

# Newsletter

## Spring 2020

### The Leon H. Charney School of Marine Sciences

#### GREETINGS FROM HEAD OF SCHOOL



We are in a midst of a strange spring season. A wet winter that has replenished water sources in our dry land. The hills are green and patches of purple, yellow, pinks, reds, and whites carpet the ground with the flowers and trees blossoming in a fiesta of colors. Yet, this spring is also one in which we least experience the nature around us as the expanding impacts of the Corona virus pandemic have sent many of

us around the world to either quarantine or curfews limiting our abilities to do science or even to roam freely and enjoy the season. As I write (6 April 2020), the country and the university have already spent over two weeks in a state of semi-hibernation and quarantine with businesses, and schools closing and children and parents at home.

The spring semester at the Charney School of Marine Sciences began by switching to on-line teaching and minimum physical contact between faculty, staff, and students. Many planned conferences and research cruises have been cancelled or indefinitely postponed and daily research drastically reduced to only essential work. Our international students that have stayed in Israel are dealing with being in a new country at a time of crisis while worrying about their

homes and families living in some of the most affected areas; while our newly registered students have to “learn the ropes” via an on-line remote system.

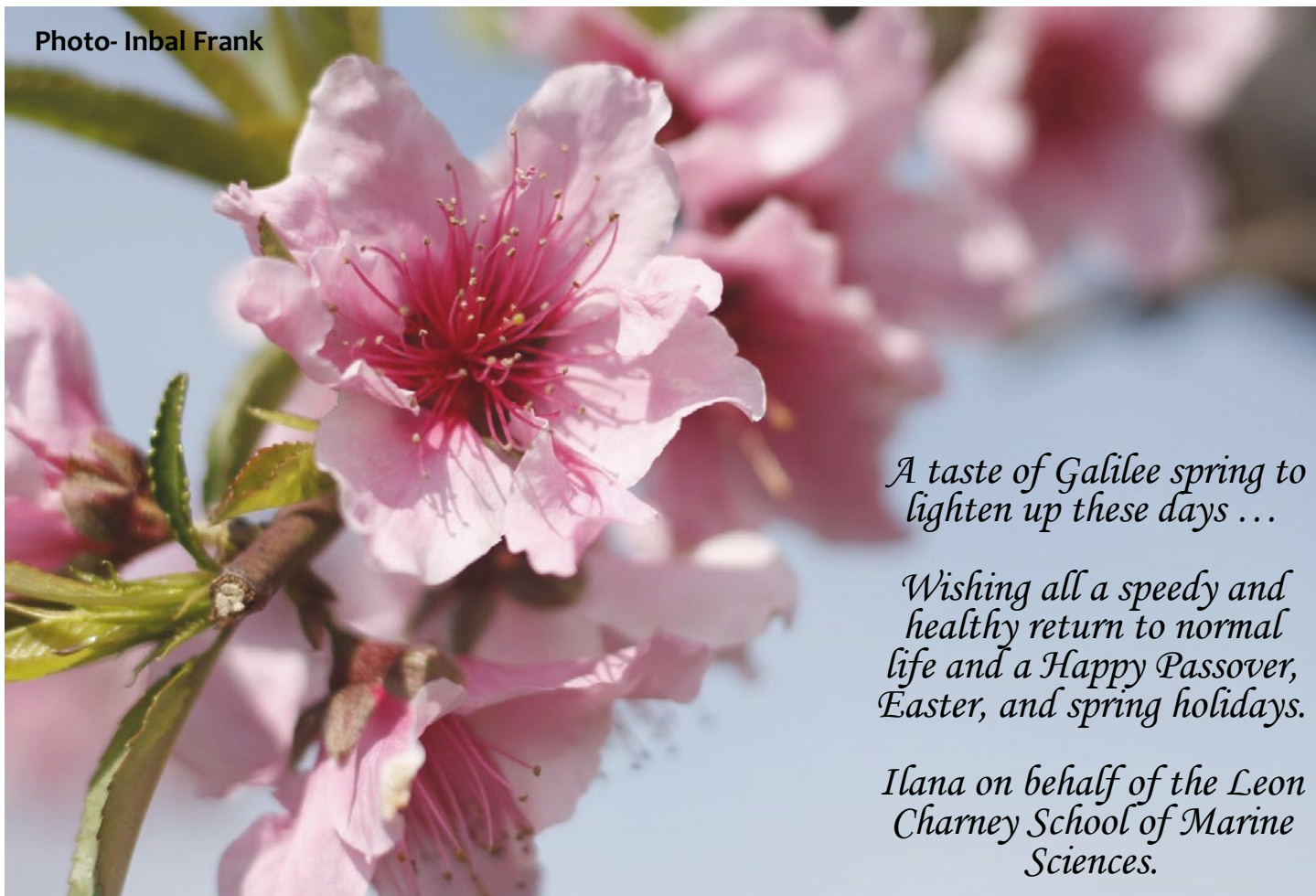
Although, we do not see the end of this crisis yet, I can only hope that the outbreak and spread affecting almost all areas of life will slow-down and decline quickly. In the meantime, to our faculty, staff, and students please do not hesitate to let us know if you need any help at this time of trouble.

I am hoping that with the extra time spent at home and online, you will enjoy our current CSMS newsletter highlighting the activities of the past fall semester.

Wishing everyone health and a rapid return to our daily rhythms and routines and to the beauty of the spring unfolding outside.

*Alan Berman-Frank*

Photo- Inbal Frank



*A taste of Galilee spring to  
lighten up these days ...*

*Wishing all a speedy and  
healthy return to normal  
life and a Happy Passover,  
Easter, and spring holidays.*

*Ilana on behalf of the Leon  
Charney School of Marine  
Sciences.*





The Charney School of Marine Sciences extends its condolences to the Hatter family for the loss of

### Sir Maurice Hatter

A longtime friend and supporter of the School and its activities

MAY HE REST IN PEACE

Pinsky to the laboratory of Dr. E. Nantet and Carmel Danino Gozlan to the laboratory of Prof. D. Angel.

Lastly, we congratulate two of our faculty members. Dr. G. Gambash won the prestigious Leverhulme Visiting Professorship for the year 2020 at the University of London. Dr. H. Khalilieh for the prestigious Cambridge University Press publication of his book entitled **"Islamic Law of the Sea: Freedom of Navigation and Passage Rights in Islamic Thought"**. The book was also recently honored at a special evening conference at the Faculty of Law, Tel Aviv University (see book cover below).

