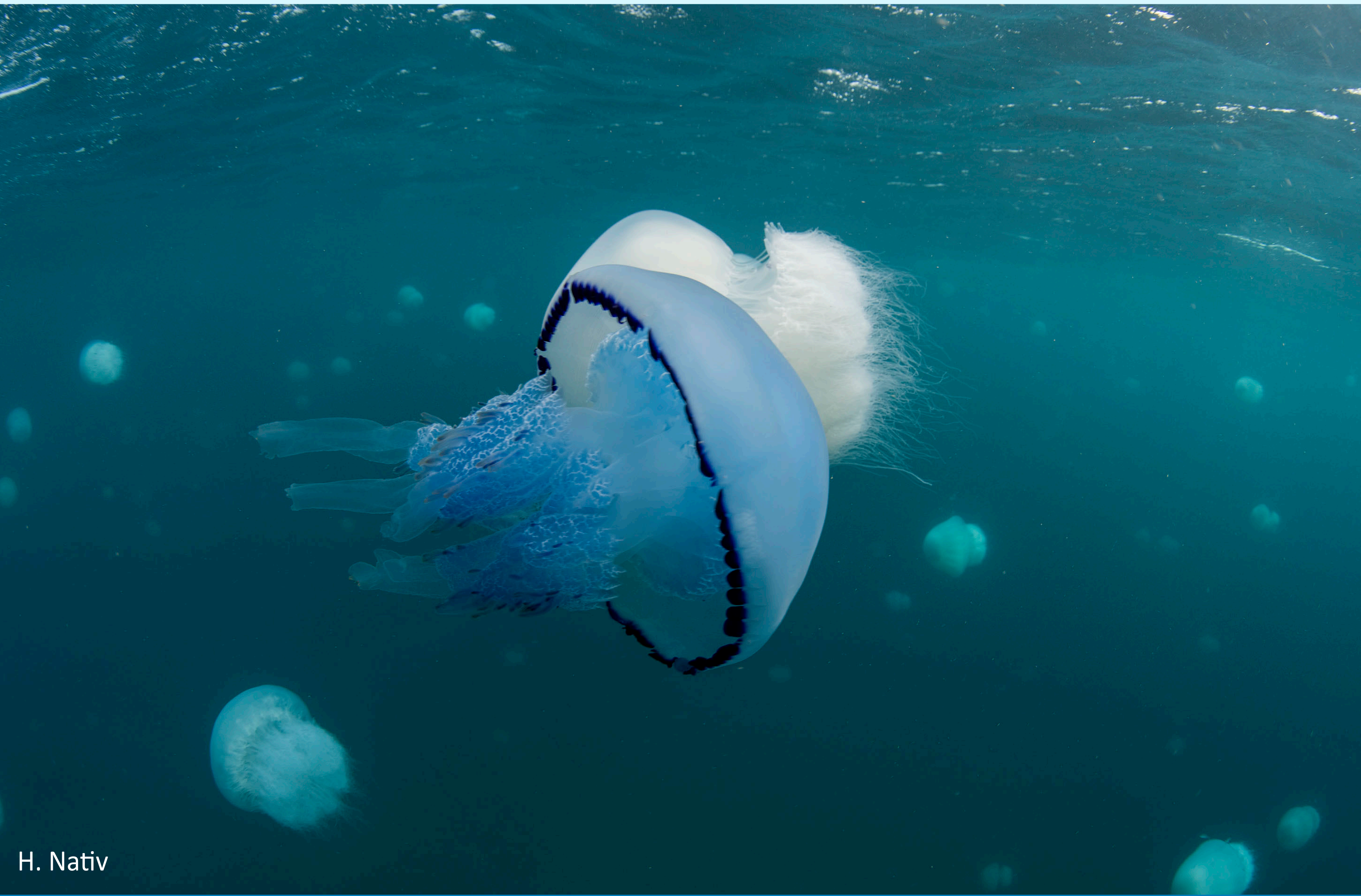
The Department of
Marine Biology

Alumni newsletter

Keeping in touch with the Marine Biology Department after you graduate



H. Nativ

July 2021

אוניברסיטת חיפה
University of Haifa
جامعة حيفا

LEON H. CHARNEY
SCHOOL OF MARINE SCIENCES
בית הספר למדעי הים על שם ליאון צ'רני

Dear students, colleagues, alumni and friends,

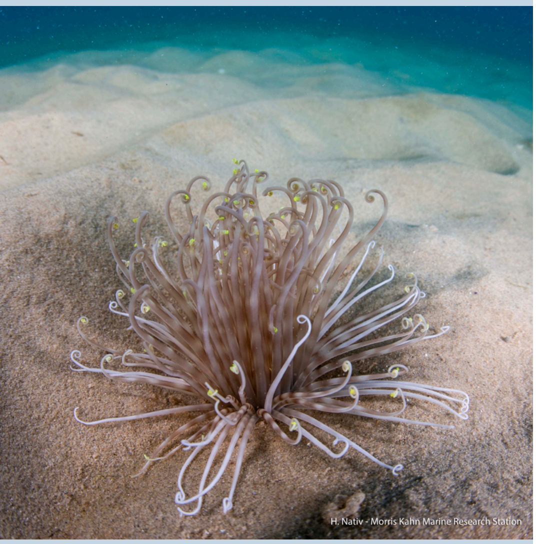
It is with great joy that I write this letter, as we are finally free from all COVID-19 pandemic restrictions. This year, most of our courses were taught via Zoom; however, research has continued in the lab and at sea. Our field and methods courses were given in the second semester and we are already looking forward to the start of next year, when we will finally resume in-person studies. We also hope to continue growing by recruiting a new faculty member.

Our recent yearly academic get-together was a real face-to-face celebration, allowing first-year students to get acquainted with the other students. We also celebrated in this intimate atmosphere the recent graduation of our MSc and PhD students, to whom we extend our warmest greetings. These include three fresh PhDs: Dr. Stephan Martinez, who continues to postdoctoral research in Monaco, Dr. Ziv Zemach Shamir, who is staying with us for his postdoctoral research and Dr. Leigh Livne, who did her PhD in the Morris Kahn Marine Research Station and got her degree from the Natural Resources and Environmental Management Department. Leigh is now joining the CETI project (see below).

Reflecting on the past year, we must recall the intense oil and tar contamination along our shoreline in February, a result of an oil spill at sea. This disastrous event reminded us of how fragile and vulnerable our marine ecosystem is. Yet, on the bright side, students and investigators from all Israeli institutions rallied together to address this crisis, which reminded us of the strength and collaborative nature of our marine research community.

Before we all go on vacation, we look forward to the upcoming 8th Haifa Conference on “Deep Dive – accessing the ocean with Science, Education and Art (SEA)” that will be held on July 14-15, of which Dr. Daniel Sher from our department is a co-organizer.

Finally, I would like to congratulate Dr. Tal Luzzatto-Knaan for receiving the prestigious VATAT grant to establish a center for Metabolomics and Natural Products; Prof. Dani Tchernov for winning the outstanding TED Audacious grant for Project CETI (Cetacean Translation Initiative) to study the communication of sperm whales; and Prof. Ilana Berman Frank for successfully leading the first German-Israeli Helmholtz International Laboratory for studying the East Mediterranean Sea.



