respectively, spanning the Bronze and Iron Ages (ca. 3500 BCE to 586 BCE). I have extracted small fragments of the mtDNA (Yang *et al.* 1998), and for the cattle, small fragments of the Y chromosome were also amplified.

I found that pigs underwent a complex translocation history, with links between Anatolia with southeastern Europe in the Bronze Age, and movement from southeastern Europe to the Levant in the ensuing Iron Age I. The analysis of the cattle remains suggests that taurine cattle of African haplogroup were introduced to the Levant from Egypt during the Late Bronze Age. I also detected the earliest evidence for crossbreeding between taurine and zebu cattle, in the Iron IIA (ca. 900 BCE). Both phenomena may be understood in light of the Egyptian imperial domination in the region during the Late Bronze Age. I have submitted a paper, which summarizes the results, and it is currently under review.

Resilience and collapse of early Christian development of the Negev Desert

I have collected a few modern local vine cultivars to build a reference collection to the ancient samples, together with grape seeds from four archaeological excavation sites in the Negev: Haluza, Kesifa, Ovdad and Shivata. The DNA extraction was done according to the protocol by Wales *et al.* (2014). The grape extracts were then screened with microsatellite marker to assess the DNA survival. Although I have succeeded with extracting the DNA from the grape seeds from Kesifa, the radiocarbon dates of the samples came out to be modern. Therefore, from now on, the ancient samples will be first dated, and then, DNA extracted. I am planning to take a few ancient samples for extraction and amplification using Next Generation Sequencing in the ancient DNA centre in Copenhagen, in spring 2017.

Laboratory of Archaeozoology

Lidar Sapir-Hen

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

- Two MA students and one PhD student (who also did her MA with me) were advised. The students' work is based on faunal assemblages from archaeological sites, and relies on the mammalian comparative collections of the museum.
- Teaching at TAU: Animal remains in archaeology, domestication of animals, MA seminar in Archaeological Science, practical workshop in archaeozoology, history and society through animals.
- Teaching includes lectures and a practical workshop based on recent mammal collections of the museum.
- Presenting at two international (Atlanta, USA; Berlin, Germany) and one local (Jerusalem) conferences.
- Community service: presenting at the TAU Pausa event for the public, the evening was dedicated to the SMNH.
- Active participation in archaeological excavations to Timna (February 2016), Tel Azekah, Tel Megiddo (July–August 2016).
- Participation included advising site directors on finds retrieval methods, and lectures to students at the field school using comparative collections.

- Carrying out research on archaeological assemblages of the 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, Iron Age Ophel.

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 Steinhardt Museum of Natural History, Tel Aviv University. Research into archaeomalacological shell assemblages of Israeli sites, with special emphasis on the Palaeolithic sites: Manot Cave (directed by Ofer Marder of Ben Gurion University, Omry Barzilai of the IAA, and Israel Hershkovitz of Tel Aviv University). The shells of Misliya Cave, dating to about 160,000 years ago, were also studied (Project directed by Mina Weinstein-Evron and Israel Hershkovitz).

The Chalcolithic and Early Bronze Age shell assemblages of Horvat Karkar and Tel Yaquash are under study, as is the assemblage of Late Bronze Age Tel Eton (Bar Ilan University) and Tel Shera (Ben Gurion University).

The Paleontological Collection

Daniella E. Bar-Yosef Mayer

Cataloguing of the paleontological collections at the museum intensified. The largest component of the collection is the private collection donated by the late Prof. Hans Bytinsky-Salz, formerly a professor of entomology in the Department of Zoology, Tel Aviv University, who collected fossils as a hobby.

The collection is mostly identified and tagged, and now each item is registered in the digital catalogue and given catalogue numbers. As each item is being entered into the catalogue, we update scientific names; however, the identifications themselves are not being verified and have to await research by specialists. The main sources for the taxonomic updates are the Internet sites "The Paleobiology Database" and its sub-site "fossilworks" as well as online catalogues of other museums such as the Musée National d'Histoire Naturelle in Paris and relevant scientific publications. In addition, we verify the geographic names of collection sites.

Intensive cataloguing is performed by Dr. Olga Orlov, who deals with thin-sections or slides of foraminifera (see below), and Daniella Bar-Yosef **Mayer**, who deals with mollusks. Other groups will be catalogued at a later stage.

To date, we have catalogued over 2200 records of mollusks (approx. 6000 individual specimens). Those belong to at least 612 genera and 936 species. While the majority of specimens were collected around the world, and mostly in Europe, 550 records are from Israel. Chronologically, our world-wide palaeontological collections consist of organisms belonging to as early as the Ordovician, some 450 million years ago, and from Israel as old as the Triassic, about 250 million years ago. The most recent fossils date to the Pleistocene, dating to the last two million years.

Fossil Foraminefera

Olga Orlov-Labkovsky

During the past academic year I continued to work on:

1. The preparation of the fossil material in the Paleontological collection;

2. The organization of a database for microfossils;
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 Order Fusulinida including 5 families, 4 subfamilies, 21 genera, more than 97 species and 21 thin-sections of holotypes. Some of the above fusulinids are entered into the database or are in a progress of being catalogued. During the past academic year I continued to work on the project “Foraminifers of Permian–Triassic (P/T) transition at the Coastal Plane in Israel with Dr. D. Korngreen of the Geological Survey of Israel in Jerusalem. She is studying the Triassic Foraminifera. Our current research is focussed on “Patterns of Foraminifera extirpation and reconstruction during the Paleozoic-Mesozoic transition in tropical mixed settings”.

I took part in the Workshop of the Bashkirian–Moscovian Task Group, International Subcommission on Carboniferous Stratigraphy (SCCS), held in St. Petersburg, Russia, September 4–9, 2016. The workshop included scholars mainly from China, Russia, Kyrgyzstan and Ukraine, and myself representing Israel. My presentation was titled the “Distribution of Fusulinids in the transition of the Bashkirian–Moscovian of the section Kafirnigan, Gissar, southwestern Tien-Shan” (Tajikistan, Uzbekistan). The Bashkirian–Moscovian Task Group was established some 10 years ago in order to establish a GSSP (Global Boundary Stratotype Section and Point) close to the existing Bashkirian–Moscovian boundary; however, so far the progress was relatively slow. During this timespan many interesting results dealing with the discovery of new promising areas and significant correlations were studied.

The purpose of reviewing the material was the discussion of the potential of some sections and to promote them as the stratotype of the Bashkirian–Moscovian boundary, and to choose the foraminifera and conodont species as markers for this boundary.

At the same time we took into account the following requirements:

1. The first appearance of the type marker (FAD) on the boundary;
2. The follow-up species of a marker evolutionary lineage (ancestor – species – marker – descendant);
3. The confinement species-marker to marine carbonate sections;
4. The availability of the stratotype section for study.

The Moscovian stratotype is located in the Moscow Basin (western Russian Platform), where fusulinids have traditionally been used to subdivide the stage and to trace its lower boundary. However, fusulinid assemblages from the Lower Moscovian and the underlying Upper Bashkirian show differences in species composition throughout Eurasia and also worldwide which makes it difficult to establish correlations with the Russian Platform.

During the last years members of the International Working Group have discussed the proposals of various species as markers among the foraminifera for the lower boundary of the Moscovian stage. Most discussed was the boundary of the first appearance of *Aljutovella aljutovica* (Rauser) or *Depratina prisca* (Depart). An alternative to this level was proposed with the appearance of the *Eofusulina triangula* line *Verella–Eofusulina*. During the Workshop we discussed the foraminifera and conodonts in the transitional deposits of the Bashkirian–Moscovian in the following regions and sections: the Moscovian Basin, Middle and Southern Urals (Russia); Cantabrian Zone (NW Spain), Donets Basin (Ukraine); Southern Tien-Shan (Kyrgyzstan, Uzbekistan), Guizhou Province (South China) and the results of my presentation dealing with

the “Distribution of fusulinids in the transition of the Bashkirian–Moscovian of the section Kafirnigan, Gissar, Southwestern Tien-Shan” (Tajikistan, Uzbekistan).

After discussing the viewed material the participants of the Task Group reached the following conclusions:

- The Bashkirian-Moscovian boundary present in the “Basu River”, located in the southern Urals, was suggested as the reference section.
- Among the previously proposed taxa (*Aljutovella aljutovica*, *Depratina prisca* and *Eofusulina triangula*) only two—*Aljutovella aljutovica* and *Depratina prisca*—were recommended as marker-species. The species *Aljutovella aljutovica* is widespread and determines stratigraphically without doubt the Moscovian stage. The species *Depratina prisca* (in the evolutionary line *Depratina praeprisca*–*Depratina prisca*) is also a potential marker of the Bashkirian-Moscovian boundary. *Aljutovella aljutovica* and *Depratina prisca* are both fixed in foraminiferan assemblages in the Basu River section.

The species *Ovatella ovata*, regarded by me as a boundary-marker was not accepted because it does not occur in the Basu River section.

Quaternary Molluscs

Henk K. Mienis

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

1. With the help of Mrs. Svetlana Vaisman the study of the fossil *Theodoxus* and *Melanopsis* material from Gesher was continued but not yet finished.
2. Various species belonging to the families Ampullinidae, Naticidae, Buccinidae and Volutidae from the Eocene in France present in the former D.A. Visker collection were identified and catalogued.
3. S. Vaisman worked on fossil land and freshwater molluscs from Nahal Poleg.

New Acquisitions

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

| Name | Brief description of the material |
|-------------------|---|
| Kibbutz Ma'abarot | Various fossil molluscs from the collection of Abraham (Bumi) Toren, a biology teacher in Ma'abarot |
| Kibbutz Dan | Numerous fossil molluscs from the collection of Bet Usshiskin |
| H.K. Mienis | Eemian molluscs from Terschelling, the Netherlands |

Mollusc Collection

Henk K. Mienis and Oz Rittner

Research

During the academic year 2015/16 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. S. Vaisman of the Plant Protection and

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

Support with identifications

Various ecological observations and studies on the presence of molluscs in Israel are currently being carried out by a number of private people and teams from various institutes. They benefited from our expertise through the identification of their material. The major part of the identified material has been permanently deposited to the Steinhardt Museum of Natural History.

New records from Israel

The Chromodorid slug *Felimare orsinii* (Vérany, 1846), a species considered so far a typical western Mediterranean species, was photographed by a submersible at a depth of 100 m off the Mediterranean coast of Israel. Stranded specimens of the cephalopod *Ommastrephes bartramii* (Lesueur, 1821), a huge squid species, have been found several times on the Mediterranean beaches of Israel. Fieldwork carried out by colleagues of the Israel National Center for Aquatic Ecology in Upper Galilee resulted in the first Israeli record of *Potamopyrgus antipodarum* (J.E. Gray, 1843), an the invasive freshwater snail species from New Zealand. Likewise, the terrestrial snail *Euconulus praticola* (Reinhardt, 1883) was found by them in a former tributary of the Jordan River. It is not only new for the fauna of Israel but for the whole Levant.

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

As usual, 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*.

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 was 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 29 samples of land and freshwater snails intercepted by PPIS inspectors from either agricultural shipments arriving from abroad or found on local material or in nurseries. Noteworthy were the large numbers of snails intercepted on vegetables from the Gaza Strip via the Kerem Shalom border post. The presence of *Pomacea maculata* in a pond in a public park in Kefar Sava and in ponds in the Ariel Sharon Park remains a problem of international concern.

Cooperation with the Israel Nature and National Parks Protection Authority

Also this year we received some mollusc material collected during the BioBlitz-project, which took place this year in several Marine Nature Reserves along the Mediterranean coast of Israel. The results were rather disappointing from both a quantitative and qualitative view.

Cooperation with archaeologists

In the last decades archaeologists became aware of the importance of proper identification of their archaeomalacological material. Correctly identified shells provide an archaeologist with a wealth of information concerning climate, diet, trade routes, exploitation of shells as votive objects, utensils, beads,

pendants, etc. During the past academic year we continued working on malacological material from the following archaeological 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;
- 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.

Cooperation with malacologists abroad

A revision of the *Frigidocardium* complex living in the Red Sea has revealed that neither *F. torresi* nor *F. exasperatum* are living over there, but three other species: *F. centumliratum*, *F. helios* and *F. kiranum*. The work was carried out by the Dutch malacologists Jan Johan ter Poorten and Leo J. van Gemert. 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.

New acquisitions

New material, not only from colleagues at various institutes but also from private collectors, arrived regularly during the past year. The new acquisitions were immediately identified and the samples were prepared for permanent storage in the collection. The collection of B.S. Singer contained also much material from other collectors. They are mentioned below as D. Stratman (via BSS), W. Segers (via BSS), etc.