## NEWS FROM DEPARTMENT HEADS

### The Department of Maritime Civilizations

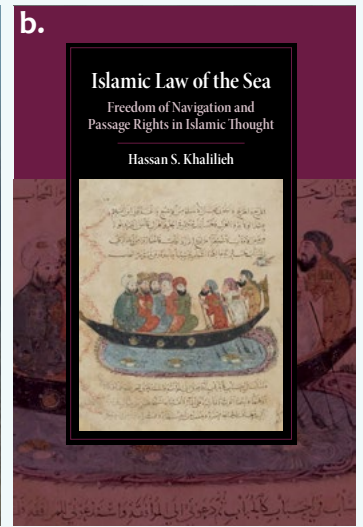
#### Prof. Ruth Shahack-Gross

The Department of Maritime Civilizations continues its broad research and teaching activities. The fall semester ended successfully with over 20 new students at the various levels, as well as the pioneer teaching by Prof. A. Yasur-Landau at the newly formed inter-departmental BA program on Mediterranean Archaeology together with the Archaeology Department.

The semester break was busy as well with the teaching of the course Advanced Field Methods for underwater and coastal survey (see image). On the research arena, the department's researchers completed three exciting underwater and coastal excavations: The Ma'agan Michael B shipwreck (September

2019, led by D. Cvikel), the underwater Neolithic settlement at Habonim North (January 2020, led by PhD student R. Nickelsberg), and the Roman harbor of Tiberias (February 2020, led by Dr. E. Nantet).

The department welcomes two new laboratory managers: Sonia



a. Students learn how to draw underwater during the course Advanced Field Methods. The course was taught by Prof. A. Yasur-Landau and Dr. E. Nantet, supported by the Maritime Workshop of Recanati Institute for Maritime Studies, and conducted in collaboration with the Maritime Unit of the Israel Antiquities Authority headed by Kobi Sharvit. Photo: I. Ogloblin. b. Cover of H. Khalilieh's book- "Islamic Law of the Sea: Freedom of Navigation and Passage Rights in Islamic Thought".



## Dr. Moses Strauss Department of Marine Geosciences

### Dr. Beverly Goodman-Tchernov

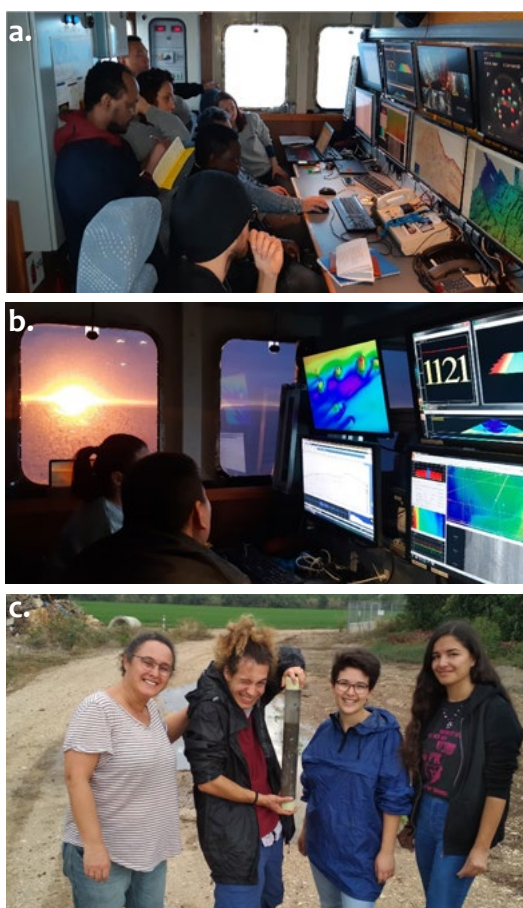
The first semester of 2019-2020 has been very busy in the Department of Marine Geosciences. It has been an especially productive time for new publications (~15) spanning topics from the deep sea to the atmosphere, and across recent and deep geological time. Our most recent cohort of students is perhaps one of our most international groups to date with representatives from Israel, Ethiopia, South Africa, Nigeria, United States, India, and China.

This year's educational cruise (coordinator Dr. Gideon Tibor) took advantage of the deep sea capabilities of the R/V Bat Galim and focused on increasing the mapping resolution on the lower continental rise with research questions concentrating on better understanding underlying tectonic processes as well as overlying sedimentological concerns such as sediment transport and microplastic pollution.

Dr. Revital Bookman led high school students in an environmental project to explore the impacts of anthropogenic pollution on Israel's coastal wetlands. The research project aims to identify heavy metal

pollution along the coast of Israel. Recognizing these pollution trends is critical for the management of coastal wetlands, highly sensitive and endangered ecosystems worldwide. The project is a collaboration with the Department of Science Teaching, Weizmann Institute of Science and the students will present their results as part of their matriculation examination. We hope to see some of these bright young scholars as graduate students in the future!

The seminar series this semester included two international visitors. Prof. Michel Mahiques of University of São Paulo, Brazil, guest and collaborator of Dr. Uri Schattner, presented a seminar on recently recognized features offshore Brazil that redefine the understanding of that area's geological history. Dr. Stephen Pekar of Queens College, USA shared findings from IODP Expedition #371 investigation into the '8<sup>th</sup>' continent Zealandia.



On Board the R/V Bat Galim during Educational Cruise 2019-2020. **a.** Students looking over the freshly collected maps and cross sections determining where to collect sediment cores. **b.** MingJian Wang and Adellina Cina end the nightshift with a sunrise. **c.** High school students and Dr. Bookman sampling coastal wetland sediments to measure and study environmental pollution as part of their science project (Geotop).

## The Department of Marine Biology

Dr. Tamar Lotan

We began the academic year with a newly recruited faculty member, Dr. Tal Luzzatto Knaan, an expert in marine metabolomics, who studies microbial chemical communication in the sea. This year also marked the launching of our international MSc program and currently our department has grown to about 60 MSc and PhD students.