We would very much like to hear from you and to learn how you have fared since your graduation.

Please stay in touch and update us (marine@univ.haifa.ac.il) on your new research or work ventures.

Wishing you all a great summer,

Prof. Tamar Lotan

Dear Students, Faculty, Graduates, and all our friends from near and far,

The summer winds sweep away the vestiges of this challenging year and a half. Yet, it has also been a productive year at the Leon H. Charney School of Marine Sciences. This year we have expanded our faculty and student numbers and now comprise 33 academic faculty, 50 professional and administrative staff, and 264 students and post-docs. Yet we are aiming further. The latest report from the University of Haifa President's External Strategy Committee highlights the importance of marine sciences to Haifa University and on a national scale and recommends expansion and development of existing and new areas in marine sciences. This agrees with our strategic plans, and we hope to continue implementing this with strong backing from the University. In practice, this means new faculty positions, new opportunities for students and staff, and novel infrastructure to support the cutting-edge research that we aim for at the school.

So, congratulations to all for finishing another academic year and to those of you graduating and going off to post-docs or the new paths off the academic-track – keep in touch to see what opportunities will arise in the future. And, to our friends from near and far, we hope that we can count on your continued support as we move ahead to make the Leon H. Charney School of Marine Sciences a center of excellence to tackle the challenging issues facing our world today.

Enjoy the summer,

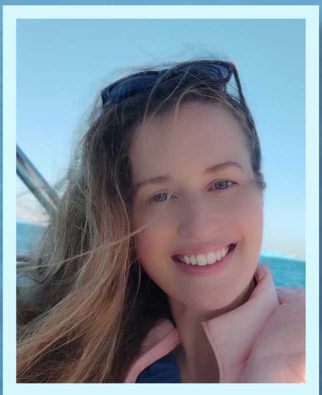
Prof. Ilana Berman-Frank

8th Haifa Conference on the Mediterranean Sea Research

Deep Dive – accessing the ocean with Science, Education and Art (SEA) meeting is organized by Daniel Sher (Marine Biology) together with Michael Lazar (Marine geologist and sculptor), Maayan Tsadka (a sound artist) and Naama Charit-Yaari (nuclear physicist/educator). The meeting will take place on July 14-15 and will explore questions such as: How do we form a bond between people and the sea? What is the role of maritime education and outreach? Do we need to forge an emotional bond ("a love for the sea"), and what are the roles of scientists, artists and educators in forging this bond? Additionally, workshops with youth and their families will take place all over Israel. If you have not registered yet, please join us – seahaifa2021.com.