New acquisitions in the Mollusc Collection 2015–2016:

| Name | Brief description of the material |
|--------------------------|--|
| D. Azulai | Land snails on imports to Israel |
| D.E. Bar-Yosef | Marine molluscs Canary Islands & Orkney Island |
| B. Dell'Angelo (via BSS) | Scaphopoda |
| A. Dotan | Marine molluscs Mediterranean Sea Israel |
| A. Dvir | Shell-craft box |
| T. Eshcoly | Land and freshwater molluscs from Israel |
| B. Galil | Marine molluscs Mediterranean Sea Israel |
| I. Gavrilov | Freshwater bivalves from Mali |
| Y. Hershkovitz | Land and freshwater molluscs from Israel |
| T. Idan | Marine molluscs Mediterranean Sea Israel |
| M. Keppens | Molluscs in general |
| H. Lubinevsky | Marine molluscs Mediterranean Sea Israel |
| S. Martinez | Marine molluscs Mediterranean Sea Israel |
| M. Mendelsohn | Cephalopod from the Mediterranean Sea Israel |
| D. Mienis | Land snails from Israel |

| | |
|-----------------------|--|
| H.K. Mienis | Molluscs from the Netherlands and Israel |
| Y. Mienis | Land snails from Israel |
| E. Orbach | Molluscs from Israel and Vietnam |
| I. Pieck | Land snails from Israel |
| L. Rittner | Land and freshwater snails from Israel |
| O. Rittner | Land snails from Israel |
| H. Schütt | Freshwater mussels from Egypt and France |
| W. Segers (via BSS) | Marine molluscs world wide |
| S. Shefer | Marine molluscs Mediterranean Sea Israel |
| B.S. Singer | Molluscs in general |
| D. Smits (via MK) | Molluscs in general |
| T. Stern | Land snails from Israel |
| D. Stratman (via BSS) | Marine molluscs world wide |
| F. Swinnen (via BSS) | Marine molluscs from the Mediterranean Sea |
| Bet Ussishkin | Molluscs from Israel and Egypt |
| A. Uzan | Land snails from Israel |
| S. Vaisman | Land and freshwater snails from Israel |

Computerization of the collection

The computerization of the mollusc collection was 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 62,329 samples (excluding fossil ones) representing 10,419 taxa (including fossil one) in the mollusc collection have been computerized. The majority of species and subspecies (928) newly added this year to the collection were again mainly from the Paleontological collection of the late Prof. Hanan (Hans) Bytinski-Salz.

The Malacological library

The library is for the Mollusc Collection a most important tool for taxonomic and systematic studies.

Recent donations

Received from Benjamin (Solly) Singer (Rehovot):

Kira, T., 1959. Coloured Illustrations of The Shells of Japan (enlarged and revised edition). 239 pp., 71 plts. Hoikusha, Japan.

Received from Henk K. Mienis:

Benoit, L., 1881. Nuovo catalogo delle Conchiglie Terrestri e Fluviatili della Sicilia. 176 p. Tipografia D'Amico, Messina.

Jansen, E.A., 2015. Veldgids Slakken Mossels – land en zoetwater. 272 pp. KNNV Uitgeverij, Zeist.

In addition we have received many reprints and again numerous journals from Zoological Institutes and Malacological Societies in exchange of *Triton*, an independant malacological journal published in Israel.

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

Several members of the entomology team attended the NPA ecological camp for a survey of the flora and fauna of Biq'at Hureqanya (Judean Desert) on March 14–15. Overall, 1,053 insect specimens of 300 species were collected (mainly Coleoptera, Hymenoptera, Diptera and Heteroptera), including a few rare species of Coleoptera and Heteroptera.

L. Friedman undertook 15 long (1–2 days) collecting trips throughout Israel (part of them together with A. Freidberg, N. Dorchin and their students), and 30 short fieldwork trips, mainly in Qedumim and nearby localities in Samaria. This resulted in the collection of 5,359 insect specimens, at least a third of which are weevils (Curculionoidea) and the rest are representatives of other beetle families (Coleoptera), as well as Hymenoptera, Diptera, Heteroptera, Neuroptera and Dictyoptera. He also did a four-day collecting trip (June 27–30) to Kefalonia Island, the largest of the Ionian Islands, in order to study weevil fauna and particularly collecting the rare endemic *Brachycerus graecus*. He collected from wide range of biotopes: hills covered by Mediterranean maquis, seashore, saline and forest of endemic Kefalonian fur-tree at high altitudes (Mount Ainos, 1,600 m a.s.l.) and collected overall 1,656 insect specimens, including 54 species of weevils (more than what had been known from Kefalonia).

Z. Yanai (PhD student in N. Dorchin's lab) made dozens of collecting trips all over the country, during which about 700 larval mayfly specimens (Ephemeroptera) of ca. 20 species were collected and identified. About 10 are new to science and will be described within the next few months.

M. Mostovski operated Malaise traps and yellow pan traps in the Judean Hills and in the Jerusalem Botanical Gardens. Bulk samples were preliminary sorted and several hundreds of Araneae, Hymenoptera and Coleoptera were passed on to colleagues for identification and incorporation into relevant collections. Collecting also resulted in the discovery of unknown sexes of previously described Phoridae species and in additional scuttle fly species new to the country and to science. Those will be published in the forthcoming year(s). The discovery of *Puliciphora rufipes* (Diptera: Phoridae) in the Galilee has offered a fresh insight into this scuttle fly biogeography and distribution.

G. Pysanti collected 1681 bees and 307 other insect specimens throughout around the country (Mt. Carmel, Mt. Hermon, Upper Galilee, Judean Foothills, Arava Valley, Judean Desert).

A. Ionescu collected Formicidae material (ants) for his ongoing revisions of the genera *Cataglyphis* and *Messor* in Poleg, Tel Baruch and Yafo.

W. Kuslitzky collected by Malaise traps in TAU Zoological Garden and at Bet Dagan (III–IV.2016); has was also collecting parasitic wasps by net in various places and reared several specimens from various hosts on *Ricinus communis*, Compositae, and other plants. Ichneumonidae and Braconidae have been collected, mounted on pins and labeled. Parasitic wasps of the superfamilies Bethyloidea, Chalcidoidea, Proctotrupoidea, Ceraphronoidea and Cynipoidea were collected and preserved in alcohol or mounted.

Additional contributions to the parasitoid collection were made by A. Freidberg, L. Friedman, V. Kravchenko, N. Dorchin and other collectors. In total, more than 2500 parasitic Hymenoptera were collected.

Z. Yefremova attended an NPA ecological camp for a survey of the flora and fauna of Biq'at Hureqanya (Judean Desert) on March 14.

V. Kravchenko enhanced the SMNH collection with a wealth of insects of different orders procured during his extensive field work in Africa and Israel.

Malacological fieldwork in Israel

Henk K. Mienis and Oz Rittner

During the 2015–2016 academic year fieldwork was carried out on 11 days. Four times molluscs were collected 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:

PPIS – Plant Protection & Inspection Services, Ministry of Agriculture.

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

TAU – Tel Aviv University.

29 October 2015 Tel Aviv

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

The purpose of this fieldwork was to check two complexes of gardens for the presence of the Giant African snail *Lissachatina fulica*, a large tropical invasive land snail. For several years living specimens of that land snail, a known pest species, had been collected in gardens in Rehov Yosef Eliahu and Rehov Mitzpeh/Megiddo. In spite of the rain no specimens (dead or alive) of *Lissachatina fulica* were found in Rehov Yosef Eliahu and neighbouring street. On the other hand three other species were actively crawling around: the slug *Limacus flavus*, and the snails *Cornu aspersum megalostomum* and *Eobania vermiculata*. Also in the gardens at the corner of Rehov Mitzpeh and Rehov Megiddo the dominant land snail turned out to be *Cornu aspersum megalostomum*. Of the Giant African snail a single rather fresh empty snail was found.

19 November 2015 Herzliyya, Tel Michal

Participant: Henk Mienis (SMNH).

During excavations carried out at Tel Michal by a team headed by Prof. Z. Herzog, TAU (Herzog *et al.*, 1989) only two relatively large species of land snails had been recovered for further investigation. The purpose of the fieldwork was to check the Tel Michal site for the presence of additional terrestrial gastropods. The fieldwork yielded 13 species which had not been recovered during the excavation: *Euchondrus pseudovularis*, *Euchondrus septemdentatus*, *Euchondrus sulcidens*, *Daudebardia saulcyi*, *Eopolita protensa jebusitica*, *Sphincterochila aharonii*, *Caracollina lenticula*, *Microxeromagna lowei*, *Monacha syriaca*, *Xerocrassa davidiana davidiana*, *Xeropicta vestalis joppensis*, *Helix engaddensis engaddensis* and *Theba pisana*. The two species recovered during the excavation: *Buliminus labrosus labrosus* and *Levantina spiriplana caesareana*, were not found.

8 December 2015 Even Sapir

Participants: Ori Peleg (TAU), Oz Rittner and Henk Mienis (SMNH).

The purpose of the fieldwork was to check the burnt slopes of the hills between Even Sapir and the Hadassah Ein Kerem Hospital, Jerusalem, for the presence of terrestrial gastropods. In spite of the fine weather and the flowering wild bulbs (*Narcissus*, *Crocus* and *Colchicum*) hardly any living snails were seen. Fortunately four specimens of *Deroceras berytensis*, a local slug species, were found. They might turn out to be of use when someone decides to make a thorough revision of that difficult group of slugs.

15 December 2015: Herzliyya, Apollonia

Participants: Oz Rittner, Henk Mienis (SMNH).

Recently Mienis & Rittner (2015) have published a review of the 25 terrestrial gastropods ever found in the National Park Apollonia (Tel Arshaf/Arsuf). The purpose of the new fieldwork was to investigate once again this National Park after a rainy period. Two species were recorded for the first time: a single specimen of *Deroceras berytensis*, the first slug ever reported from Apollonia, and *Cornu aspersum megalostomum*, only the second invasive land snail found in this National Park.

28 December 2015 Kefar HaNagid

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

The purpose of the fieldwork was to investigate once more the *Bougainvillea* nursery of Sagi Peled in Kefar HaNagid for the presence of invasive terrestrial gastropods. The following 14 species of snails and slugs were found in the nursery (exotic species are preceded by an asterisk): **Novisuccinea ovalis*, *Oxyloma elegans*, **Zonitoides arboreus*, *Eopolita protensa jebusitica*, **Oxychilus translucidus*, *Limacus flavus* juvenile, **Lehmannia valentiana*, *Deroceras berytensis*, **Deroceras invadens*, **Deroceras laeve*, **Prietocella barbara*, *Monacha syriaca*, *Xeropicta vestalis joppensis* and **Xerotricha conspurcata*. Of *Lehmannia valentiana*, two forms were found: one cream coloured with the characteristic two oblong stripes and the other with the same pattern on a mottled background.

4 January 2016: Herzliyya, Apollonia and Tel Michal

Participants: Oz Rittner and Henk Mienis (SMNH).

The purpose of the fieldwork was to investigate once more Apollonia for slugs after rainfall and Tel Michal for additional species of land snails after rainfall. Five slugs were found at Apollonia, all turned out to belong to *Deroceras berytensis*. At Tel Michal four terrestrial snails were found which had not been recorded before: *Calaxis hierosolymarum*, *Calaxis saulcyi*, *Cecilioides acicula* and *Paralaoma servilis*. Besides that a single empty shell of *Buliminus labrosus labrosus* was found on the so-called High Tell. Also this time no slugs were seen in the Tel Michal area, which is not so strange because slugs are rarely encountered in a dune area with scattered kurkar-outcrops.

21 January 2016: Sedot Yam and Caesarea

Participants: Oz Rittner and Henk Mienis (SMNH).

The purpose of the fieldwork was to search the beaches of both sites for interesting marine molluscs thrown on the beach after the storm and to look for land snails in the Caesarea area. The beaches at both sites were of the typical *Glycymeris* type, i.e. thousands of *Glycymeris nummaria* valves with admixture of other species remains. Most interesting were the living specimens of *Pinctada radiata* found locally on the beach east of Sedot Yam. North of Caesarea we collected some land snails and slugs among the ruins. The most important among them were *Deroceras berytensis* and *Elia moesta moesta*. The latter is an introduced species from Lebanon.

2 February 2016: Gilgal

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

The purpose of the fieldwork was to survey the current land snail fauna in order to compare them with the land snails collected during the excavation of the prehistoric site. Only seven species were collected: *Buliminus labrosus labrosus*, *Buliminus therinus* (extremely small specimens), *Sphincterochila prophetarum*, *Monacha obstructa*, *Xerocrassa mienisi*, *Xerocrassa seetzenii seetzenii* and *Helix engaddensis*. All the specimens of *B. therinus* were extremely small and slender (13.7×5.5 mm). Noteworthy is still the fact that specimens of *Sphincterochila fimbriata* found on the slopes were of a rather large size (20.6×15.3 mm), while those living on the plateau at a distance of 10–15 m were extremely small (11.9×8.7 mm). Here and there empty shells of *Melanopsis buccinoidea* and *Melanopsis cerithiopsis* were found.

1 March 2016: Alon

Participants: Oz Rittner and Henk Mienis (SMNH).

The purpose of the fieldwork was to collect live specimens of *Xerocrassa langloisiana hierocontina*. Six species were collected: *Buliminus diminutus*, *Buliminus therinus*, *Sphincterochila fimbriata*, *Xerocrassa langloisiana hierocontina*, *Xerocrassa seetzenii seetzenii* and *Helix engaddensis engaddensis*. On the way back we visited the hill opposite Sho'eva with the "Porzei HaDerech" memorial. There we collected *Buliminus labrosus spirectinus*, *Euchondrus septemdentatus*, *Monacha syriaca*, *Xeropicta vestalis joppensis*, *Helix engaddensis engaddensis* and *Levantina spiriplana hierosolyma*.

4 April 2016: Hiriya

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

The purpose of the fieldwork was to check whether the exotic Apple snail *Pomacea maculata* still occurred in the ponds ("the wetlands") on the former garbage hill. A small number of living Apple snails was found in the ponds and the nearby water filters together with a number of empty shells. On three different places a single egg mass was seen on *Phragmites*. Shai Levi, the ecologist working on the hill, promised to check the ponds regularly for living Apple snails and their colour full egg masses.