In January, the 6<sup>th</sup> academic meeting of the Department took place at Caesarea Sea Center. It was attended by more than 80 PhD and MSc students, postdoctoral fellows, principal investigators, research fellows and scientists. Ziv Zemach Shamir provided an eloquent memorial of Prof. Abraham (Avremale) Haim who helped establish CSMS



*Marine biology get together logo designed by Irit Shaim*



*Members of the Department of Marine Biology at the 6<sup>th</sup> Academic meeting in Sdot Yam.*

in its early years. The meeting included excellent lectures by students from different research groups and two poster sessions, during which 45 interesting posters were presented by the students. Irit Shaim, won our Department logo competition and her beautiful logo decorated the mugs for the meeting. We plan to hold logo competitions for our future meetings.

We are now getting ready for the second semester offering a variety of new courses. A new outreach course named “Sea, Society, Education and Leadership”, which is supported by the Rector’s Office and “Flagship Programs” and also by the Council for Higher Education and the Charney School of Marine Sciences, focuses on challenges in our marine environment. The students will search for social-

educational solutions to national-level problems. These will be implemented in collaboration with 7<sup>th</sup> grade students. The course has just begun, and we hope that it will provide a unique experience to our students as well as the teenagers (see p.16 for more details).

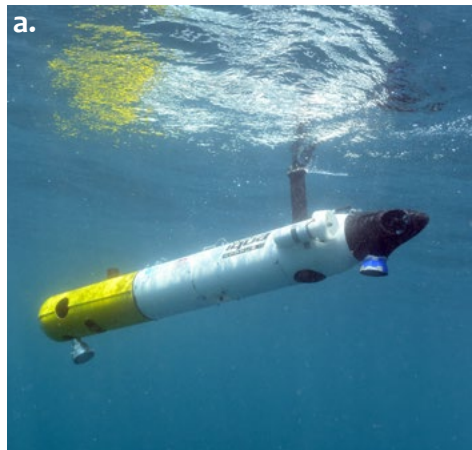
## The Hatter Department of Marine Technologies

Prof. Morel Groper

These past months have been busy at the Department of Marine Technologies with many ongoing and new research projects. Our team of students and engineers have upgraded our SPARUS II AUV to perform visual surveys of the seabed - a challenging mission that requires the robot to fly or hover at a low altitude, very close to the seabed. For this end, we



developed a high resolution, pressure resistant, stereo camera system, underwater strobes, and an enhanced propulsion system to permit delicate maneuvering close to the seabed. In our sea trials, together with the Morris Kahn Marine Research Station (MKMRS) monitoring team, we mapped sections of mesophotic reefs along the Israeli Mediterranean coastline using the SPARUS which photographed unexpected objects such as the turtle. Parallel developments of AI technologies for automatic classification of the substrate will also help us study processes in benthic ecology. Our collaborations within the Department (SubSea Engineering and Marine Imaging labs) resulted in a prototype of a navigation system for autonomous surface high speed planing crafts capable in automatically modulating the craft speed as a function of the sea-state faced by the craft. To test this, we have converted a JetSki into an autonomous surface vehicle adding an in-house forward-looking stabilized stereo vision system and a unique algorithm capable of estimating in real time the wave-height facing the craft and subsequently modulating the craft-speed. Our



goal is to present a novel concept in autonomous navigation of unmanned surface vehicles.

Our Underwater Acoustics and Navigation lab (ANL) has been busy with servicing of the deep THMO mooring for a very unique operation of replacing surface buoys in deep water; in-situ experiments for detection of sea turtles using active acoustics; demonstration of underwater acoustic networks in rough sea environments; localization of acoustically tagged sharks, and applying submerged drifters to evaluate water current velocity fields. ANL has succeeded in securing new funding (Ministries of Science, Defense, Infrastructures, and the British Council), for developing algorithms in the fields of environmental monitoring, oceanographic data analysis, sonar signal processing, and underwater acoustic communications.

Stay tuned for our new Departmental Website coming your way soon.

*a. The upgraded SPARUS II AUV. b. A diver 3D mapping mesophotic areas in the Mediterranean. c. Turtle encountered and photographed by the SPARUS II AUV.*

## WELCOME NEW FACULTY

Dr. Itzik Klein



### The Hatter department of marine technologies

Navigation aims to determine the position, velocity and attitude of platforms, humans and animals. Commonly, fusion between several sensors is required to complete the task. Joining the Department of Marine Technologies at the Leon H. Charney School for Marine Sciences, I'm establishing my lab -The Autonomous Navigation and Sensor Fusion Lab (ANSFL). Our goal is to derive unorthodox inertial navigation systems and sensor fusion algorithms for marine applications. Currently, we are hunting for the next inertial navigation system architecture and pioneering deep learning based navigation approaches.

## WELCOMING OUR NEW ZUCKERMAN POST-DOCTORAL SCHOLARS

We are happy to welcome to CSMS our new Post-doctoral scholars from the Zuckerman STEM leadership program that “supports future generations of leaders in science, technology, engineering, and math in the United States and Israel”. We wish them a productive and happy time in our School and hope that their experience will be a positive and enriching one.

### Dr. Gustavo A. Ramírez

#### Host- Dr. Laura Steindler Marine Microbiology Lab, Department of Marine Biology



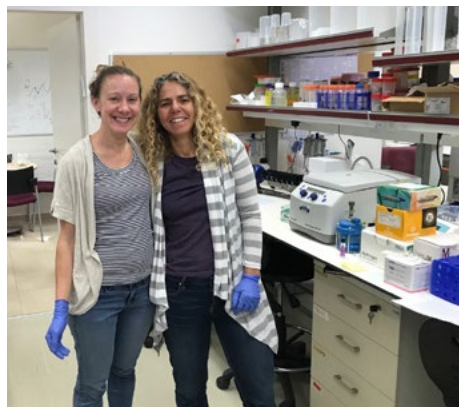
My journey to becoming a Zuckerman fellow began with an unexpected project for a subseafloor microbial ecologist who largely focused on dark ocean habitats. I became interested in exploring the possibility of light production and light sensing in subseafloor ocean

environments buried kilometers under water and mud far from any influence from the sun. This unusual question prompted my interest in proteorhodopsins, membrane-bound proton pumps, abundant in the microbes that live in the sunlit surface ocean. Through a series of serendipitous events, an American colleague put me in contact with Laura Steindler who leads a group at the forefront of proteorhodopsin ecology at the University of Haifa. Subsequently, Dr. Steindler encouraged me to apply to, and ultimately be granted, a Zuckerman Fellowship. I am now a Zuckerman Fellow in the Steindler group leading the bioinformatic analysis of a year-long survey of light-related microbial activities in two oligotrophic gyres in the Eastern Pacific Ocean and the Eastern Mediterranean. My research aims to understand environment-specific advantages of proteorhodopsin-based energy generation in microbes living in these two ocean habitats.