Project CETI – Cetacean Translation Initiative

Prof. Danny Tchernov written by Dr Leigh Livne CETI Project Coordinator

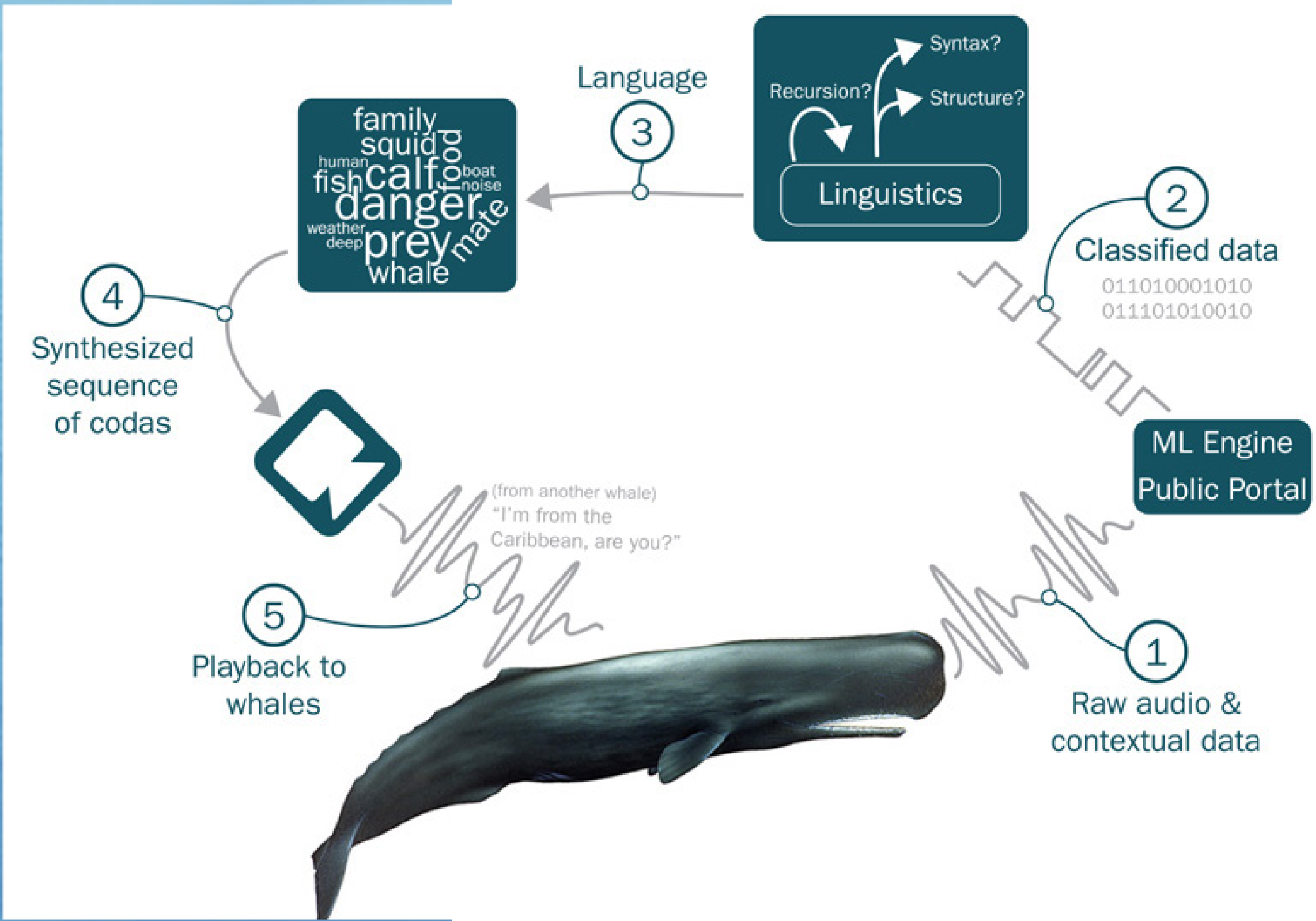


Prof. Danny Tchernov has embarked on a 7-year journey with Professor David Gruber (City University of New York) to decipher and communicate with Sperm Whales (*Physeter macrocephalus*) along the coast of Dominica. Prof. Tchernov is the Chief Operations Officer for the project, and the team is composed of several National Geographic explorers, led by Dr David Gruber, Dr Shane Gero (Dominica Sperm Whale Project, DSWP) and Dr Robert Wood (Harvard University). Also from the University of Haifa, Dr Roee Diamant is the projects' head of acoustic communication, leading a team to install the largest acoustic array (20 km^2) in the world. The Morris Kahn Marine Research Station oversees the operations for the entire project and is currently outlining plans to build a marine station on Dominica.