28 June 2016: Kefar Sava

Participants: Svetlana Vaisman (PPIS), Henk Mienis (SMNH) and Mrs. Hadas Marshall (Environmental Unit of the Kefar Sava Municipality).

The purpose of the fieldwork was to check the situation of the exotic Apple snail *Pomacea maculata* in the upper ponds near Yad LeBanim and to show these invasive Apple snails to Hadas Marshall, the ecologist of the Kefar Sava municipality. Not only numerous Apple snails were still present in the upper basins but also their rose-coloured egg-masses were commonly seen on the walls and on the emerging aquatic vegetation.

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Malacological fieldwork in the Netherlands

Henk K. Mienis

Like in previous years, I visited the Netherlands. This time my visit lasted from 1 September until 9 October 2016. Malacological fieldwork was carried out in the provinces North-Holland and Friesland with the following objectives:

North-Holland:

- a. A follow up survey of the terrestrial mollusc fauna of the Catholic graveyard near the Overweerseploderdijk in Purmerend;
- b. A check of the presence of the exotic land snail *Eobania vermiculata* in the Burgemeester D. Kooimanpark in Purmerend;
- c. A brief survey of the presence of land snails on a new traffic circle in the Neckerstraat near Highway A-7 in Purmerend;
- d. A search for *Rangia cuneata*, an invasive brackish water mussel, in “het IJ” in Amsterdam;
- e. A brief survey of the Hemmeland in Monnickendam for the presence of terrestrial snails characteristic for a sand dune area.

Friesland:

- a. A second survey for freshwater molluscs in the renovated lake Doodemanskisten near West-Terschelling, Terschelling;
- b. A follow up survey of the “Eerste Plak”, a wetland near Lies, Terschelling;
- c. A renewed survey for freshwater molluscs of a small, slowly shifting artificial lake near the Stuifdijk in the European Nature Reserve the “Boschplaat”, Terschelling;
- d. A survey for freshwater molluscs of a drainage channel in the western part of the European Nature Reserve the “Boschplaat”, Terschelling;
- e. A survey for the presence of *Hygromia cinctella*, an invasive Mediterranean land snail, in the surroundings of the church in Hoorn, Terschelling;
- f. A further survey of the presence of *Monacha cantiana*, an invasive land snail, on Terschelling;
- g. A first survey of an artificial waterhole serving as a drinking place for grazers in the dunes between Lies and Formerum-North, Terschelling.

Special attention was given to the presence of exotic, often invasive terrestrial and aquatic molluscs. Most of the collected material was permanently lodged in the MolluscMollusc Collection of the Steinhardt Museum of Natural History.

Results

Fieldwork in the province North-Holland.

- a. The graveyard at the Overweerseploderdijk in Purmerend had yielded in previous years (2012, 2014 & 2015) 17 species of terrestrial gastropods: nine snails and eight slugs (Mienis, 2016b). Although I had the intention to use the wet carton method in order to attract as many species as possible in 2016, the weather—extremely dry for the season—forced me to change the tactics. Instead of that I visited the graveyard seven times during the early morning hours, on 2, 5, 7 & 12 September and 3, 6 & 10 October

2016. In this way eight species were recorded for the first time at that locality: *Vallonia pulchella*, *Vallonia costata*, *Pupilla muscorum*, *Punctum pygmaeum*, *Zonitoides nitidus*, *Oxychilus alliarius*, *Hygromia cinctella* and *Deroceras invadens*.

Invasive species among the 25 species which are now known from this cemetery are: *Boettgerilla pallens*, *Lehmannia valentiana*, *Deroceras invadens*, *Hygromia cinctella* and *Cornu aspersum*, while *Pupilla muscorum* and *Candidula intersecta* were probably brought to the site with dune sand for the hill which carries the graves. Still interesting is the fact that several slugs belonging to *Arion rufus*, *Deroceras reticulatum* and *Lehmannia valentiana* were heavily infested by slug-mites of the genus *Ricardoella*.

In addition I found for the first time in that cemetery three specimens of the land planarian *Microplana terrestris*, a potential predator of slugs which had been found by me already elsewhere in Purmerend (Mienis, 2014).

b. The exotic Mediterranean land snail *Eobania vermiculata* is still present in small numbers in the Burgemeester D. Kooimanpark in Purmerend. It is the only colony of that species known to occur in the Netherlands.

c. While cycling in the outskirts of Purmerend I noticed a rather strange plant for that area on and around a new traffic circle in the Neckerstraat near the Verbindingsweg: Common cichory *Cichorium intybus*.

While photographing it I saw also several exotic snails clinging to the various plants like *Ceruella virgata*, *Cornu aspersum* and surprisingly *Theba pisana*. The first two are well-known from Purmerend and its vicinity, however I had never seen *Theba pisana* before in Purmerend. I knew that it was rapidly spreading in the dune area between Zandvoort and Beverwijk and in small areas east of it, but it had never been recorded so far inland in North-Holland. The specimens collected in Purmerend are somewhat larger than those of *Theba pisana* found in Israel. The sand used for that traffic circle was brought from a coastal area judging from the presence of numerous marine shells.

d. Since a few years back the brackish water mussel *Rangia cuneata* has been known to occur in several countries in the mainland Western Europe including the Netherlands. The first locality where it had been found in the Netherlands was "het IJ", a large water body serving as the Amsterdam harbor. On 13 September 2016 I made a bicycle trip to the Nieuwendammerdijk in Amsterdam North and sampled briefly an arm of "het IJ" for that exotic S.E. North American bivalve. At the beginning I found three other invasive mussel species (*Corbicula fluminea*, *Dreissena polymorpha* and *Dreissena bugensis*), but at last I also found my first ever loose valves of *Rangia cuneata*.

e. On a visit to the Hemmeland in Monnickendam on 7 September 2016 I learned that a small patch of it is still densely covered with *Parnassia palustris*, an interesting plant from wet patches in the dunes along the coast of the Netherlands at quite some distance of the Hemmeland, which is adjacent to the Markermeer, a part of the IJsselmeer (formerly Zuiderzee). According to hearsay dried plants had been brought once to the Hemmeland from the coastal area and with it arrived also *Parnassia*. However with it most probably also came two species characteristic for a dry sandy area like dunes: *Pupilla muscorum* and *Candidula intersecta*. Both gastropods are still common in the *Parnassia*-field.

Fieldwork in the province Friesland.

This year all the fieldwork in Friesland was carried out on the island Terschelling, which is separated from the Frisian mainland by the Wadden Sea. Like in previous years I did spend two weeks on that island from 18 September until 1 October 2016.

a. During the years 2013–2014 a small lake in the woods near West-Terschelling was fully renovated. The lake was completely drained and all the vegetation, fish and mud were removed. Most of the shrubs and trees around the lake was cleared off. The the lake was again filled with water. On 1 September 2015 I carried out a first survey of the ‘new’ lake, which resulted in recording 10 species of aquatic gastropods (Mienis, 2016a): *Bithynia leachii*, *Bithynia tentaculata*, *Stagnicola palustris*, *Radix auricularia*, *Physella acuta*, *Anisus vortex*, *Ferrissia clessiniana*, *Gyraulus albus*, *Planorbarius corneus* and *Planorbis planorbis*. I continued the survey of the lake on 22 & 28 September 2016. At least seven additional species were registered: *Potamopyrgus antipodarum*, *Acroloxus lacustris*, *Radix balthica*, *Physa fontinalis*, *Gyraulus crista*, *Musculium lacustre* and *Pisidium* sp. However, *Pisidium* may be represented by several species. Next year I hope to continue the survey.

b. The wetland in the dunes near Lies, which serves as a skating-ring in winter, was surveyed for the presence of molluscs in the autumn of 2012 and 2015. During those periods each time 4 species were observed. In the autumn of 2016 I planned to carry out a much more extensive survey. Unfortunately the summer and the following autumn days were so dry that hardly any water was left in the wetland.

I had to cancel my plans for a survey with the help of wet cartons and carried out one with the help of a kitchen sieve. This time 6 species were collected. All findings made over the three years are summarized in Table 1. Only two species—*Radix balthica* and *Planorbis planorbis*—were found in all three years.

Table 1: Molluscs collected in the wetland “Eerste Plak” near Lies.

| Scientific name | Autumn 2012 | Autumn 2015 | Autumn 2016 |
|------------------------------|-------------|-------------|-------------|
| Aquatic species | | | |
| <i>Radix balthica</i> | + | + | + |
| <i>Anisus vortex</i> | + | - | - |
| <i>Ferrissia clessiniana</i> | - | + | - |
| <i>Planorbis planorbis</i> | + | + | + |
| <i>Musculium lacustre</i> | - | + | + |
| <i>Pisidium milium</i> | + | - | - |
| Terrestrial species | | | |
| <i>Zonitoides nitidus</i> | - | - | + |
| <i>Deroceras laeve</i> | - | - | + |
| <i>Deroceras reticulatum</i> | - | - | + |

c. A small lake at the foot of the “Stuifdijk”, an artificial barrier made of sand, is situated between beachpoles 19 and 20 in the European Nature Reserve the “Boschplaat”. It is nicknamed the “Bulldozerplas” (Bulldozerlake) because it was excavated by a bulldozer. The locality of the lake is slowly but steadily shifting because wind is constantly blowing sand in it.

A survey carried out on 27 September 2016 revealed the presence of at least four aquatic species: *Gyraulus albus*, *Gyraulus crista*, *Planorbarius corneus* and *Pisidium* sp. *Pisidium* may contain more than one species.

d. The amphibious and aquatic molluscs of a drainage ditch in the dunes of the western part of the European Nature Reserve the “Boschplaat” were surveyed on 26 September 2016. Twelve species were collected, most of them in large numbers: *Potamopyrgus antipodarum*, *Acroloxus lacustris*, *Physa fontinalis*, *Physella acuta*, *Radix balthica*, *Anisus vortex*, *Gyraulus albus*, *Planorbis planorbis*, *Pisidium casertanum*, *Pisidium milium*, *Musculium lacustre* and *Sphaerium corneum*. Among them are two invasive species: New Zealandian *Potamopyrgus antipodarum* and North American *Physella acuta* (Mienis, 2016c).

e. In 2007 I saw the invasive Mediterranean land snail *Hygromia cinctella* for the first time in Terschelling near the ancient Dutch Reformed church in Hoorn (Mienis, 2007). In the following years additional specimens were seen sparingly. This year it was encountered in small numbers in several gardens or backyards all in the surroundings of the church. Near the church it seems to be very common especially in the hedge bordering the south and east side of the church yard.

f. The Kentish garden snail *Monacha cantiana* has to be considered an invasive species on Terschelling. The first specimens were discovered on that island in 2001 (Mienis, 2001). Since then I have encountered this species in and near the villages from the West to East (i.e. from West-Terschelling until Oosterend, the western- and easternmost village on Terschelling). This year I encountered it crawling after rain on the vegetation in gardens along the Duinweg, in wasteland around the parking lot near the “entrance” to the European Nature Reserve the Boschplaat and in the dunes near the Heartbreak Hotel all in Oosterend and on the slope of the Dellewal and near the harbor both in West-Terschelling.

g. While cycling in the dunes between Lies and Formerum-North I noticed a small artificial waterhole serving as a drinking place for grazers—horses, cows and goats—used in a continuous combat against an excessive growth of grasses on the dunes. However at most places natural watering places are not available. Therefore small holes are being dug in sand till groundwater is reached. After some time usually several species of aquatic plants and animals start to appear. Now and then these also includes gastropods and/or bivalves, although none of these molluscs are easily dispersed.

A check of the particular waterhole revealed to my surprise the presence of thousands of living specimens of the Lake fingernailclam *Musculium lacustre*, a fairly large type of a pea-mussel that may reach a size of 10 mm at maturity. This bivalve reached most probably the waterhole by air. Pea-mussels are occasionally encountered attached to the feet of ducks, waders or even aquatic beetles and other insects. They may transport pea-mussels inadvertently as hitchhikers to new habitats as water-holes. No other molluscs were present in the waterhole.

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OUTREACH – NATURE CAMPUS

Nature Campus incorporates the public programs of The Steinhardt Museum of Natural History, Israel National Center for Biodiversity Studies, together with I. Meier Segal's Garden for Zoological Research and the Botanic Garden. Its mission is to advance public understanding of science, nature and the environment, and to serve as a bridge between academic research and the public. Nature campus offers programs, publications, and services fostering discovery, science literacy and lifelong learning for all audiences of all ages and backgrounds, both within TAU and far beyond its campus. In the past year Nature Campus increased its reach and impact of many existing programs, while also breaking a new ground to connect wider audiences with the latest issues and developments in ecology, evolution and conservation science.

Some highlights and numbers of 2015/2016

Numbers summary

- 12,000 visitors
- 9 brand new programs
- 650 new web pages – learning resources on-line
- 90,000 ILS grant received from Nekudat Hen

Audience

Nature Campus caters for all sectors of the Israeli society. Our audience ranges from kindergarten children to senior citizens and from students to decision makers. In total, more than 12,000 people participated in the Nature Campus programs:

- 41% were children (k–6 grades);
- 24% youth (7–12 grades);
- 21% families;
- 14% were adults, including teachers, conservation professionals and students from TAU and other academic institutions.

Most visitors preferred short activities:

- 64% of the visitors participated in programs of up to 2 hours;
- 28% participated in science days of 3–4 hours;
- 8% enjoyed activities that lasted more than 4 hours.
- Around 1,500 visits were part of a series of more than 3 visits.