Dr. Jeana Drake

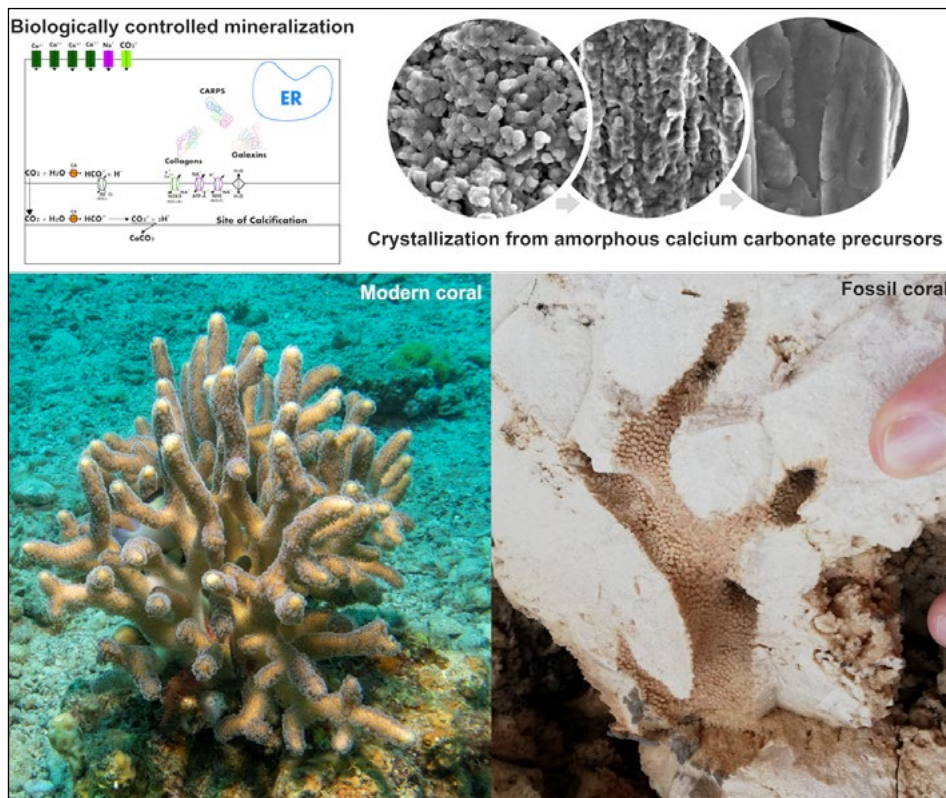
Host- Dr. Tali Mass Coral Biomineralization and Physiology Laboratory, Department of Marine Biology



I study coral biomineralization proteins as a Zuckerman postdoctoral research fellow in Dr. Tali Mass's laboratory at the University of Haifa. I came to Tali's lab after conducting similar research for my PhD in Oceanography at Rutgers University and later at UCLA. Tali's lab and the department host a variety of tools for me to probe the localization and function of coral skeletal proteins. This includes coral aquaria for the production of coral cell cultures to study vesicular export of skeletal proteins from the cells, light and scanning electron microscopy to visualize calcium carbonate precipitation by these proteins, and affiliation with the Inter-

University Institute for Marine Science from which I can collect live coral adult and larval specimens. Since joining the lab, Tali and I have co-authored a review on coral biomineralization

published in Global Change Biology and will soon submit a manuscript on expanding the sequenced coral skeletal protein complex to BMC Materials.



*Stony corals make rocks that can lead to the formation of massive reefs in shallow tropical and subtropical seas and that persist in the fossil record. The basic mechanism of formation of calcium carbonate skeleton in stony corals has been studied for decades and it has become increasingly clear that biological processes play key roles in the biomineralization mechanism. We review historical hypotheses, discuss the present understanding of how corals evolved, and explain how biological processes, particularly those occurring at the sub-cellular level, critically control the formation of calcium carbonate structures.*

**A special appreciation to all our generous supporters who believe in our work and recognize the growing needs of our school. Thank you for providing us with scholarships for our students and funds for research.**





## CONGRATULATIONS

### Congratulations to our faculty for newly funded grants

Our faculty and research associates have been busy obtaining research funding that is essential to run many new and on-going projects. Below is a table with some of the most recent funded projects from many public and private foundations including the Ministry of Science and Technology, German- Israeli-Foundation, the Water Authority, Ministry of Infrastructures, new collaboration with Hong Kong University of Science and Technology, and others.

Additionally, congratulations to Dr. Gil Gambash, Dept. of Maritime Civilizations for being awarded the Leverhulme Visiting Professorship hosted by the Institute of Classical Studies at the University of London for the year 2020. The project entitled 'Where the Desert Meets the Sea - Connecting Ecological Histories in the Roman Near East' is a collaborative project with Prof. Greg Woolf (London) and Prof. Guy Bar-Oz (Haifa).



Mosaic from a Byzantine church near Kissufim, 6<sup>th</sup> century. Israel Museum, Jerusalem.

### Special Honors

It is our great honor in congratulating Prof. Zvi Ben-Avraham (The Founding Director of the Leon H. Charney School of Marine Sciences) upon being selected as a foreign member of the Russian Academy of Sciences.



The Russian Academy of Sciences is the highest scientific entity in Russia, which acknowledges the top scientists in Russia. Each year the Academy grants membership to a few exceptional foreign scientists from the international community. Professor Ben-Avraham joins a select group of four Israelis previously elected as foreign members of the Russian Academy of Sciences including Nobel Prize laureates, a former President of the Israeli Academy of Sciences, and a Turing Prize recipient.