The project's specific, long-term goal is interspecific communication. This will be accomplished via a multi-method approach: data collection (a combination of robotics, engineering, and field biology), machine learning, linguistics, and biological surveys. The team of linguists, deep learning experts, and biologists will use historical recorded sounds, and deploy a suite of drones and hydrophone array to process the data. Stepwise:

- The researchers will isolate individual sounds, like clicks, from the audio recordings. Each sperm whale has its own individual sound, like humans, so they will be able to identify it.
- Next, they will detect repeated speech that may function as words in their communication. Next, we will detect the simple, repeated speech patterns most likely to function like words.
- At the final level, grammar and syntax (language structures) will be linked with the whales' behavior and within the environmental context.

CETI Sperm whale mother and calf; Photo Amanda Cotton acottonphoto.com



Most of the main Project CETI partners have known each other for more than 15 years, and the long-term dataset collected by the DSWP has allowed CETI researchers to recognize individual whales, their families, and the boundaries of their cultural clans. The work by DSWP also provides comprehensive insights into these animals' relatedness, social lives, diet, movement habits, genetics, vocal communications, native dialects, and cultures. This, combined with contextual data (visualizing the directions of sounds emitted by the whales, and who they might be directed at; whale state) and of the marine environment (water conditions like temperature, turbidity, pH) offshore Dominica, lends confidence that a 'full picture' will be obtained during the lifetime of the project.

Another key component of the work is public engagement. Adjacent to Project CETI, the WAVE program (Whale AdVocacy, Education & Empowerment) will aspire to ensure a better future for the ocean through protection of biodiversity through its leadership program. It will rely on a bottom-up, community driven approach. It aims to bring together key stakeholders, research experts, Dominican ocean advocates, wildlife managers, and conservationists to monitor and conserve these whale families and boost advocacy efforts for all marine life in the Caribbean region.

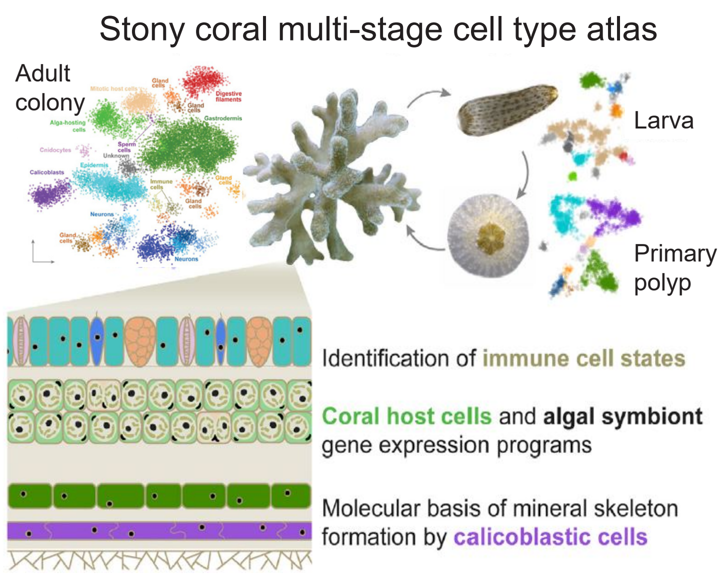
This project will dramatically advance the science of AI translation and greatly enhance public awareness and connection to the natural world – and this will only help to protect life around us.

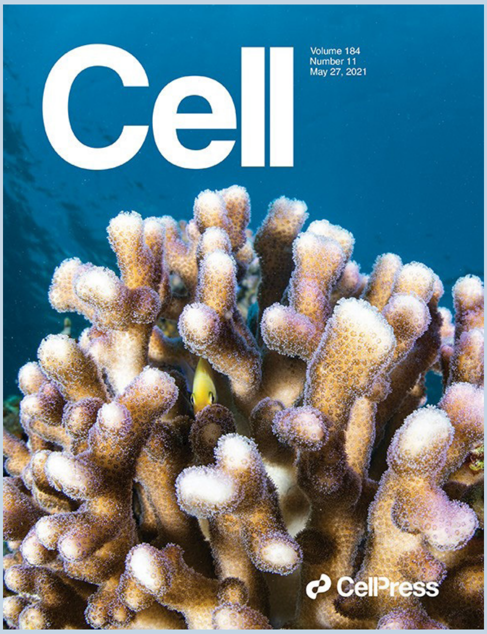
Stony coral cell atlas- every cell counts