Events to the general public

As a run-up to the museum programs, we expanded our activities to the general public:

- **A monthly 'open to the public' tour** around the Zoological and Botanic gardens.
- **Darwin Day** celebration. The program comprised of a lecture by Prof. David Eilam from the Department of Zoology, a show & tell demonstration of some unique exhibits from the SMNH collections and 2 guided tours on the theme of evolution in the Zoological and Botanic gardens.

- **Purim** celebration. The program comprised of tours on “costumes” in Nature at the Zoological and Botanic gardens followed with a show & tell demonstration of exhibits from the SMNH collections and arts workshop.
- **Pesach** celebration. The program comprised of tours at the Zoological and Botanic gardens followed with a show & tell demonstration of exhibits from the SMNH collections.
- **Biodiversity Day** celebration. The program comprised of tours on biodiversity conservation at the Zoological and Botanic gardens followed with a show & tell demonstration of exhibits from the SMNH collections.

In total, 800 people attended these events.

New programs

Every year new programs are being developed. Some are prompted by our partners’ requests and some are initiated by us in order to promote new themes or to reach new audiences. This year, several new programs were added to our menu:

- **Birthdays** is a good excuse for families to organize a group visit. In order to provide an improved program, we developed 3 new quest activities:
 - tracking animals
 - predators & prey
 - animal senses & communication
- **Science Days** is a 4-hour program (see more in ‘continuing programs’). This year 2 new science day lesson plans were added:
 - Fur, feathers, scales – on animals’ body cover.
 - The amazing kingdom of Fungi (mushrooms, yeast and relatives)
- **Observations & Insights** is a Science enrichment series (see more in ‘continuing programs’) that was developed for children from underprivileged neighborhoods, in cooperation with the Municipality of Tel Aviv. The program comprised of 4 science days:
 - Observation of form, insights on function
 - Observation of tracks, insights on animals
 - Observation of behavior, insights on communication
 - Observation of fossils, insights on the past

Continuing programs

- **Guided Tours** is a 2-hour activity at the I. Meier Segals Garden for Zoological Research or the Botanic Gardens. During 2015/2016, the Gardens hosted 7,600 visitors on more than 20 different tour themes; the most popular tour at the Zoo was ‘The Fauna of Israel’ followed by the theme of ‘Predators and Prey’. At the Botanic Gardens, the most popular was ‘The Flora of Israel’.
- **Science Days** is a 3–4-hour activity, mainly for school children. During the past year 2,800 participated in science days. The themes that are covered are diverse and include, among others, Evolution, Nature Conservation, Reproduction in Nature, Plants and Their Environment, Predators and Prey, Adaptation, and Ecology of Temporary Winter Pools.

- **Science Camps.** Science camps were being held during the Hanukkah, Passover and summer school vacations. During 2015/2016, 130 children participated in our science camps, about a third of them returned to more than one camp. The 5-day program targets 1–3 grades school children. It offers an exploration of the biosphere: each day is focused on a major phenomenon or process in the living world, for example the food web, behavior and communication, or adaptation.
- **Science enrichment programs for schools.** Tailored to the specific needs of each school, several unique programs were developed, each spanning for several months to a whole school year:
 - **Evolution** is a series of 4 science days for elementary school children. During 2015/2016 60 children from 3 schools participated in it.
 - **Looking at Nature – understanding science** is a series of 8 science days for elementary school children. During 2015/2016 40 children from 4 schools participated in it. This program run in cooperation with the Municipality of Tel Aviv as part of their project for children from underprivileged neighborhoods. In addition, 20 children from a TAU neighborhood school participated in it for the 4th year.

Online resources

The Nature Campus online resources have acquired a great reputation along the years. They provide up-to-date scientific contents in a clear language intended to all. During 2015/2016 we launched many new items, including 2 entirely new websites:

- **Portal, Ecoagriculture website** (<http://ecoagriculture.campusteva.tau.ac.il>) is a primer and a knowledge base for farmers and the general public on eco-agriculture. The website was initiated by Nekudat Hen, which promotes agricultural-ecological research projects since 1999. The outputs of Nekudat Hen activities are published in its annual seminars and accompanying publications. In order to make this knowledge, and information from other resources, more accessible, we developed 'Portal to Ecoagriculture' website. The website is built on the infrastructure of Nature Campus websites' called EarthWeb, and thus joined the existing 'Portal to Conservation Biology' and 'Portal to Evolution'.

At the first stage of development 142 web pages were created. These were divided into three main sections: a primer on ecoagriculture; applied research; and additional resources such as links to other websites, lectures and publications.

The development was supported by Nekudat Hen.

- **The Zoological Garden website** new edition was developed during 2015, in both Hebrew and English. The website offers information about the Zoological Garden's history, future plans and vision; acquaintance with the technical and academic staff; information about some of the contemporary researches that are carried out in the garden; an interactive map that enables the users to learn about the various animals in the garden; all "Garden News" issues; and technical information for groups and individuals who wish to visit the garden.

The Hebrew website consists of about 265 web pages, its English version comprises 100 webpages.

Three on-line projects added new content to our "Evolution Portal":

- **The Arthropods Story**

http://evolution.campusteva.tau.ac.il/arthropod_story is an interactive introductory resource on the amazing evolutionary history of arthropods. Along the way, it is also a learning tool on taxonomy, paleontology, natural history and principles of evolution. The Arthropods Story consists of 26 webpages, many of

them interactive. It is based on the University of California Museum of Paleontology website, and in cooperation with it.

- A Fisheye View of the Tree of Life

<http://evolution.campusteva.tau.ac.il/A-Fisheye-View-of-the-Tree-of-Life> is an interactive resource on the evolution of fish. It consists of 10 web pages. It is adapted from the University of California Museum of Paleontology website, and in cooperation with it.

Constructing evolutionary trees <http://evolution.campusteva.tau.ac.il/Trees-matter> is web learning resource about evolutionary trees and how to use them in science and in teaching. It consists of 14 web pages. It is adapted from the University of California Museum of Paleontology website, and in cooperation with it.

As a routine, new pages were added to Nature Campus website (<http://www.campusteva.tau.ac.il>), which outreaches to the public, and offers in a lay language a wealth of scientific information based on the Natural History Collections research.

Garden News

Nature Campus together with the zoological and botanical gardens publish the *Garden News*, a new newsletter that describes the latest events and news from both the Zoological Garden and the Botanical Gardens at Tel Aviv University. *Garden News* is issued since December 2014, about once every two months, 14 issues until now. *Garden News* is published in both Hebrew and English, and is distributed to the gardens' guides and workers, to the Zoology Department and the Molecular Biology and Ecology of Plants Department, as well as to the directory of the University and subscribers. *Garden News* is also published online, on Campus Teva website and on the Zoological Garden website. The readers of *Garden News* can learn about the arrival of new species to the gardens, breeding and flowering, current researches, etc.

THE ISRAEL TAXONOMY INITIATIVE

Steering Committee: 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. Menachem Goren and Frida Ben-Ami direct the initiative.

Conservation of biodiversity—the variety of life forms on the Earth—depends on the 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; however, 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, but 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 graduate fellowships;
- Providing funding for overseas training for graduate students;
- 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 the 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.

MSc Scholarships:

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

2014/15: Michaela Kolker, larval fishes.

2016/17: Timna Dvir, Ascidiarians; Tanya Levi, Spiders.

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 and Dorothee Huchon, Ctenophores; Leonid Friedman, Red Weevils; Netta Dorchin and Zvi Mendel, midges; Sigal Shefer, Tamar Feldstein & Micha Ilan, demosponges; Ehud Spanier and 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 molluscs; 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; Gretchen Lambert, ascidians.

2015/16: Donald Quicke, Ichneumonoid Parasitic Wasps.

2016/17: Jacob Larsen, harmful microalgae; Prashant Sharma, harvestmen (Opiliones).

THE ISRAEL NATIONAL AQUATIC ECOLOGY CENTRE

National project of aquatic taxonomy, biological state and ecological management

Yaron Hershkovitz, Tuvia Eshcoly, Adi Weiss, Ofir Hirshberg

Steering Committee: Prof. Tamar Dayan and Dr. Menachem Goren (TAU), Dr. Dana Milstein and Mr. Nissim Keshet (INPA), Dr. Amir Erez and Mr. Alon Zask (IMEP)

After more than half a century of water overexploitation and severe habitat modification, the Israeli authorities have acknowledged the urgency in protecting and maintaining the livelihood of the country's freshwater ecosystems. A national water quality improvement alongside with vast river restoration projects have greatly improved the previously grime condition of many aquatic systems nationwide. However, despite these efforts there little has been done so far in order to provide a reliable, nationwide ecological database of the current conditions of aquatic ecosystems.

The Israel National Aquatic Ecology Centre (hereon 'aquatic centre', or INAEC) was establish in 2015 by the Israel Nature and Parks Authority, The Ministry of Environmental Protection and the Steinhardt Museum of Natural History (SMNH).

The goal of the aquatic centre is to function as a core for ecological and taxonomical knowledge on aquatic ecosystems in Israel, for supporting decision making on applied and ministerial levels. The tasks of the INAEC include the following:

- To centralize all published material concerning aquatic ecosystems in Israel and neighbouring countries.
- To develop and apply standardized protocols for collecting, treating and managing biological data from aquatic systems nationwide.
- To incorporate multiple Biological Quality Elements (typically macroinvertebrates) for ecological status assessments.
- To conduct ecological surveys and produce assessment reports on the ecological status of streams and wetlands, and suggest possible management practices.

Currently we are engaged in preparing standardized field and lab protocols and improving the knowledge on taxonomy and autecology of aquatic invertebrates, which will be used in the process of developing type-specific indicators for different regions of the country (such as perennial flowing streams at the Jordan catchment or intermittent coastal streams).

Running projects:

- GIF project ESSESMENT: Ecological status and ecosystem services of the Lake Kinneret catchment: setting the scene for the management of a multi-stressed region). Supported by the German-Israeli Foundation (Research Grant Agreement Number: G-1272-203.13/2014).
- Ecological assessment as a supporting tool for river basin management: the southern Jordan and its tributaries as a model. Supported by the Landscape Protection Fund of the Israel Land Authority (2017–2019).
- Ecological assessment of the Dead Sea Oasis wetland reserves. Supported by the IMEP (2015–currently).
- Bioassessment of the Tanininm Stream. Supported by the YAD Hanadiv Foundation (2016).

- Ecological biomonitoring of the Kishon River. Supported by the Kishon River Authority (Autumn 2017–currently).

Achievements of the aquatic centre in 2016

In 2016 the INAEC continued its activity under the scope of the Israel National Centre for Biodiversity Studies. Here are some of the main achievements:

- Second year of field sampling and lab-work in the joint GIF 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. In 2015 we have collected aquatic invertebrates at 15 sites across the Lake Kinneret basin, added them to the already sampled 35 sites.
- Sampling macroinvertebrates in the Middle and Lower Taninim stream.
- Sampling macroinvertebrates in the Oasis nature reserves along the Dead Sea.
- Sampling macroinvertebrates along the Kishon River as part of the routine autumn sampling campaign.
- Sampling macroinvertebrates at three sites along the upper Dan to test the response of the ecosystem to the nutrient enrichment of Trout fish farms.
- Invertebrate samples from all campaigns are sorted, counted and identified to the lowest possible 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 Barmatz
 - Heteroptera (water bugs) – Dr. Tania Novoselsky
 - Ephemeroptera (mayflies) – Zohar Yanai
 - Trichoptera (caddisflies) were identified by Dr. Armin Lorenz and Laura Uekötter from the University of Duisburg-Essen, Germany.
 - Coleopterans (water beetles) are identified by Thomas Horren (University of Duisburg-Essen, Germany).

Other taxonomic groups were identified by Tuvia Eshcoly and Yaron Hershkovitz (INAEC).

The biological data are 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 cooperation

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

- Dr. Gideon Gal and colleagues at the Y. Allon Kinneret Limnological Laboratory, Israel Oceanographic & Limnological Research, Israel. The ESSEMENT project (“Ecological Status, Ecosystem Services and Management of the Lake Kinneret Catchment”: 2015–2017).
- Prof. Dr. Manfred Jaech (Vienna Austria): Family Elmidae (Coleoptera).

- Prof. Dr. Hans Malicky, (Vienna, Austria): Family Hydropsychidae (Trichoptera).
- Prof. Dr. Florian Lese and Arne Beermann (University Duisburg Essen): Barcoding of Hydropsychidae species from Lake Kinneret Catchment (manuscript in preparation).
- COST Action CA15219 “Developing new genetic tools for bioassessment of aquatic ecosystems in Europe” <http://dnaqua.net> (2016–2021).
- Laura Uekötter, MSc thesis: Diversity of Ephemeroptera, Plecoptera and Trichoptera in large streams of the Lake Kinneret Catchment. University of Duisburg-Essen, Germany, April 2016.

THE ENTOMOLOGY LAB FOR ECOLOGICAL MONITORING

Ittai Renan

Academic Committee: Drs. Menachem Goren, Inon Scherf

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 Assessment Program, Ramat Hanadiv, the Open Landscape Institute, Technion–Israel Institute of Technology and regional councils.

This year we ran 9 different projects, published five reports and presented our studies at four conferences in Israel. The lab employs two full-time workers and 7 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.