Principal investigators	Project name
R. Diamant, Y. Makovski	QUALTOS: Quality assurance in long term observation systems
M. Shpigel, A. Neori, D. Tchernov	SaltyCrops: Exploring perennial Sarcocornia as a halophyte biofilter for mariculture effluents and a source for lucrative foods and biochemicals
T. Mass	Strong black coral? What makes the antipatharians so well adapted to life in the deep sea?
D. Tchernov	The Eastern Mediterranean Sea Basin: A Sea of Opportunities Facing Global Change
Y. Makovski	Geochemical database of source rocks - potential for natural gas in the Levantine basin
R. Diamant	Using acoustic and seismic surveys to identify marine animals
U. Schattner	Pristine Micropaleontology
L. Steindler, D. Meron, D. Morick, D. Tchernov, A. Scheinin, MD. Krom, Y. Lehan, Y. Lampert	A monitoring program for Evtach Hof Hasharon and Rosh Hanikra nature reserves
D. Morick, D. Tchernov	Specific pathogens and microbial abundance within liver and kidney tissues of wild marine fish in South China Sea and Eastern Mediterranean Sea

## THE TONGA CRUISE

Prof. Ilana Berman- Frank

Searching for hydrothermal impacts on biological productivity in the Pacific ocean

Working as a scientist of the marine environment is truly an exciting and dynamic vocation. This past November, I was fortunate to feel the thrill and adventure of being an ocean scientist when I joined the TONGA research cruise on the French research ship L'Atalante to explore the impacts of hydrothermal sources on the planktonic ecosystems of the South Pacific ocean in areas of active volcanic activity both below the sea as well as above.

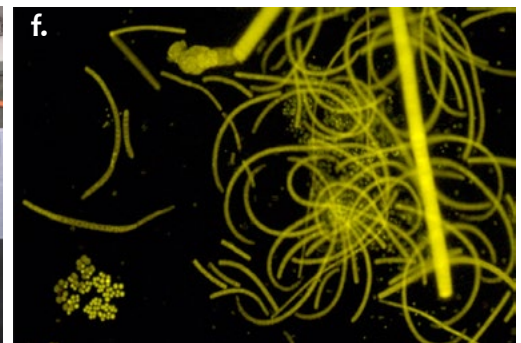
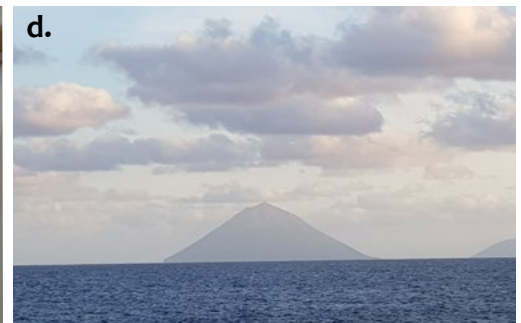
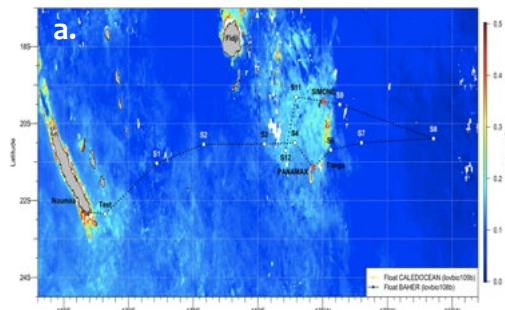
Thirty seven days at sea (no docks in sight), 7000 km traversed, going down to 5700 m at deepest station, and spending this time with ~ 70 people (30 scientists) on board an 85 m long ship. Work was intense and around the clock. Yet, scientific work is inspiring and a true porthole into how hard and challenging it is to work at sea. Studying a complex oceanic environment requires true multidisciplinary and interdisciplinary research covering diverse perspectives from mapping the underwater

volcanoes, physical structures and stability, assessing the chemistry of the plumes and hydrothermal emissions and their impacts on the surface waters and the atmosphere above, to examining the biological populations and their responses – including the abundance and diversity of viruses (also now recognized as important players in causing infections throughout

the aquatic food-webs and driving phytoplankton bloom crashes and organic matter degradation).

**My most important take-home message from the cruise is the absolute requirement of team-work for a successful cruise and for excellent data to be collected and analyzed.**

Everyone is needed: from the



Images from the TONGA cruise: **a.** Cruise track – 7000 km from New Caledonia into the south Pacific gyre, **b.** the research vessel L'Atalante; **c.** sampling procedure for trace metal clean water; **d.** first land in 25 days- an uninhabited volcanic island south of Tonga; **e.** at work measuring photosynthesis; **f.** the dominant phytoplankton of the region – dinitrogen fixing cyanobacteria – bringing nitrogen to a nutrient limited ocean. Photos: **b** and **c**- H. Cousin, **d** and **f**- I.B-F, **e**- K.Desboeufs.



cooks making sure we were well fed, to the electricians and plumbers ensuring our machines and tubes were well connected and running (not trivial at all), to the hard-working crews on deck deploying equipment safely all hours of day or night, once-again sweet-talking the winch to make sure it worked and the water-collecting apparatus (Rosettes & Niskins) went down thousands of meters – and returned with full bottles and working sensors, the doctor helping all minor and major complaints, the engineers on the engines, the professional photographer, and the captain and officers safely navigating us through some challenging seas. Only then can we – the scientific team of students, researchers, and chief scientists – perform our work and try to get answers to all those open questions we set out to explore.

## CORAL BIOMINERALIZATION AND PHYSIOLOGY LAB

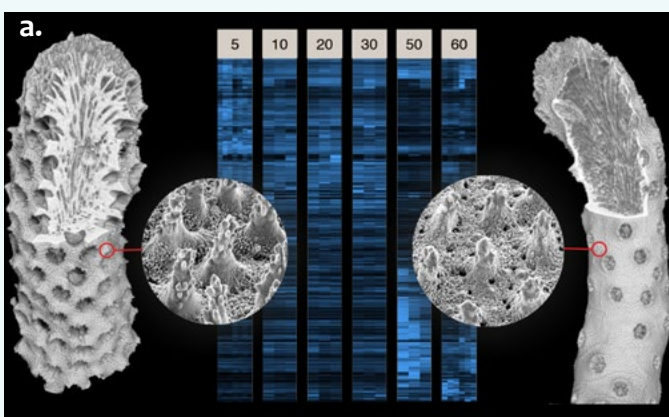
Dr. Tali Mass

### Shallow and Mesophotic reefs: phenotypic plasticity and physiological adaptation to depth

As oceans continue to warm, the recent devastating decline of shallow-water coral reef communities are expected to increase, leading to more frequent and severe bleaching-induced mortality events. Mesophotic Coral Ecosystems (MCEs), occupying deeper waters, have not experienced the same trend and their deep habitats may buffer them from some of the local and global impacts affecting shallow-water coral reefs.