Dr. Shani Levy

I started my academic journey studying media and communications and started to work as a photographer. Very soon I felt that I missed something and, since I was always fascinated by biology and the sea, I turned to a new way and became a marine biologist. As I still love photography, I often find myself spending hours and days taking pictures of marine animals under the microscope. I did my PhD in Tamar Lotan's lab studying the nervous system of the sea anemone *Nematostella vectensis*. In recent years, I have been a post-doc in Tali Mass's lab, trying to expand our understating of the molecular pathways involved in many aspects of stony coral biology as calcification (how do corals build their skeleton?), immunity (how do corals cope with environmental stressors?), and symbiosis (how do corals manage their symbiosis with the photosynthetic dinoflagellate algae?).

Why studying corals? Because corals are like the rainforests of the oceans. Stony corals are the main builders of the reefs that constitute the most diverse marine ecosystems, providing home to roughly a quarter of all marine species. This fragile ecosystem has faced mass decline in the last decades due to increased ocean temperature and acidification, both related to increased emissions of anthropogenic CO_2. Despite their ecological importance, little is known about the molecular pathways underpinning coral biology. To fill in some of the gaps, we collaborated with Dr. Arnaue Sebe-Pedros from the Centre for Genomic Regulation (CRG) in Barcelona to create the first stony coral cell atlas. To create the cell atlas, we separated about 40,000 individual cells from three different live stages of the coral *Stylophora pistillata* and used

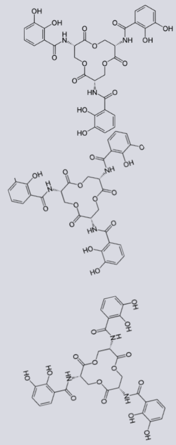




single-cell RNA sequencing to get a unique RNA profile for each cell type. We identified more than 40 cell types across the life cycle of *S. pistillata* including neurons, gland cells, cnidocytes, gastrodermal cells and more. Interestingly, among adult cell types, we identified two distinct cell types with molecular signatures indicative of immune function. Hence, our findings reveal the existence of a specialized cellular immune system in corals. Furthermore, we uncover the developmental gene expression dynamics of calcium carbonate skeleton formation and we characterize the metabolic programs involved in symbiosis. These findings were recently published in Cell. Overall, the *S. pistillata* cellular roadmap should enable the development of targeted strategies to improve coral resilience to global change, ultimately impacting the reef ecosystems that depend on stony coral health.

Congratulations to Dr. Tal Luzzatto-Knaan for winning the award of the Council for Higher Education for establishing a center for metabolomics.

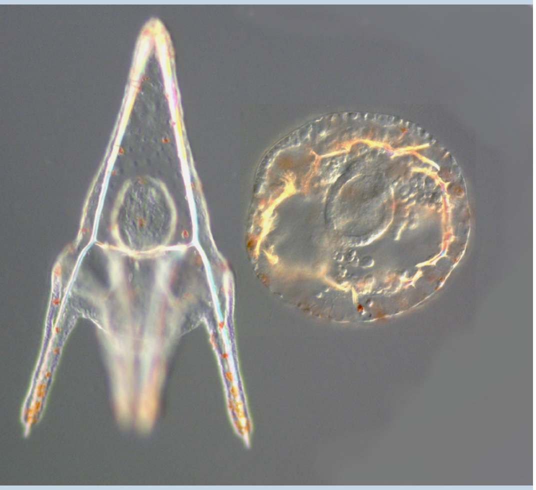
The Interdisciplinary Unit for Metabolomics and Natural Products will enable the study of small molecules (metabolomics), peptides and drugs discovery, which are in the frontline of today's science. This field is continuously developing with mass spectrometry being the main analytical tool. The unit will comprise complementary systems of MALDI-TOF and LC- ESI- MS/MS that are able to address wide array of spatial and temporal expression of molecules from microscale of microbial colonies, through tissue sections to macro and global-scale.