HAMAARAG – ISRAEL'S NATIONAL NATURE ASSESSMENT PROGRAM

Irina Levinsky

Steering Committee: Gadi Levin, Avi Perevolotsky, Menahem Zalutski, Hanoch Ilsar, David Brand, Yehoshua Shkedi, Dan Tchernov

Hamaarag—Israel's National Nature Assessment Program—is a consortium of independent scientists and organisations that are responsible for natural resource management in Israel. Our partners include The Ministry of Environmental Protection, The Nature and Parks Authority, the Jewish National Fund (KKL-JNF), with additional financial support from a private fund. In early 2016 Hamaarag moved from under the auspices of Israel Academy of Sciences and Humanities and operates now out of The Steinhardt Museum of Natural History.

Hamaarag's primary mission is to assess the state of nature in Israel for knowledge-based management of open landscapes and biodiversity. We aspire to contribute to the advancement of knowledge-based management of open spaces and natural resources, via continuous production of scientific knowledge on the state of ecosystems and biodiversity in Israel. This knowledge is accessible to decision-makers as well as to the general public.

Our activities include operating long-term programs that are interconnected and mutually supportive.

Main achievements in 2016:

State of Nature report

We published the State of Nature in Israel Report 2016, a document that quantitatively and qualitatively describes the state of nature and its dominant trends. The report is based on information gathered within the framework of programs conducted by Hamaarag and other bodies, and provides an up-to-date and reliable assessment of the state of nature in Israel for decision-makers with respect to open landscapes. The report is available on our website www.hamaarag.org.il (in Hebrew, with an executive summary in English).

Israel National Ecosystem Assessment

A halfway report of the Israel National Ecosystem Assessment project, including key findings, is due to be completed in January 2017. The project is designed to increase the awareness of dependence on functioning ecosystems and their multi-dimensional value. In addition, the project will produce a knowledge base that will assist managers and policy designers in assimilating the value of biodiversity and ecosystem services in the planning and management of Israel's landscapes.

The National Program for Terrestrial Biodiversity Monitoring

We completed a second full-scale monitoring cycle of the National Program for Terrestrial Biodiversity Monitoring. The monitoring program was launched in 2013, and aims to assess the state of Israel's biodiversity and nature and significant changes taking place within them. The program monitors the Israeli flora and fauna on a regular basis through field surveys, surveillance cameras and sensors, and each monitoring cycle lasts for two years.

The program for ecosystem monitoring in Evrona Nature Reserve

We completed the first monitoring year of the effects of the oil spill in Evrona Nature Reserve. The oil spill that occurred in December 2014 was estimated to be one of the most severe environmental disasters that took place in Israel, and serious concerns were raised regarding its long-term damage to the region's unique flora and fauna. The Nature and Parks Authority appointed Hamaarag to coordinate, develop and monitor an assessment of the ecological consequences of the oil leak and the naturally-occurring rehabilitation processes within the ecosystem.

OPEN LANDSCAPE INSTITUTE – ANNUAL SUMMARY FOR 2015/16 AND FORECAST FOR 2016/17

Uri Ramon

Steering Committee: Yoav Sagi, Amir Ritov, Tamar Dayan, Alon Sapan, Yehoshua Shkedy, Nir Angret / Yuval Peled, David Brand, Alon Zask, Menahem Zaluzki, Nir Papay, Itamar Ben-David, Hanoch Ilisar, Eran Feiltelson, Uriel Ben-Haim, Yael Mandelik, Tal Alon-Mozes, Hana Sweid, Ehud Afek.

The main activities during the past year were:

Nature and Landscape Surveys – Surveys were carried out in the following regions: the Jordan Valley, the loess plateau of the Northern Negev, the Jerusalem Hills, the Kishon River and the Southern Negev. The Institute is a partner in development and implementation of methodology in the following fields: assimilating the value of vacation and leisure into the surveys, examining the possibility of integrating remote sensing, examining a new methodology for surveys by JNF foresters, developing monitoring programs with professionals from HaMaarag and the Nature and Parks Authority, surveys of endangered plant species, and identifying and developing conservation tools for sites with high value for biodiversity conservation (hotspots).

Research – a number of studies and projects in the field of environment and agriculture have been carried out. A study on barriers to the integration of cultivation methods that conserve soil and water was completed. Additional studies in progress in this field will be detailed below.

In early January 2017 the Institute moved to the Museum of Natural History at Tel-Aviv University, in the belief that the new location has great potential for expanding research activity and collaboration with various organizations.

The main challenges facing the Institute this year are:

1. Strengthening and expanding our activity in fields defined within the Institute's core practices:
 - 1.1. Agriculture and environment – developing knowledge, expanding dialog circles, supporting professional and public processes.
 - 1.2. Ecological and landscape background for planning – conducting and developing methodology for nature, landscape and human heritage surveys.
 - 1.3. Integrating field surveys and remote sensing to obtain the best outcome for mapping of vegetation and conservation value.
2. Expanding and assimilating outcomes among various target audiences:
 - 2.1. Developing tools for disseminating knowledge: workshops, instructors and more.
 - 2.2. Increasing professional and public exposure of the accumulated knowledge: renewing the Institute's website and expanding the mailing list.
3. Strengthening connections and expanding collaboration with the partner organizations in the Open Landscape Institute and colleagues from the Museum of Natural History and academia.
4. Professional and budget strengthening – determining the budgetary basis for the coming years, absorbing new employees and training them to carry out the intended tasks.

Detailed Plans for 2016/17 – Nature and Landscape Surveys

- **Jordan Valley survey** – the botanical survey has been completed. In the next year zoological surveys of different taxonomic groups are being carried out and a survey of sites will be added.
- **Vegetation monitoring within the National Assessment of the State of Nature (HaMaarag)** – A survey in four additional monitoring units is planned. This year we plan to expand the use of high-resolution aerial photographs, probably in the Western Negev dune area.
- **Survey of ‘red’ plant species** – most of the survey of the 40 endemic red species, defined as high priority, has been completed. The survey will continue next year, and will also include sub-endemic species.
- **Dead Sea monitoring** – the nature and landscape monitoring unit assists the establishment and monitoring of vegetation in various habitats in the Dead Sea region within the framework of this project.
- **Hevel Eilat: Southern Arava and Uvda Valley surrounds** – in parallel with work on a master plan for open landscapes in the Hevel Eilat Regional Council, we are carrying out a nature and landscape survey in areas with higher endemism within the planning region, in which development pressure is stronger. The work is being performed in close collaboration with the planning team and advisors from the council.
- **Alonim Hills and Northern Nazareth Mountains** – this survey is being carried out in a region that exhibits a range of preserved vegetation landscapes such as open forests of gall oak, which are threatened by strong development pressure from both settlement and infrastructure.
- **Basalt plateaus of the Eastern Lower Galilee** – a region with expansive open landscapes, which are only partly protected. The survey is being carried out in parallel with preparation of master plans for the open landscapes of the regional councils in this area.
- **Negev Highlands: Upper Zin Basin** – in parallel with work on a master plan for open landscapes by the Negev Highlands Regional Council, a nature and landscapes survey is also planned, which will include large parts of the upper section of the Zin River Basin, as well as relatively small areas of the Ro’eh River and Boker River basins.

Detailed Research Plans

Identifying localized, essential sites for nature conservation in Israel: ‘Hotspots’ – this project is designed to locate, map and classify sites with great importance for biodiversity in Israel, and to describe their state and the forces threatening them as a basis for advancing conservation of these sites and of the natural values they support.

Agricultural practices supporting biodiversity that are suited to Israel – this project is designed to identify agricultural practices that support biodiversity and are relevant to Israel in terms of its climatic conditions, agricultural crops and farm structure.

Developing a guide for farmers: agricultural practices supporting biodiversity – preparing an implementation guide for farmers who are interested in encouraging biodiversity on their farms. Assimilating the guide into relevant communication channels.

Developing a methodology for surveying agricultural landscapes as part of nature and landscape surveys – examining and experimenting with methods for estimating the importance of agricultural landscapes, with different spatial and farming characteristics, for biodiversity conservation.

Vacation and leisure in the open landscapes of the Lev HaSharon Regional Council – this research examines the economic benefits of ecological projects with respect to tourism and local businesses, and the ability to integrate biodiversity conservation with tourism.

Monitoring pesticides in the atmosphere as a basis for agreements in the agriculture–community interface – this research examines trends in the distribution of pesticides in the atmosphere in order to derive conclusions about coordinating spraying times near residential areas.

Think tank for environmentally-friendly agriculture – this think tank brings together academics, decision-makers and farmers to discuss aspects of agricultural practice and biodiversity.

CHAPTERS IN THE HISTORY OF THE NATIONAL COLLECTIONS OF NATURAL HISTORY OF TEL AVIV UNIVERSITY:

Obituary: Professor Dan Gerling (1936–2016)

Moshe Coll / Moshe Guershon



Dan Gerling, Emeritus Professor of Entomology at Tel Aviv University, passed away unexpectedly on March 26, 2016.

Dan was born on October 10, 1936 and grew up in Jerusalem. He received his B.Sc. degree in agriculture in 1959 from the Hebrew University of Jerusalem and his PhD in entomology in 1965 from the University of California, Riverside, USA. After a year of postdoctoral training at the Dry Lands Research Institute at the University of California, Riverside, Dan joined the Department of Zoology at Tel Aviv University in Israel. After serving the university for over 37 years and rising to the rank of full professor, Dan retired in 2003. Nevertheless, he continued to be highly active until his last days, conducting research as an emeritus professor and an adjunct curator at The Steinhardt Museum of Natural History, both at Tel Aviv University.

Dan's research focused on whiteflies and their natural enemies. Over the years, he explored a wide range of morphological, physiological, behavioral, ecological and evolutionary aspects of whitefly-parasitoid relationships, both in the lab and in managed and natural habitats. He then used insights gained from these studies to enhance biological control of pestiferous whitefly species in a variety of cropping systems around the world. In this context, Dan also studied how host plants affect whitefly-enemy interactions, and the influence of various defensive mechanisms found in wild whitefly species on their natural enemies.

This work, carried out by Dan and his students, set the stage for a change in pest management practices. In Israeli cotton, for example, data they collected on the identity and population dynamics of whiteflies and their parasitoids and predators convinced the growers association to abandon insecticide-based pest management recommendations in favor of routine pest monitoring and judicious application of selective insecticides based on established economic-thresholds. Finally, Dan's extensive work in natural ecosystems greatly enhanced our appreciation of the wild whitefly fauna and its natural enemies on native flora.

Dan served as the editor of two highly cited books on whiteflies and their natural enemies, and authored or coauthored more than 130 peer-reviewed publications, including three important review articles. This body of literature not only reflects the main thrust of Dan's research—whiteflies and their natural enemies—but also includes a significant amount of work on the biology of carpenter bees (*Xylocopa*

spp.), parasitoids of pestiferous moths (*Spodoptera* and *Heliothis* spp.), herbivorous insects that feed on *Tamarix* spp. (invasive trees in the USA), and more. Dan presented the results of his research in numerous lectures worldwide.

Dan contributed to the development of modern Israeli entomology through his research, the supervision of dozens of MSc and PhD Students, and through teaching. Over the years, he taught courses in evolution, general entomology, insect physiology, parasitoid biology, and pest management.

During his career, Dan was a visiting professor in numerous academic and research institutions including the Universities of California, Georgia and Hawaii (USA), Simon Fraser University (British Columbia, Canada), the University of Sao Paulo (Brazil), the International Institute of Tropical Agriculture (Tanzania), Makerere University (Uganda), CORBANA (Costa Rica), Beijing Normal University (China), the Union Academy of Sciences in Leningrad (Russia), and the USDA research labs in Beltsville, Maryland and Phoenix, Arizona (USA). In addition, he served as a consultant for biological control and pest management in Latin America, Africa and Asia.

Between 2004 and 2011, Dan served as scientist-in-charge of the Peres Center for Peace Integrated Crop Management programs. He was instrumental in the promotion of collaborations between Israel and the neighboring countries in addressing acute pest management problems. His fluency in Arabic, which he taught himself over the years to the level of reading poetry, greatly enhanced his role as initiator and coordinator of cooperative activities among Palestinian, Jordanian, Egyptian and Israeli researchers and growers. A case in point is the project for control of the Red Palm Weevil in date palms. Dan was the organizer or co-organizer of several international conferences, including two memorable ones on whitefly biology and control in 1994 and 2011, both held in Israel. More recently, he was a coorganizer of a meeting of the IOBC Working Group "Integrated Control in Protected Crops, Mediterranean Climate" and a COST Training Course in Biological Control of Organic Greenhouse Pests, both of which took place in October 2015. Dan's diligent efforts to draw the attention of the international community to whiteflies, to their biological control, and to whitefly-related problems were instrumental in the recent formation of a new global series of meetings, "The International Whitefly Symposia". He was unfortunately not well enough to present his invited talk at the second meeting in this series that took place in February 2016 in Tanzania. Dan was a hard-working, enthusiastic and tireless scientist, with never-ending curiosity about insects in their habitats. He was a true naturalist, spending his best hours outdoors, observing his surroundings, trying to capture the most hidden phenomena. His fascination with nature and keen attention to detail served him well in two of his hobbies, painting and writing poetry. Dan was a meticulous researcher and very generous to others, be they visiting professors whom he hosted in his home, or young students seeking guidance. Dan was an unusually modest and humble person. Until his last days, he commuted to the Tel Aviv University campus by bicycle. Throughout his travels, which often involved sub-optimal conditions, he never complained or asked for any upgrading. Those who knew Dan surely remember Neima, his kind and amiable companion of more than 50 years. Dan never got over her passing in 2009. They are survived by their three daughters, five grandchildren, and their extended family. Together with the family, many colleagues, students and friends around the world mourn the passing of a good friend, a scientific authority of international repute, and an exemplary mentor.