MCEs may thus serve as an important refuge for coral species, thereby increasing overall reef resilience. Resilience of ecosystems under rapid environmental change relies, in part, on the capacity of organisms to adapt and/or acclimatize to new conditions. Understanding the relative importance of these mechanisms is vital to understanding the potential for corals to persist through climate change.

Dr. Tali Mass and her lab group focus on the stony coral *Stylophora pistillata* from the Gulf of Eilat to investigate how functional morphology and physiology differ with changing depth. Findings demonstrate structural and molecular adaptation to life in extreme environment that repeatedly allowed this coral group to thrive. The results of this study



a. Graphic abstract from Malik et al on the Molecular and skeletal fingerprints of scleractinian coral biomineralization: From the sea surface to mesophotic depths in *Acta Biomaterialia*. Most of the reef corals operate near to their upper limit of heat tolerance. A possible rescue for some coral species is migration to deeper, cooler mesophotic depths.  
 b. Tali Mass and Gretchen Goodbody-Gringley from the Bermuda Institute of Ocean Sciences during the field expedition in Eilat in April 2019.



were recently published (Malik et al, Acta Biomaterialia 2020). In other research, in collaboration with Dr. Gretchen Goodbody-Gringley from the Bermuda Institute of Ocean Sciences, we try to understand the influence of parental physiology and origin upon offspring phenotype. We

investigate whether the known differences in adult reef building corals as a function of water depth are passed onto the larvae produced at each depth. As a first step we examined the physiological characteristics of larval stages of the stony coral, collected from the shallow and

deep reefs in the Gulf of Eilat during the spawning season (our results are published in Frontier of Marine Science - Scucchia et al 2020).

## THE SEDIMENTOLOGY AND ENVIRONMENTAL LABORATORY

Dr. Revital Bookman

### Understanding sub-marine landslides and turbidites

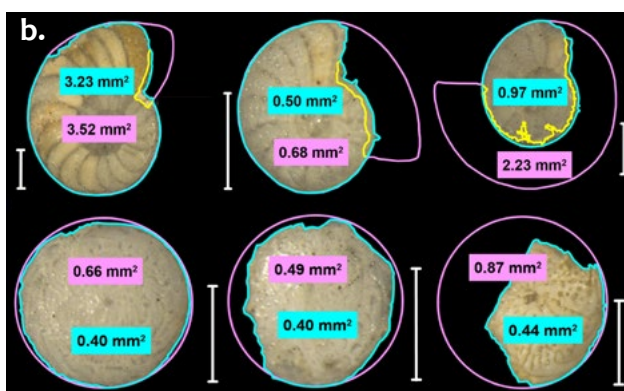
Our laboratory focuses on the study of mass transport processes that have important implications for marine infrastructure planning and geo-hazard assessment. Example projects from our graduate students include: Yael Hermon (MSc) dating the most recent landslides events that occurred along the Israeli Mediterranean off-shore using the long piston cores and Radiocarbon Dating; Anat Mor-Ash (PhD) studies the paleoseismic record of the southern segment of the Dead Sea Transform from the Gulf of Aqaba turbidites. Anat dates the turbidites, which are sediment units that represent shaking of the sea floor triggered by

historical and pre-historical earthquakes. She is also analyzing benthic foraminifera assemblages picked from the turbidites, which indicate the intensity of the transport during the seismic event. Another project by Hadar Elyashiv (PhD) models numerical simulations for understanding slope failure initiation influenced by sediment

peak strength. Next year, Hadar will use her theoretical results to study sub-marine landslides along the north west Atlantic Ocean margins. The group results put our laboratory at the forefront of scientific studies of mass transport processes that benefit our ability to predict future sub-marine catastrophic events that can harm coastal populations.



a. Mediterranean continental shelf. In the picture Yael and Hadar and our colleagues Dr. Yizhaq Makovsky and Dr. Mor Kanari.



b. A figure from Anat's paper showing the degree of *O. ammonoides* and *A. papillosa* breakage represented by area of broken shell (light blue) vs. estimated area of the original shell (pink). Scale bars = 500  $\mu$ m.

## THE 2019 EXCAVATION SEASON AT TEL KABRI

Prof. Assaf Yasur-Landau

The excavations at the Middle Bronze Age palace of Tel Kabri, 3 km southwest of Nahariya aim to explore the ancient Mediterranean economy 3700 years ago, as well as the human impact on the environment. The 2019 season took place in June and July and was co-directed by Prof. Assaf Yasur-Landau (University of Haifa), Prof. Eric H. Cline (The George Washington University). This year was marked by several new scientific collaborations: We were joined by associate directors Prof. Philipp Stockhammer (LMU, Munich and the Max Planck Institute for

the Science of Human History) who initiated a new study of a DNA and ancient proteins at the site, and by Dr. Alexandra Ratzlaff (Brandeis University) who implemented experimental 3 d modelling of the site. Large scale archaeobotanic study exploring the palatial impact on the environment was led by Prof. Simone Riehl, Eberhard-Karls-Universität Tübingen.

The team of 60 team members were trained in an on-site fieldschool which provided credit through the university of Haifa. Staff included area supervisors and graduate students Brigid Clark and Reoy Nickelsberg (Haifa) and Steffi Eisenmann (LMU) The Several remarkable discoveries were made during this season: One such discovery was another storeroom filled

with storage jars that connected to the wine cellars of the palace. The five storage rooms contained hundreds of jars, intended to contain wine and perhaps other liquids to be used in palatial feasts. A second surprise was a floor painted with at least three colors, belonging to a hall in which banquets took place. The excavation was supported by a National Geographic Society grant, as well as by an ISF grant "understanding collapse" (co-PI's Yasur-Landau and Shahack-Gross). Please see our full report in <https://digkabri2019.wordpress.com/2019-season/> 

## SOUTH TIBERIAS HARBOUR PROJECT FIRST EXCAVATION SEASON

Dr. Emmanuel Nantet (Laboratory for Nautical History and Archaeology, The Leon Recanati Institute for Maritime Studies, University of Haifa)

Dr. Emmanuel Nantet, directs this excavation as part of a four-year project funded by the Israel Science Foundation. The project team, of ~ twenty people, mainly students from the University of Perpignan-France, worked at the newly excavated site on the shore of the Sea of Galilee (Lake Kinneret), in the southern part of the modern



An aerial of the Kabri palace showing the find places of the new store room and the painted floor. Photo: The Tel Kabri excavation project.



municipality of Tiberias during February 2020. The northern part of the site includes the southern end of the city wall that surrounded the ancient city of Tiberias. The rampart was built on a cement jetty built with wooden caissons. Perpendicular to the rampart, a long wall, lying southwards, has been identified either with a quay wall or another rampart. This site was excavated for the first time.