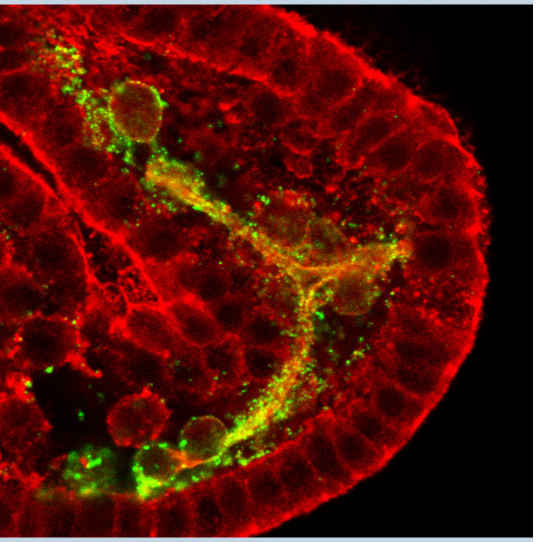
What sea urchins can teach us on the secrets of life

Prof. Smadar Ben-Tabou de-Leon

Life begins when a single cell, the fertilized egg, starts dividing and at each division, the daughter cells make decisions about their fate: would they become a muscle cell? a blood vessel? a neuron? Once the cells differentiate into their fates, they need to act – to migrate to certain positions, to form organs and generate the body plan. How do cells know which fate to choose? What guides their migration? How is the program for making an organism encoded in the egg and how is this program executed during embryo development? – These are the questions we address in our lab using the sea urchin embryo as a model system.



Three days old sea urchin embryo (left) and a sea urchin embryo that was grown under hypoxic conditions (right). The bright rods are the sea urchin skeleton that are made of calcite by the skeletogenic cells. The skeleton becomes radial when the embryo is exposed to environmentally relevant hypoxic conditions in the first 16 hours of its life. Image: Majed Layous.



The sea urchin spicule is coated with actin filaments that are necessary for its formation. The skeletogenic cell membrane and spicule are stained in green and actin filaments in red. Image credit: Tsvia Gildor.

The sea urchin provides an excellent system to study the regulation of embryogenesis and the evolution of biodiversity. The sea urchin is an echinoderm, which means it is a close relative of the sea stars, sea cucumbers and the brittle stars, which are relatively close to the vertebrates' phylum. The sea urchin embryo looks like a small Eifel tower, with its larval skeleton made of calcite. The molecular mechanisms that control the formation of the sea urchin skeleton are surprisingly similar to the mechanisms that control blood vessel formation in vertebrates, as we discovered in our previous studies (https://www.pnas.org/content/116/25/12353.abstract). That is, our blood vessels are more like the sea urchin skeleton than our bones! This finding actually fits well into the rapid evolution of biomineralization programs in different animal phyla. Apparently, the ways that animals use minerals to build their skeletons, teeth and shells had evolved independently in each phyla from different ancestral developmental processes.

We also use sea urchins to learn about the effect of current environmental stressors on marine life, for example, the effect of low oxygen levels on embryogenesis (https://journals.biologists.com/dev/article/148/8/dev195859/238104/The-tolerance-to-hypoxia-is-defined-by-a-time). In the last 50 years, the oxygen level in the ocean has reduced by 2%. This reduction of oxygen level, called, deoxygenation, is caused by the global warming that reduces the level of dissolved oxygen and increases the metabolic rates of marine organism. That means, that organisms need more oxygen when they have less oxygen than usual, making this change more lethal to marine life than the temperature increase or ocean acidification. Hypoxic conditions can be more dangerous to marine embryos that use internal oxygen gradient to direct their development, like vertebrates and sea urchin embryos. On the other hand, embryos have dedicated molecular mechanisms that protect them from environmental changes. We investigated the molecular response to hypoxia in the sea urchin embryo at different stages of development. We revealed that the tolerance to hypoxia changes dramatically between the early and late stages of embryogenesis. Hypoxia at the early stages of embryo development affects the activity of three essential signaling pathways that lead to the growth of a radial skeleton. Hypoxia applied after these signaling pathways had established the interactions between them, doesn't affect embryo morphology. These three signaling pathways are also activated in vertebrates' embryos by low oxygen levels, which indicates that this response is evolutionarily conserved. Our results illuminate the genetic response to hypoxia and the molecular mechanisms that provide organisms with resilience to ocean deoxygenation.

The main focus of our lab now is to understand the molecular mechanisms that regulate the biomineralization process in which the sea urchin calcite spicules are formed (https://journals.plos.org/ploscompbiol/article/authors?id=10.1371/journal.pcbi.1008780). Organisms across the five kingdoms of life use minerals to form shells and skeletons that provide them with physical support and protection: From the silica cell-walls of diatoms through the corals that build the reefs to the human bones. In this process, called biomineralization, cells control the mineral shape and properties in ways far beyond modern human technology. In all the studied biomineralization systems, the mineral is carried inside vesicles to the biomineralization site, but how this motion is regulated by the cells was unknown. We recently used 3D live imaging to study the motion of the calcium bearing vesicles in the cells of live sea urchin embryos during skeletogenesis. The cutting edge image analysis revealed that the vesicle motion is not directed to the biomierazliation site, but instead they perform a diffusion motion that is defined by the cytoskeleton actomyosin network. This discovery emphasizes the importance of the cytoskeleton remodeling machinery in building and shaping the biomineral, which is the current center of the lab. We believe that our findings will uncover a central regulatory mechanism that controls the growth, shape and mechanical properties of the forming biomineral, and will have strong implication on the diverse field of biomineralization.