Obituary: Professor Nisan Binyamini (1930-2017)

Bruria Gal



In memory of Nisan Binyamini, Mycologist and pioneer of Fungi research in Israel

Nisan was born in 1930 and sadly passed away in the beginning of 2017. He spent his childhood in Jerusalem and was a member of the Young Maccabi youth movement. Later on he joined the Hagana forces and helped build the Burma passageway and escort food envoys during the 1948 siege of Jerusalem.

He began his academic studies at the Hebrew university and continued his studies at the Faculty of Agriculture in Rehovot, specializing in Fungi, under the supervision of Prof. Mina Nadel-Schiffmann and Prof. Isaac Wahl.

In 1959 he received a position at Tel Aviv University, where he researched and lectured in his field and in time became a professor at the Botanical Department. He received two annual grants, one in Switzerland and the other in Denmark, and furthered his knowledge on edible and poisonous Fungi.

He identified over 800 species of fungi from diverse groups which can be found in Israel. He collected and preserved about 6000 specimens from all the various habitats in Israel. Of the many species he was the first to describe *Macowanites galilensis*, *Boletus reichertii* and *Russula carmelensis*.

His fungi collection is part of the Steinhardt Museum of Natural History collections, at Tel-Aviv University.

Nisan Wrote 5 books, including illustrated field guides, used by the public to this day. He wrote and published many articles on Israeli fungi and gave many species their scientific Hebrew name. He retired at the age of 69.

May he rest in peace.

Picture taken by Elinoar Shavit

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 2015/2016 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

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Chapters in books

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2. Gonzalez-Duarte MM, Megina C, Galil BS, Lopez-Gonzalez PJ 2016. Cnidarian alien species in expansion". In: S. Goffredo, Z Dubinsky (eds) *The Cnidaria, past, present and future – The world of Medusa and her sisters*. Springer International Publishing Switzerland.
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6. Roth H. Zanton N. Langgut D. 2016. Prestige and splendor evident from the stepped street (Jerusalem): a dendroarchaeological evidence. In: Stiebel, G.D. Uziel J. Re'em A. Cytryn-Silverman K. Gadot Y. (eds.). *New Studies in the Archaeology of Jerusalem and its Region, Collected Papers, Vol. X*, Jerusalem 2016, Pp. 128-148 (Hebrew).
7. Yannai, E. D.E. Bar-Yosef Mayer, The beads. In: E. Yannai, ed. *En Esur (Asawir) II Excavations at En Esur Cemeteries. IAA Reports, Jerusalem*

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1. Benzaquen M. Langgut D. The Charcoal Remains. In: Finkelstein, I. Martin, M.A.S. (eds.), *Megiddo VI: The 2010-2014 Seasons* (Monograph Series of the Institute of Archaeology of Tel Aviv University). Tel Aviv. (In press).
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3. Langgut D. Namdar D. Shahack-Gross R. Arie E. Finkelstein I. A Latrine in Level H-14. In: Finkelstein, I. Martin, M.A.S. (eds.), *Megiddo VI: The 2010-2014 Seasons* (Monograph Series of the Institute of Archaeology of Tel Aviv University). Tel Aviv. (In press).
4. Langgut D. The History of Etrog in Ancient Near East & Israel: Archaeobotanical and Historical Evidence. In: Goldschmidt E.E., Bar Yosef M. (eds.), *The Etrog (Citrus Medica) Source Book*. Israel Science Foundation Publications (Hebrew). (In press).
5. Roth H. Langgut D. Dendroarchaeological Analysis: The Western wall excavation (Area L), Jerusalem. *'Atiqot*. (In press).
6. Tamar, K.; Bar-Oz, G. Zooarchaeological Analysis of the Faunal Remains from City of David, Area G (2006-2008 Excavation seasons). *City of David Excavations of Area G (2006-2008 excavations seasons)*. (In press).
7. Tamar, K.; Marom, N.; Raban-Gerstel, N. The Faunal Remains from Tel-Rehov: 1997-2008 Excavation Seasons. In: A. Mazar N. Panitz-Cohen (eds.). *The Excavations at Tel Rehov, 1997-2012*. Volumes I–V. Qedem Monographs Series, Jerusalem: The Institute of Archaeology, Hebrew University of Jerusalem. (In press).

Books

1. Gerling D., Guershon M., Seplyarsky V. 2016. Whiteflies of Israel. Ministry of Agriculture and Rural Development. Bet Dagan. 112 pp
2. Yom-Tov, Y. 2016. Deer in Israel. Dan Peri – Magnes Press, 176 pp

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1. Roth H. Langgut D. Dendroarchaeological Analysis: The Western wall excavation (Area L), Jerusalem. *'Atiqot*. In press.

Papers presented in scientific meetings

- 2015 Differential relationships between habitat fragmentation and within-population genetic diversity of three forest-dwelling birds. bioRxiv. (Zuckerberg B., Carling M. D., Dor R., Ferree E. D., Spellman G. M. and Townsend A. K.)
- 2015 History of the taxonomic research of insects in Israel". Volcani Center, Israel: Seminar of Taxonomy of Arthropods in Israel and Activities in National Natural Collections. December. (Friedman, A.L.L.)
- 2015 Managing a marine ecosystem under the impacts of multiple stressors. 1st Science Based Management of Marine and Coastal Resources convention. Haifa University, November, 9-10, Israel (Corrales X., Ofir E., Gal G., Goren M., Heymans S.).
- 2015 The deep water fishes of the Levant Sea. Bat-Sheva de Rothschild Seminar: Environmental Science and Policy – Challenges in the South Eastern Mediterranean, Nir Etzion November 16-19. Israel (Goren M., Galil. B.S.).
- 2015 The Levant Sea: New Biota – New Food Web. 1st Science Based Management of Marine and Coastal Resources convention. Haifa University, November, 9-10, Israel (Goren M.).
- 2015 Wing deformation during maneuvering flight of the flower chafer *Protetia cuprea*: an overlooked aspect in the ecology and evolution of insect flight. Entomological Society of America (ESA). Minneapolis, MN, (Merseman Y, Husak G. F. and Ribak G.)
- 2016 Aerial stabilization in mm sized flyers: take-off jumps in tobacco whiteflies, *Bemisia tabaci*. SICB 2016 annual meeting. Portland, OR. (Ribak G., Dafni E. and Gerling D.)
- 2016 Biodiversity and connectivity in coral reef ecosystems in an era of global climate change (Okinawa, Japan) (M. Ilan)
- 2016 Carnelian Bead analysis from Nahal Hemar Cave, Israel; Neolithic voyages to Cyprus: Wind patterns, routes and mechanisms. PPN8: NeoLithics Conference, Nicosia, Cyprus (Bar-Yosef Mayer, D. E.).
- 2016 Cess pit remains from Late Bronze Megiddo. The 42th Archaeological Congress of Israel, Tel Aviv University, April 2016, (Langgut, D.).
- 2016 Did the agriculture revolution in the Levant improve peoples' nutrition? 40 years of ongoing debate, Spain (May, H.).
- 2016 Dietary habits and food preparation techniques at the advent of agriculture in the southern Levant, Russia (May, H.).
- 2016 Jerusalem's Arboreal Environment and Wood Economy during the Early Roman Period. Annual Meeting of the American Schools of Oriental Research (ASOR), San Antonio, USA, November 2016, (Langgut, D.).
- 2016 Lessons from damselflies (Zygoptera) for the design of Autonomous and miniature UAVs. Living Machines. Edinburgh, Scotland. (Ribak G., Kassner, Z. Dafni E. and Davidovich, H.)
- 2016 Mobility between the Aegean and the Levant in the Late Second Millennium BCE: inference from ancient DNA of pigs. International Symposium on Biomolecular Archaeology. Oxford, UK. (Meiri, M.)
- 2016 Mollusc Shells and Stone Beads at Bet Yerah: Insights into Daily Life. ICAANE: International Conference on the Archaeology of the Ancient Near East Vienna. Participated in Workshop: Tel Bet Yerah and the Early Bronze Age: 15 Years On (Bar-Yosef Mayer, D. E.).

- 2016 Mollusc Shells at Tel Eton. In collaboration with Mr. Israel Weissblum. Project director: Avi Faust, Bar Ilan University. Tel Eton researchers workshop (Bar-Yosef Mayer, D. E.).
- 2016 Negev Global Issues – Impact on Energy, Environment, Health and Water (Beer Sheba, Israel) (Keynote talk) (M. Ilan)
- 2016 One invasive fish and two new parasites. 3rd Conference of Young Natural History Scientists Meeting. 2- 5 February Paris, France (Rothman S., Goran M., Diamant A).
- 2016 Shell beads and shellfish at Upper Palaeolithic Manot Cave, Israel. AMWG: Archaeomalacology Working Group, Kirkwall, Orkney, UK (Bar-Yosef Mayer, D. E.).
- 2016 The Color of Ornaments in the Neolithic and Chalcolithic of the Levant: Their Symbolic Meaning and Economic Value. Economic Aspects of Colours in Antiquity, TOPOI Berlin (Bar-Yosef Mayer, D. E.).
- 2016 Unraveling sponge-microbial interactions and unique bacterial functions important for new antibiotics and bioremediation (Tel Aviv, Israel) (also meeting organizer) (M. Ilan)
- 2016 What was the use of arrow-heads during the Pre-Pottery Neolithic Period?, Israel (May, H.)

GRADUATE STUDENTS

Much active scientific research is conducted by graduate students. Here we list the graduate students of faculty members affiliated to the Steinhardt Museum of Natural History at the Tel Aviv University. We list also a few graduate students from other higher education institutions, 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.
- 2008- Ariella Gotlieb (T. Dayan and Y. Mandelik)
Agriculture and conservation in the Arava Valley
- 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.
- 2010-2016 Anna Halaz (Y. Benayahu)
Phylogeny of octocorals, family Xeniidae.
- 2010-2016 Liron Goren (F. Ben-Ami)
The evolutionary ecology of *Daphnia* and its microparasites in Israel.
- 2010-2015 T Tunis-Sella (I. Hershkovitz)
The chin.
- 2011-2016 Lavy A. (M. Ilan)
The benefits of culturing the unculturable -Identifying antibacterial compounds producing bacteria in *Theonella swinhoei*.
- 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- Rony Izhar (F. Ben-Ami)
The evolution of virulence under conditions of frequent multiple infections.
- 2011- Orly Cohen (E. Geffen)
Selection variation among spadefoot toad tadpoles along the edge-core gradien.
- 2012-2016 Orr Comay (T. Dayan).
Owl pellet taphonomy and the paleoecology of Qesem Cave
- 2012-2016 Boaz Grous (Langgut D. and O. Lipschits and Y. Gadot)
The Carrying Capacity of Ella Valey during Historical Periods

- 2012- Laurent Davin, (D.E. Bar-Yosef Mayer, B. Valentin, F. Valla, & A. B.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- 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 – Palearctic lizards at multiple scales..
- 2012- Mey-Tal Yaniv (Shenkar, N.)
Early detection of non-indigenous ascidians along the Mediterranean coasts of Israel.
- 2013- 2016 Hilla Shamoun (DayanT.)
Anthropogenic effects on the carnivore guild in an agro-rural-natural landscape.
- 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-Barmatz (Shenkar N.)
Diversity and spatial distribution of *Caridea* species along the coasts of Israel
- 2013- Opher Mendelssohn (DayanT.)
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- Oliver Tallowin (S. Meiri and A. Allison).
Evolution of reptiles along elevation gradients in a tropical island.
- 2013- Zohar Yanai (Dorchin, N.).
The mayflies (Insecta: Ephemeroptera) of Israel: taxonomic and ecological aspects
- 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- Meoded, R. (M. Ilan and J. Piel))
Sponge secondary metabolite pathways
- 2014- Liat Koch (Holzman R.)
Functional morphology of the suction feeding mechanism in larval fishes
- 2014- Alex Slavenko (S. Meiri and A. Allison).
Macroevolution and macroecology of mountain reptiles.
- 2014- Yishai Weissman (E. Geffen)
Procaviidae vocalizations: From specific elements to phylogenetics.
- 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- Yael Goll (E. Geffen)
Leadership in rock hyrax society.
- 2015- Tal Idan. (M. Ilan)
Mediterranean mesophotic sponge gardens
- 2015- Noa Katz (Scharf, I.).
Expression of AgRP in hydrodynamicly-starved fish.
- 2015- Yonatan Meresman (Ribak G.)
Evolution of wing elasticity in beetles (Coleoptera)
- 2016- Levona Bodner (N. Dorchin)
Ecology of oak wasps and gall midges
- 2016- Andressa Duran (S. Meiri and Dave Chapple).
Lizard macroecology.
- 2016- Ori Frid (Belmekker, J.)