As the lake level was particularly high in February, we conducted probes in the upper parts of the site. The main probe was located at the step of the two sections of the rampart to provide a better understanding of their function.



The rampart while being excavated. Note the two sections (above and below) of the city wall. Photo: Emmanuel Nantet.

The four smaller probes, carried out along the long wall, demonstrated the complexity of the structure, rebuilt many times. The rank vegetation cleared from the site, allowed drone photography (by Hagai Nativ) of the site.

## INCREASING OUR KNOWLEDGE OF LOCAL DOLPHIN POPULATIONS

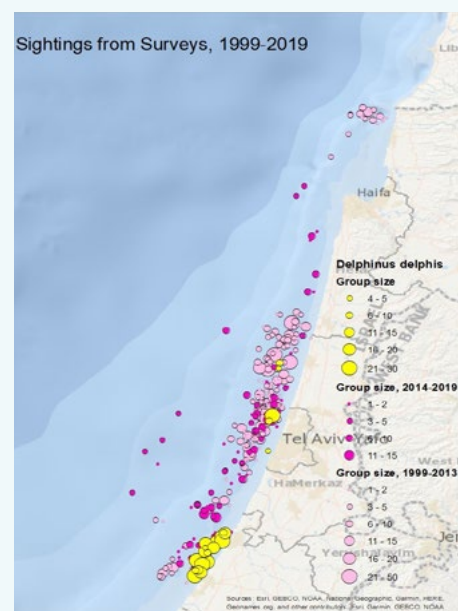
Dr. Aviad Scheinin

### 20 Years of Coastal Dolphin Population Surveys along the Israeli Coast

In the Levantine Basin of the Eastern Mediterranean Sea, few long-term studies exist on cetacean populations, in the Israeli coastal region (196 km in length). In 1998, IMMRAC (Israeli Marine Mammal Rescue and Assistance Center) began monitoring dolphin populations' near-shore.

Surveys from 1998 to 2019 (952 ship-board surveys were carried out and 329 dolphin sightings) show changes in species, presence and distribution of the different species. The changes observed in dolphin distribution may reflect small-scale environmental changes

or anthropogenic affects, but could also reflect larger basin-wide changes in the Eastern Mediterranean region where knowledge is lacking. To better assess the variation in distribution, a study modelling environmental variables that shape dolphin habitat preferences is underway by Marine Biology graduate student, Ori Galili.



*Tursiops truncatus* (Common bottlenose dolphin) and *Delphinus delphis* (Short beaked common dolphin) sightings during IMMRAC and the University of Haifa surveys in Israel between the years 1999 -2019. Size of circles is indicative of the number of dolphins in the sighting and color represent species, with *Tursiops truncatus* displayed in two different shades of pink for different time periods, in order to visualize their disappearance from Achziv Canyon in the north of Israel.



## Studying the Israeli resident population of dolphins through their dorsal fins

Along the Israeli coast of the Mediterranean, two dolphin species are prevalent: the common bottlenose dolphin *Tursiops truncatus* and the short beaked common dolphin *Delphinus delphis*. Keeping track on the population status is possible using photo IDs of the dorsal fins. Over their lifetime, dolphins acquire multiple marks and notches on their dorsal fin, from interactions, games, etc. Those marks are permanent and enable individual dolphin identification. IMMRAC (Israeli

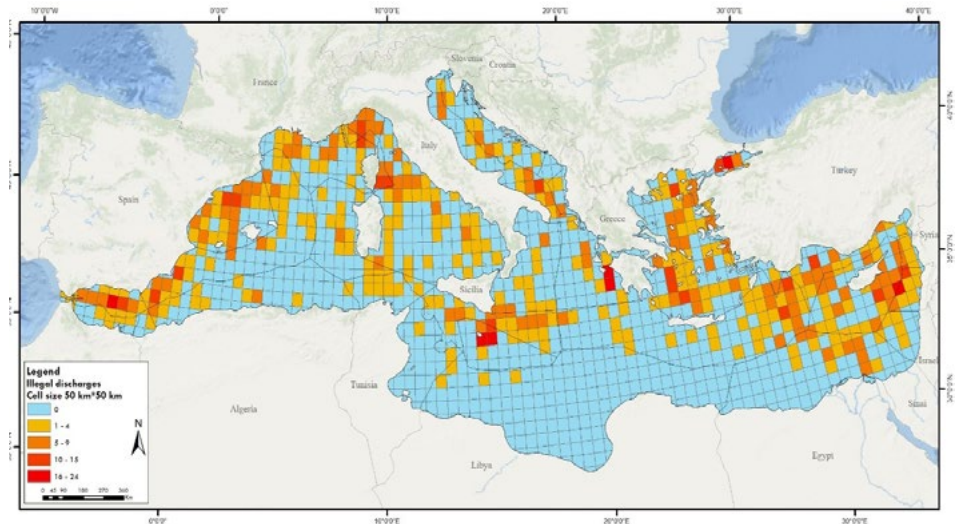


a. The dorsal-fin identifying Hooks the female dolphin. b. Over their lifetime, dolphins acquire multiple marks and notches on their dorsal fin. Photo: Aviad Scheinin.

Marine Mammal Rescue and Assistance Center) collected dolphins photographs from the last 15 years, which are now used for estimating size and trends of the population as well as assessing their social structure. Since 2015, frequent observations of the same individuals have familiarized them to the research team. The most familiar and repeatedly observed is Hooks, a healthy female first observed in 2009. Hooks is very social and interacts with the research vessel. Throughout these years, Hooks has been observed with 3 different calves and in different locations along the coast.