Congratulations to Miri Morgulis, an ISEF fellow, for receiving The Belmonte Family Science Award for academic excellence in the natural sciences for the year 2021.

“Miri volunteers for better science education for people who come from background of lack of opportunity and encourages higher education and attainment of graduate degrees among students”

Designed by Barbara Muller

7th Academic Get-Together

The 7th academic meeting of the Department of Marine Biology took place at the University campus. It was attended by more than 80 PhD and MSc students, postdoctoral fellows, principal investigators, research fellows and scientists. Greetings were given by Prof. Lily Orland-Barak, Dean of Graduate Studies Authority, who emphasized the importance of outreach and the communication of science to nonscientific communities. The meeting included lectures by students from different research groups and two poster sessions, during which 43 posters were presented by the students. The winner of the Get Together logo competition was **Barbara Muller**, whose beautiful logo decorated the mugs for the meeting. At the end of the meeting, we celebrated the graduation of this year's students and prizes were awarded to the three best talks and posters.

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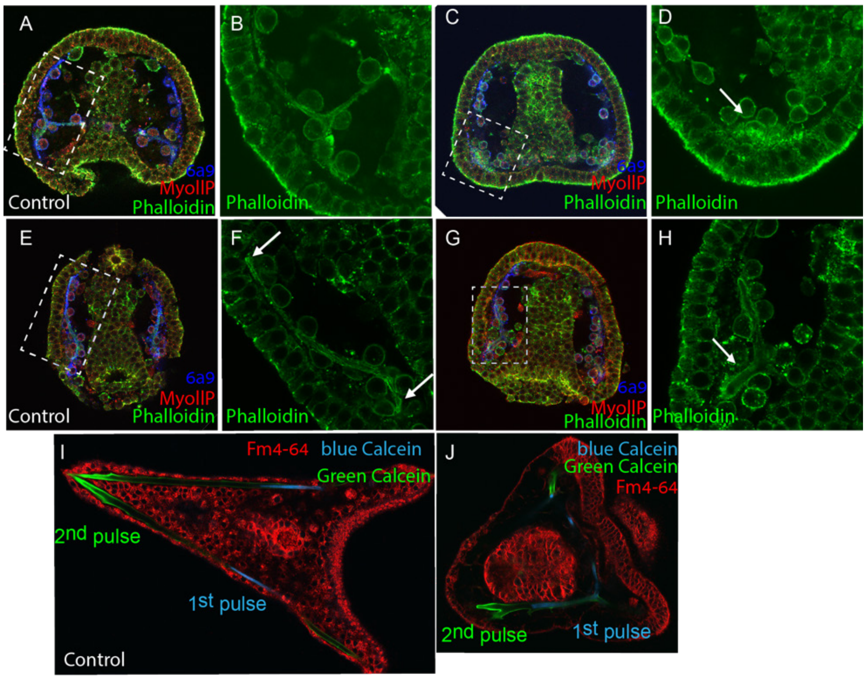
Outstanding talk awards

Eman Hijaze

I am a master student in the marine biology department at Haifa University. Since my first degree I was fascinated by the biological control of embryogenesis. Luckily, I had the great opportunity to join Prof. Smadar Ben-Tabou De Leon's lab to deepen my knowledge and conduct a breakthrough research.

We study how gene regulatory networks and cytoskeleton remodeling networks regulate skeletogenesis in the sea urchin larvea. Specifically, in my research, I study the role of RhoA kinase (ROCK), a cytoskeleton remodeling protein, in sea urchin skeletogenesis. ROCK plays a critical role in sea urchin skeletogenesis: Continuous inhibition of ROCK results in total loss of the skeleton. Adding ROCK inhibitor after the spicules form, results with skeletal delay and ectopic branching.