- Mediterranean fishes community structure
- 2016- Tal Gorgon (Shenkar, N.)
Polycarpa mytiligera as a model organism for regenerative studies
- 2016- Itai Granot (Belmekker, J.)
Community assembly and specialization across latitudinal gradients
- 2016- Ziv Kassner (Ribak G.)
The mechanics and behavior of aerial interception by insects
- 2016- Michaela Kolker (Holzman R. and S. Meiri)
Larval fishes in the Mediterranean of Israel
- 2016- Rona Nadler-Valency
Unfolding the diverse meanings, histories and conservation implications of human and wildlife 'co-habitation'.
- 2016- Itai Nodel (Sarig, R.)
Secondary dentin evaluation using computerized tomography: application for anthropology and forensics
- 2016- Renanel Pickholtz (Belmekker, J.)
Stress and movement patterns of fishes
- 2016- Rajjman, L (M. Ilan)
Red Sea mesophotic sponges
- 2016- Svetalana Vaisman (Dayan, T.)
Exotic and invasive molluscs in Israel (temporary title)

MSc students

- 2009- Dolev Kastin (M. Goren)
reproductive and growing biology of the cyprinid fish *Garra rufa*.
- 2010-2015 Ariel Kedem (T. Dayan with N. Kronfeld-Schor)
Snake predation risk on spiny mice.
- 2010- Levona Bodner (A. Freidberg)
The Tephritoidea (Diptera) of Israel
- 2011- Yehala Roterman (Y. Benayahu and U. Gofna)
Bacteria in invasive and indigenous bivalves.
- 2011- Iris Wiseman (S. Meiri and M. Goren).
Overfishing in Israel.
- 2012-2015 Farovich, Y. (M. Ilan)
Antimicrobial natural products from sponge-associated bacteria
- 2012-2015 Idan, T. (M. Ilan)
Sponges and corals of the Mediterranean mesophotic reefs
- 2012- 2015 Naim, A. (M. Ilan Wageningen University)
Analysis of steady state cell proliferation and shedding in a selection of Red Sea sponges.

- 2012-2015 Ohad Mass (S. Meiri).
Latitudinal diversity of Israeli Mediterranean biome mammals.
- 2012-2015 Jonatan Reberger (F. Ben-Ami)
Parasite-Mediated Determinants of Coexistence between Sexual and Asexual Host Snails.
- 2012-2016 Yoni Alcalay (Scharf, I. and O. Ovadia).
Behavioral syndromes of pit-building antlion larvae.
- 2012-2016 Mark Cavanagh (Langgut, D. and E. Ben Yosef)
Identifying the Wood Fuel that was used for Metalurgical Activity in Timna
- 2012-2016 Ehud Gilad (Benayahu, Y. and Y. Edelman-Furstenberg).
Bivalve assemblages as environmental indicator.
- 2012-2016 Noga Perry (Benayahu, Y. and U. Gofna).
Bacteria induce metamorphosis of coral polyp larvae.
- 2012-2016 Erez Shoham (Benayahu, Y.).
Soft corals of the mesophotic zone at Eilat (northern Red Sea).
- 2012- 2016 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- 2015 Ori Frid (Belmaker J.)
Ecological impacts of coastal fishing .
- 2013-2015 Itai Granot (Shenkar, N. and Y. Belmaker)
Processes structuring the assembly of fouling communities.
- 2013- 2015 Ziv Kassner (Ribak G.)
Sensory and mechanical constraints on target interception and flight control in Odonata
- 2013-2015 Yaniv Shmuel (Shenkar N.)
Ecology and reproduction of *Halocynthia spinosa* in the Red Sea
- 2013-2015 Alex Slavenco (Meiri, S. and P. Pafilis)
Evolution of life history in an Aegean-islands lizard.
- 2013-2016 Yuval Baar (Scharf, I. and S. Meiri).
The effect of climate on body size and shape of insects in Israel.
- 2013-2016 Renanel Pickholtz (Belmaker J.)
Landscape ecology of invasive herbivorous fishes.
- 2013-2016 Margarita Pogorelov (Dayan T.)
Economic aspects of crane management at the Hula wetland.
- 2013-2016 Hanna Rapuano (Loya, Y.)
Reproductive effort in fungiid corals.
- 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- Camelia Gochev (Benayahu, Y. and G. Zilman).
Settlement of coral planulae in response to hydrodynamic conditions
- 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- Chen Piller (Benayahu, Y.).
Environment friendly antifouling paints: efficiency and toxicity
- 2013- Erez Shpirer (D. Huchon)
Identification of nematocyst-restricted genes in Myxozoa.
- 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
- 2014-2016 Tal Gordon (Shenkar N.)
Ecological aspects of the tropical ascidian *Polycarpa cryptocarp*
- 2014-2016 Yuval Jacobi ((Shenkar N. and G. Yahel)
Ascidian filtration rates
- 2014-2016 Shay Adar (Scharf I. and Dor R.)
Foraging behavior, habitat selection and intraspecific interactions of pit-building wormlions
- 2014-2016 Ariel Akron (Dayan T.)
Ecosystem services of Israeli wetlands
- 2014-2016 Shachar Ben Cohen (Dor R.)
Morpholpgical, genetic and behavioral aspects with emphasis on invasive populations of the House Sparrow in Israel.
- 2014-2016 Lior Davis (Dayan T. and Meiri S.)
Community-wide character displacement in shore birds.
- 2014-2016 Michaela Kolker (Holzman R.)
morphological disparity in larval fishes
- 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 - Mordechay 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.
- 2014- Stav Brown (Ribak G.)
Effect of larval growth on scaling of dispersal flight in beetles
- 2014- Liran Dray (D. Huchon)
The complete mitochondrial genome of *Rhopalaea idoneta*.
- 2014- Hila Dror (Shenkar, N.)
Characterizing bacterial communities in *Styela plicata* along the Mediterranean coast of Israel and the mid-western Atlantic coast.
- 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- Naomi Gordon (E. Geffen)
Vocal repertoire in female rock hyraxes in relation to social structure.
- 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- Maayan Itzhaki (F. Ben-Ami)
How biotic and abiotic factors affect the infectiousness and development of *Pasteuria ramosa*.
- 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- 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 – Lee Oz (Sapir-Hen L. and I. Finkelstein).
The Iron IIA in the Ophel excavations
- 2014- Tal Rubin (Dayan T. and Kronfeld-Schor N.)
Urban Bats

- 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 (A. Hefez)
Instar-related development of *Cales noacki*.
- 2015- Adi Ashkenazi (M. Ilan)
Mediterranean Stryphnus from the deep sponge garden
- 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- Inbal Gamliel (Belmaker J. and Gil Rilov)
Biotic interactions and resilience to climate change in intertidal invertebrates
- 2014- Chen Gilboa (F. Ben-Ami)
Evolution of parasite virulence and host resistance strategies with parasitism.
- 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 isotopic composition in Soreq Cave speleothems
- 2015- M Levi (M. Ilan)
Mediterranean Irciniids from the deep sponge garden

- 2015 – Helena Roth (Langgut D. and Y. Gadot).
Wood economy and botanical reconstruction of Early Roman Jerusalem
- 2015- Jamie Shapiro (D.E. Bar-Yosef Mayer, Ehud Spanier)
Changes in the Food Habits and possible competition of the mango tilapia, *Sarotherodon galilaeus*, and of the silver carp,.
- 2015- Guy Sinaiko (S. Meiri and R. Dor)
Taxonomy and phylogeny of slender racers of the *Platyceps rhodorachis* complex.
- 2015- Hagar Yancovitch shalom (Belmaker J)
Abundance-range size relationships in reef fishes
- 2015- Ronni Zafriri (Shenkar, N.)
The solitary ascidians *Microcosmus exasperatus* (order: Stolidobranchia), and *Phallusia nigra* (order: Phlebobranchia) as potential bio-indicators of marine environments
- 2016- Ella Avidor (E. Geffen)
Characterizing habitat requirements and occupancy of the Hula painted frog.
- 2016- Nir Bonda (N. Dorchin)
The role of natural enemies in host-associated speciation of gall-inducing midges (Diptera: Cecidomyiidae)
- 2016- Aviv Ben-Tal (Shenkar, N.)
Ascidian mucous mesh
- 2016- David David (S. Meiri and S. Gafny)
Captive breeding and the conservation of *Pelobates syriacus*.
- 2016- Hilla Davidovich (Ribak G.)
Biomechanics and mate selection in the copulatory flight of damselflies
- 2016- Gal Elhadad (S. Meiri)
Lizard macroecology.
- 2016- Tal Gavriely (Belmaker J.)
Fish movement ecology.
- 2016- Or Greber (Ribak G. and Ayali A.)
Neurophysiology and mechanics of aerial righting in locusts
- 2016 Astrid Hasday (D.E. Bar-Yosef Mayer, Reuven Yeshurun).
To be determined.
- 2016- Yuly Marom (Sarig, R.)
Taxonomic characterization of hominin in the Kebara Cave in relation to Dentition
- 2016- Nir Netanel (M. Ilan and E. Zchori-Fein)
Microsymbionts of *Bemisia*
- 2016 Heeli Schechter (D.E. Bar-Yosef Mayer, Nigel Goring-Morris)
To be determined.
- 2016- Shoam, S. (M. Ilan)
Arsenic tolerant bacteria from sponges

- 2016- Amir Sarig (Ribak G.)
Flight Biomechanics and direction preference of miniature insects in wind conditions
- 2016- Gal Vered (Shenkar, N.)
Ascidians as bio-indicators of micro-plastic and phthalates in marine environments
- 2016- Yohananoff, G. (M. Ilan)
Sponge filtration

Post-doctoral fellows

- 2011- Razi Hofman
- 2013-2016 Meirav Meiri
- 2013- Noga Sokolover
- 2014 - Karin Tamar
- 2014- Gidi Pizanty
- 2014-2015 Alison Gainsbury
- 2014-2016 Anat Feldman
- 2014-2016 Sharon Renan
- 2015-2016 Irina Zonstein
- 2015-2016 R. Keren
- 2015-2016 Malkie Spodek
- 2015- Guy Sion
- 2016- T. Tunis-Sella
-
- 2016- Liron Goren
- 2016- Shane Blowes
- 2016- Jenny Tynyakov
- 2016- Iris Bernstein
- 2016- Ronit Justo-Hanani

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 the Tel Aviv University during the past academic year. Much use is made of the collections by other scientists, who did not visit them in person. Some scientists got identification services for their research projects and others had 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 to researchers at their home institutions.

| Date | Name | Institute | Country | Taxonomic group |
|----------|---------------|--|----------------|-----------------|
| 2015 Oct | S. Vaisman | Ministry of Agriculture | Israel | Molluscs |
| 2015 Oct | A. Dotan | Beit Berl | Israel | Molluscs |
| 2015 Nov | S. Vaisman | Ministry of Agriculture | Israel | Molluscs |
| 2015 Dec | S. Vaisman | Ministry of Agriculture | Israel | Molluscs |
| 2015 Dec | A. Lerner | Israel Oceanographic and Limnological Research | Israel | Corals |
| 2015 Dec | Y. Wasserlauf | | Israel | Birds |
| 2015 Dec | O. Gon | Institute for Aquatic Biodiversity | South Africa | Fish |
| 2015 Dec | D. Golani | Hebrew University | Israel | Fish |
| 2016 Jan | S. Vaisman | Ministry of Agriculture | Israel | Molluscs |
| 2016 Jan | A. Dotan | | Israel | Molluscs |
| 2016 Jan | Y. Kiat | Birding Center in Jerusalem | Israel | Birds |
| 2016 Jan | R. Yeshurun | University of Haifa | Israel | Mammals |
| 2016 Jan | M. Orbach | University of Haifa | Israel | Mammals |
| 2016 Feb | S. Vaisman | Ministry of Agriculture | Israel | Molluscs |
| 2016 Feb | J. Simonova | University of Prague | Czech Republic | Molluscs |
| 2016 Feb | J. Simonova | University of Prague | Czech Republic | Entomology |
| 2016 Feb | K. Fazekasova | University of Prague | Czech Republic | Entomology |
| 2016 Feb | J. Prazak | University of Prague | Czech Republic | Entomology |
| 2016 Feb | E. Matouskova | University of Prague | Czech Republic | Entomology |
| 2016 Feb | M. Spodek | Museum Basel | Switzerland | Entomology |
| 2016 Feb | Y. Wasserlauf | | Israel | Birds |
| 2016 Feb | Y. Kiat | Birding Center in Jerusalem | Israel | Birds |
| 2016 Feb | R. Yeshurun | University of Haifa | Israel | Mammals |
| 2016 Feb | M. Orbach | University of Haifa | Israel | Mammals |
| 2016 Mar | Z. Balint | Hungarian Natural history Museum, Budapest | Hungary | Entomology |
| 2016 Mar | P. Kimberly | Simon Fraser University | Canada | Anthropology |
| 2016 Mar | S. Vaisman | Ministry of Agriculture | Israel | Molluscs |
| 2016 Apr | S. Vaisman | Ministry of Agriculture | Israel | Molluscs |

| Date | Name | Institute | Country | Taxonomic group |
|-----------|---------------|--|---------|-----------------|
| 2016 Apr | Y. Wasserlauf | | Israel | Birds |
| 2016 May | S. Vaisman | Ministry of Agriculture | Israel | Molluscs |
| 2016 May | O. Peri | Bar-Ilan University | Israel | Polychaeta |
| 2016 Jun | A. Novikov | Hebrew University | Israel | Entomology |
| 2016 Jun | O. Valerskiy | EBC "Krestovskiy Ostrov", St. Petersburg | Russia | Entomology |
| 2016 Jun | G. Chuzhov | EBC "Krestovskiy Ostrov", St. Petersburg | Russia | Entomology |
| 2016 Jun | K. Soloviev | EBC "Krestovskiy Ostrov", St. Petersburg | Russia | Entomology |
| 2016 Jun | D. Guseva | EBC "Krestovskiy Ostrov", St. Petersburg | Russia | Entomology |
| 2016 Jun | M. Filippova | EBC "Krestovskiy Ostrov", St. Petersburg | Russia | Entomology |
| 2016 Jun | A. Katsuba | EBC "Krestovskiy Ostrov", St. Petersburg | Russia | Entomology |
| 2016 Jun | S. Vaisman | Ministry of Agriculture | Israel | Molluscs |
| 2016 Jun | Y. Kiat | Birding Center in Jerusalem | Israel | Birds |
| 2016 July | S. Vaisman | Ministry of Agriculture | Israel | Molluscs |
| 2016 July | H. Shirichai | University of Gothenburg | Sweden | Birds |
| 2016 July | A. Ben-Dov | | Israel | Birds |
| 2016 July | E. Maher | North Central College | USA | Mammals |
| 2016 Aug | S. Vaisman | Ministry of Agriculture | Israel | Molluscs |
| 2016 Aug | D. Korngreen | Geological Survey Israel | Israel | Foraminifera |
| 2016 Aug | Y. Leshno | Hebrew University | Israel | Molluscs |
| 2016 Aug | Y. Wasserlauf | | Israel | Birds |
| 2016 Sep | S. Vaisman | Ministry of Agriculture | Israel | Molluscs |
| 2016 Sep | T. Magen | | Israel | Birds |
| 2016 Sep | A. Ben-David | | Israel | Mammals |
| 2016 Oct | Y. Charka | The Jewish National Fund (KKL) | Israel | Mammals |
| 2016 Oct | S. Vaisman | Ministry of Agriculture | Israel | Molluscs |