## MEDITERRANEAN SEA OIL POLLUTION

Semion Polinov, Ph.D. A student at the Laboratory of Sedimentology and the Environment, supervised by Dr. Revital Bookman and Professor Noam Levin, is working on estimating the spatial and temporal trends of oil spills from ships in the Mediterranean by geostatistical analyses of trends in accidental oil spills (5% of total pollution) and illegal discharges (20% of total pollution). His findings show that despite a steady increase in shipping in the Mediterranean, the number and volume of accidental pollution has been significantly reduced since 1970, while illegal discharges remain at a high level throughout this period.



Location of 2066 EMSA spills (illegal discharges) for the period of 2015-2017 in the Mediterranean Sea.

## SPECIAL HIGHLIGHTS

Courses within the University of Haifa's Flagship Project - Promoting Solidarity Combating Social Exclusion



**The course: Sea, Society, Education and Leadership (SSEL) In view of the current crisis – the course was quickly modified to an on-line version so that the school kids at home are able to experience and enjoy its content.**



Faculty: Dr. Daniel Sher, Dr. Tsvia Gildor, Ziv Zemah Shamir and Amir Bar (coordinator)

The sea is a critical resource at the national and international levels. Its conservation for the next generations requires major changes, which can only happen when the public is deeply

involved and well educated in marine issues. To promote a stronger affinity in marine topics between academia and the general society we have established a special course entitled “Sea, Society, Education and Leadership”.

The course is designed to impart the students with the appropriate toolbox needed for promoting solutions for marine environmental issues using educational tools. Lectures, full-day workshops, and field trips given by experts in various marine fields, aim to provide the course students with an in-depth understanding of major challenges facing the marine environment, to teach them the basics of community education and outreach, and to develop teaching skills. Throughout the course the students will develop an educational program and will present it to middle-class children from a school catering primarily to low income families in Haifa.

The course “Sea, Society, Education and Leadership” is supported by the “Flagship Program” of the University of Haifa, the Council for Higher Education and the Leon H. Charney School of Marine Sciences.

Student feedback:

"My main goal is that the project will promote the awareness of the kids to protecting the marine environment".

"I'm very glad for the opportunity to address young audience outside the University, to enrich their knowledge and to promote the affinity to the marine environment, thanks to our effort".

"The last meeting was great. I was never part of a group planning a complicated act together, and I'm glad to learn ways how to do that".

**The course: Archeology of Materials: From the Field to the Laboratory and the Workshop - A Course Combines Studying with the Local Community.**

Faculty: Prof. Sariel Shalev and Dr. Tal Kan- Cipor-Meron

The main goal of this course is to provide students with the basics of researching ancient technologies such as past food-producing technologies and different tools production



methods. These methods are studied in the Archeology Materials Research Laboratory led by Prof. Sariel Shalev and Dr. Tal Kan- Cipor – Meron at Leon H. Charney School of Marine Sciences. The course introduces traditional technologies of Israel, from which ancient technologies and what is left of the archaeological finds can be

studied. Here students practice researching and documenting traditional crafts with the help of the local community, by instructing pupils in schools to collect information, materials, and tools from their families concerning ancient crafts. The information, materials, and tools gathered are studied with the students at the university's

materials lab using scientific methods and can shed light on the more ancient archaeological technologies. All this information and study is returned to the community through the pupils and students research projects for future use to preserve that local heritage like creation of a local museum and other.

## RECENT CONFERENCES

### Notification regarding upcoming events

Unfortunately, many events planned for the spring of 2020 have been cancelled due to the corona pandemic. We hope that we will successfully overcome this obstacle and that we will be able to reschedule some of the exciting scientific and public events planned.

### Workshop on The Impacts of Seawater Desalination Discharges on the Marine Environment (7 January 2020)

Currently, five large-scale seawater desalination facilities supply over 60 % of Israel's drinking water. The desalination process produces brine that is double the concentration of seawater and discharges this brine, and

other chemicals used during the process, back to the marine environment. The effects of these discharges on the coastal and marine habitats are not well known. The workshop summarized 4 years of new scientific data from two collaborating groups from the U.of Haifa, Israeli Oceanographic and Limnological Research (IOLR), Ben-Gurion University, Bar-Ilan University, and the Geological Survey of Israel (led by Eli Biton – IOLR and Ilana Berman-Frank – Charney School of Marine Sciences respectively) investigating the impacts of these discharges on the marine environment and its inhabitants. The topic, relevant for Israel and many other countries where seawater desalination is becoming essential, attracted representatives from the desalination industries, academics, NGOs, and

government regulators from the Ministries of Infrastructure, Environment, Water Authority, and Finance, and the general public. The take-home messages emphasized the importance of continuous and local monitoring of physical, chemical, and biological parameters near the desalination sites to ensure water quality and ecological viability.



*The Impacts of Seawater Desalination Discharges Workshop- Haifa University. Photo: Daniela Zak.*



Additional recommendations included reduction of chemical use in the process and dilution of the discharges within the marine environment.

### The 7<sup>th</sup> Haifa Conference on the Mediterranean Sea Research- "Food from the Sea- Towards 2050 and beyond" (14-15 January 2020)

Looking ahead onto the year 2050 - fish, seafood and seaweed are likely to be a major source of nutrition for the anticipated 9-10 billion people that will inhabit our planet. There is little doubt that by middle of the 21st century, most of the fish and shellfish that reach world

markets will originate from aquaculture, and most likely, will be based on seawater production systems, whether from land-based facilities or from oceanic production farms.

For Israel, food security for the future is a cardinal issue. With limited freshwater resources and a scarcity of arable land reserves, seafood production will clearly shift to sophisticated, advanced technologies. Marine aquaculture in the eastern Mediterranean must provide sustainable production of cost effective, nutritious, healthy food products.

The two-day meeting "Food from the Sea- Towards 2050 and beyond", organized by

Professors M. Shpigel and A. Diamant from the Morris Kahn Marine Station of the Leon H. Charney School of Marine Sciences focused on the different perspectives of food from the sea. Six international keynote speakers and ten Israeli aquaculture specialists presented a wide range of themes within applied marine biology and biotechnology, as well as economic and social aspects of global aquaculture, current-day global capture fisheries and world aquaculture sustainability. Appetizing products from local entrepreneurs awaited the audience in between sessions.