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-based, several of which are compulsory for first and second year students and are taught to hundreds of them. 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-Hen | Tel Aviv University | Mammals |
| Practical workshop in Archaeozoology | L. Sapir-Hen | Tel Aviv University | Mammals, Fish and Museum Class |
| Animal remains in archaeology | L. Sapir-Hen | 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 |

| Purpose | Name | Institute | Taxonomic group |
|--|---------------------------|---|---|
| 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 |
| Reconstruction of past environmental conditions and site's environs (academic course) | D. Langgut | Tel Aviv University | Palynology and Archaeobotany |
| Museology (academic course) | | Tel Aviv University | Mammals, Birds, Entomology and Museum Class |
| Outstanding program of arts (academic course) | | Tel Aviv University | Mammals, Birds, Entomology and Museum Class |
| Veni Vidi Tuli: Cabinets of Wonder – Curiosity and Collections in 16th and 17th Century Europe (academic course) | | Tel Aviv University | Mammals, Birds, Entomology and Museum Class |

| Purpose | Name | Institute | Taxonomic group |
|--------------------------------|---------------|--|---|
| 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 |
|---|------------------|--|-----------------|
| 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 | | Ben Gurion University | Entomology |
| Taxonomy Identification | | The Israel National Aquatic Ecology Center | Entomology |
| Taxonomy Identification | | Ministry of Agriculture | Arachnidae |
| 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 |

| Purpose | Name | Institute | Taxonomic group |
|-------------------------|----------------------|--|--------------------------------|
| 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 District | Israel Nature and Parks Authority | Molluscs |
| Taxonomy Identification | North District | 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 | I. Sella | SeArc Company | Molluscs |
| Taxonomy Identification | Y. Achitov | Bar Ilan University | Invertebrates: Stony Corals |
| Taxonomy Identification | D. Milstein | Israel Nature and Parks Authority | Crustacean |
| Taxonomy Identification | | IOLR – Haifa | Fishes |
| Taxonomy Identification | E. Elron | DHV MED | Crustacean |
| Taxonomy Identification | H. Lubinevsky | Israel Oceanographic and Limnological Research | Crustacean |
| Taxonomy Identification | O. Barnea | Marine biology consulting services | Crustacean |
| Taxonomy Identification | R. Yahel | Israel Nature and Parks Authority | Sponge |
| Taxonomy Identification | | Ma'arag | Sponge |
| Taxonomy Identification | S. Martinez | University of Haifa | Sponge |
| Taxonomy Identification | E. Mils | CSA OceanSciences Inc. | Sponge |

| Purpose | Name | Institute | Taxonomic group |
|--------------------------|----------------|--------------------------------------|-----------------|
| Taxonomy Identification | I. Sella | SeArc Company | Sponge |
| Taxonomy Identification | R. Yahel | Israel Nature and Parks Authority | Bryozoa |
| Taxonomy Identification | I. Sella | SeArc Company | Bryozoa |
| Taxonomy Identification | S. Martinez | University of Haifa | Ascidians |
| Taxonomy Identification | I. Sella | SeArc Company | Echinodermata |
| Taxonomy Identification | R. Yahel | Israel Nature and Parks Authority | Algae |
| Taxonomy Identification | D. Milstein | Israel Nature and Parks Authority | Amphibian |
| 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 | | Israeli Air Force | Birds |
| Molecular identification | | Israel Airport Authority | Birds |
| Molecular identification | E. Mils | CSA Ocean Sciences Inc. | Sponge |
| Molecular identification | G. Shenbrot | Ben-Gurion University | Reptilia |
| Molecular identification | D. Milstein | Israel Nature and Parks Authority | Crustacean |
| DNA Shipment | N. Saino | Universita Di Pavia, Italy | Mammalia |
| DNA Shipment | D. Adriaens | The University of Gent, Belgium | Reptilia |
| DNA Shipment | M. Rajabizadeh | The University of Gent, Belgium | Reptilia |
| DNA Shipment | F. Portillio | University of Texas at El Paso , USA | Reptilia |

| Purpose | Name | Institute | Taxonomic group |
|-----------------------|-----------------------|---|--------------------------------------|
| DNA Shipment | M. Vamberger | Senckenberg Natural History Collections of Dresden, Germany | Reptilia |
| Electronic Data | D. Milstein | Israel Nature and Parks Authority | Fishes |
| Electronic Data | A. Payo Payo | Instituto Mediterráneo de Estudios Avanzados, Spain | collection information |
| Electronic Data | Y. L. Werner | Hebrew University | Reptilia |
| Electronic Data | F. Portillio | University of Texas at El Paso, USA | Reptilia |
| Electronic Data | M. Blacher | Israel Nature and Parks Authority | Reptilia, Crustacea |
| Electronic Data | N. Lavi-Alon | The Society for the Protection of Nature in Israel | Mammals, Birds, Reptiles |
| Electronic Data | A. Arnon | Ramat HaNadiv | Amphibians, Mammals, Birds, Reptiles |
| Electronic Data | E. Terkel | Safari | Mammals |
| Electronic Data | A. Ben-Dov | | Birds |
| Electronic Data | M. Martins | Universidade de Sao Paulo, Brazil | Reptilia |
| Shipment of Specimens | S. Goldberg | Whittier College, USA | Reptilia |
| Shipment of Specimens | S. Baeckens | The University of Antwerp, Belgium | Reptilia |
| Shipment of Specimens | S. Sfenthourakis | Cypres | Reptilia |
| Shipment of Specimens | E. Karameta | Cypres | Reptilia |
| Shipment of Specimens | E. Mori | Italy | Mammals |
| Shipment of Specimens | M. Hugues | Uppsala University, Sweden | Sponges |
| Shipment of Specimens | Architecture Biennale | Architecture Biennale | Bryozoa |
| Shipment of Specimens | M. Litvaitis | University of New Hampshire Durham, USA | Soft Corals |

| Purpose | Name | Institute | Taxonomic group |
|-----------------------|----------------|---|-----------------|
| Shipment of Specimens | M. Bolaños | University of New Hampshire Durham, USA | Soft Corals |
| Shipment of Specimens | Reijnen | Naturalis Biodiversity Centre, The Netherlands | 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 | D. Reimer | University of the Ryukyus, Japan | Soft Corals |
| Shipment of Specimens | Huijbregts | Naturalis Biodiversity Center, The Netherlands | Entomology |
| Shipment of Specimens | Haran | URZF, INRA, Ardon, Orléans University, France | Entomology |
| Shipment of Specimens | Beenen | Naturalis Biodiversity Center, Netherlands | Entomology |
| Shipment of Specimens | Stekolschikov | Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia | Entomology |
| Shipment of Specimens | Kiran | Trakya University, Faculty of Sciences, Department of Biology, Turkey | Entomology |
| Shipment of Specimens | Halstead | UK | Entomology |
| Shipment of Specimens | Tedeschi | Italy | Entomology |
| Shipment of Specimens | C. Germann | Abteilung Wirbellose, Naturhistorisches Museum der Burgergemeinde Bern, Germany | Entomology |
| Shipment of Specimens | Delagado | Departamento de Zoologia, Facultad de Biología, Universidad de Murcia, Portugal | Entomology |
| Shipment of Specimens | Pražák | Natural History Museum, Czech Rep. | Entomology |
| Shipment of Specimens | J. Hájek | National Museum, Natural History Museum | Entomology |

| Purpose | Name | Institute | Taxonomic group |
|-----------------------|--------------------------|--|-----------------|
| Shipment of Specimens | Sekerka | Natural History Museum, Czech Rep. | Entomology |
| Shipment of Specimens | Delvare | UMR CBGP, France | Entomology |
| Shipment of Specimens | Bakker | Naturalis Biodiversity Center, The Netherlands | Entomology |
| Shipment of Specimens | Tabell | Germany | Entomology |
| Shipment of Specimens | R. Szadziewski | Department of Invertebrate Zoology and Parasitology, University of Gdansk, Poland | Entomology |
| Shipment of Specimens | Tkoč | Natural History Museum, Czech Rep. | Entomology |
| Shipment of Specimens | Matov | Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia | Entomology |
| Shipment of Specimens | J. Růžička | Faculty of Environmental Sciences, Czech University of Life Sciences, Czech Republic | Entomology |
| Shipment of Specimens | Saldaitis | Lithuania | Entomology |
| Shipment of Specimens | S. Salata | Department of Biodiversity and Evolutionary Taxonomy, University of Wrocław, Poland | Entomology |
| Shipment of Specimens | A. Khalaim | Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia | Entomology |
| Shipment of Specimens | Stalling | Germany | Entomology |
| Shipment of Specimens | C. J. Barros de Carvalho | Departamento de Zoologia, Universidade Federal do Paraná, Brazil | Entomology |
| Shipment of Specimens | E. Scheuchl | | Entomology |

| Purpose | Name | Institute | Taxonomic group |
|-----------------------|------------|--|-----------------|
| 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 | A. Mueller | Entomological Collection, ETH Zurich, Switzerland | Entomology |
| Shipment of Specimens | Letsch | Department of Tropical Ecology and Animal Biodiversity, University of Vienna, Austria | Entomology |
| Shipment of Specimens | J.S. Noyes | Natural History Museum, UK | Entomology |
| Shipment of Specimens | M. Terzo | Université De Mons, Belgium | Entomology |
| Shipment of Specimens | A. Pauly | Institut royal des Sciences naturelles de Belgique, Departement Entomologie, France | Entomology |
| Shipment of Specimens | Risch | Germany | Entomology |
| Shipment of Specimens | Zerova | I. I. Schmalhausen Institute of Zoology, Ukraine | Entomology |
| Shipment of Specimens | Seryogina | I. I. Schmalhausen Institute of Zoology, Ukraine | Entomology |
| Shipment of Specimens | Dyakonchuk | I. I. Schmalhausen Institute of Zoology, Ukraine | Entomology |
| Shipment of Specimens | Simutnik | I. I. Schmalhausen Institute of Zoology, Ukraine | Entomology |
| Shipment of Specimens | Fursov | I. I. Schmalhausen Institute of Zoology, Ukraine | Entomology |
| Shipment of Specimens | Kaluzhna | I. I. Schmalhausen Institute of Zoology, Ukraine | Entomology |
| Shipment of Specimens | Kotenko | I. I. Schmalhausen Institute of Zoology, Ukraine | Entomology |

| Purpose | Name | Institute | Taxonomic group |
|-----------------------|---------------|--|-----------------|
| Shipment of Specimens | Nuzhna | I. I. Schmalhausen Institute of Zoology, Ukraine | Entomology |
| Shipment of Specimens | Tolkanitz | I. I. Schmalhausen Institute of Zoology, Ukraine | Entomology |
| Shipment of Specimens | B. Muller | National Museum, South Africa | Entomology |
| Shipment of Specimens | Londt | KwaZulu-Natal Museum, South Africa | Entomology |
| Shipment of Specimens | Ogden | Utah Valley University, USA | Entomology |
| Shipment of Specimens | M. Hauser | California Department of Food and Agriculture, Plant Pest Diagnostics Branch, USA | Entomology |
| Shipment of Specimens | Tomanovic | University of Belgrade, Institute of Zoology, Serbia | Entomology |
| Shipment of Specimens | von Reumont | University of Leipzig, Institute of Biology, Germany | Entomology |
| Shipment of Specimens | Bohn | Zoologische Staatssammlung München, Germany | Entomology |
| Shipment of Specimens | Putshkov | Dept. of Taxonomy of Entomophagous Insects, I. I. Schmalhausen Institute of Zoology, Ukraine | Entomology |
| Shipment of Specimens | Montes de Oca | Instituto de Investigaciones Biológicas Clemente Estable, Uruguay | Entomology |
| Shipment of Specimens | Yu. Marusik | Turku Univeristy, Finland | Entomology |
| Shipment of Specimens | Stuke | Germany | Entomology |
| Shipment of Specimens | R.H.L. Disney | Department of Zoology, University of Cambridge, UK | Entomology |