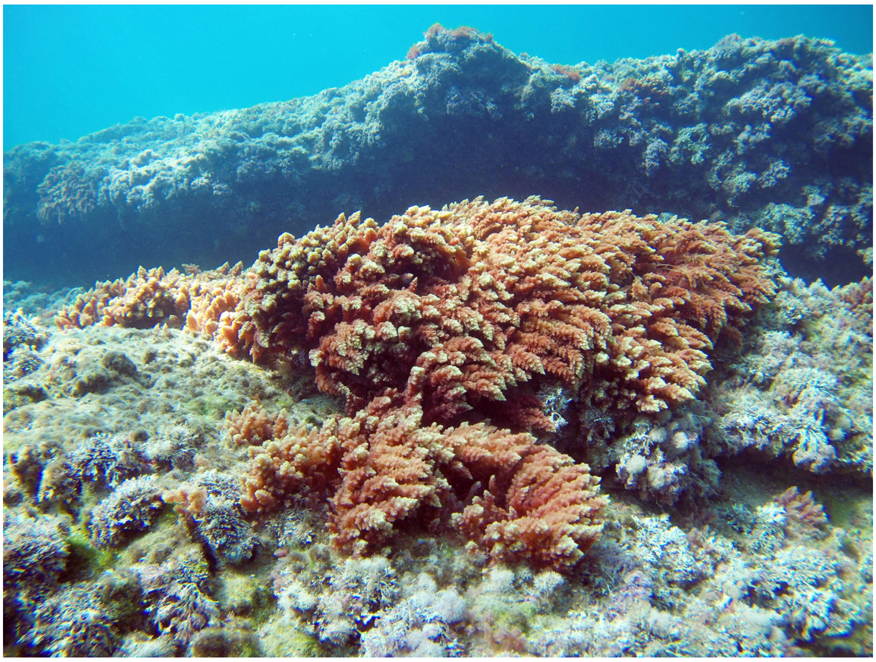
In my research I looked at the actomyosin structure and calcium deposition, in normal and ROCK inhibited embryos. While myosin activity was not enriched near the spicules, I found that actin filaments (factin) are initially organized around the spicule cord. When the spicules elongate, factin is enriched at the tips of the skeletal rods. Continuous ROCK inhibition doesn't seem to affect myosin activity, however, it disrupts factin organization and the spicules don't form. The addition of ROCK inhibitor after the spicule initiates, leads to uniform factin coating throughout the spicules. Interestingly, calcium deposition is still enriched at the tips of the rods in both normal and ROCK inhibition. My studies suggest that ROCK activity is necessary for factin coating of the spicule, factin enrichment at the tips of the rods and for skeletal elongation, but not for myosin activation or the localization of mineral deposition.



Actomyosin structure and calcium deposition. (A-D) representative images showing normal embryo and continuous inhibition of ROCK. Phalloidin (green) was used to stain F-actin, MyoIIP (red) was used to stain active myosin and 6a9 (blue) was used to mark skeletogenic cells. (E-H) representative images showing normal embryo and ROCK inhibitor addition. Arrow in (D) marks the disorganize f-actin. Arrows in (F) mark the strong f-actin signal on the tips of skeletal rods. Arrow in (H) marks the f-actin signal coats all the spicule. (I-J) images of calcein staining (blue and green) and FM4-64 membrane marker (red) show the localization of calcium deposition at the tips.

Omri Nahor

I am a Ph.D. student in the department of Marine biology, with Dr. Tal luzzatto Knaan (University of Haifa) and Dr. Alvaro Israel (IOLR). I did my MSc at Tel-Aviv University in collaboration with IOLR on improving the domestication of the marine macroalgae *Ulva* as a sustainable feedstock for biofuel production. My current research focuses on the red macroalgae *Asparagopsis* of the Israeli coastline. *Aspargopsis* is regarded as a Non-Indigenous Species (NIS) and has been flourishing extensively in the last few years. My project has so far revealed by phylogenetic analyses that the local *Asparagopsis* populations belong to a distinct genetic line different from previously published Mediterranean clade from Lebanon, Italy and Spain. The research aimed to understand the seasonal impact on changes in the microbiome and metabolome of the Israeli *Asparagopsis* during the year. Future work includes additional sampling from several field sites, and a full description as well as potential microbiome correlations with major active natural products in this seaweed.



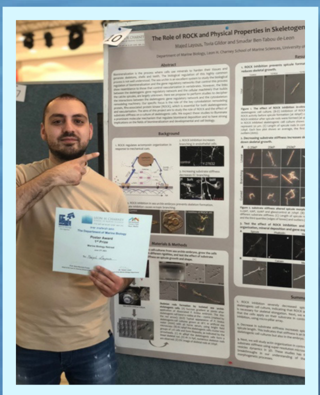
Barbara Muller

I arrived to Israel 6 years ago from Hungary. I'm a mother of 3 children. Stepping in my grandfather's footsteps, I finished my Bachelor degree in general biology at the Eotvos Lorant Research University in Budapest, Hungary. I did my thesis work in the field of parasitology. Since my early childhood, I have been passionate about aquatic life.

Starting a new life in Israel, in Tamar Lotan's lab I found the perfect Masters research project for me, which is about a Myxozoan fish parasite. My project is trying to fill knowledge gaps about a growing problem in the Israeli aquaculture. My research area is at the fish farms in Beit Shean Valley, where a newly discovered parasite causes devastating effects on the local cultured Tilapia population. I'm looking for the complete life cycle of the parasite in order to facilitate a protection and avoidance plan against the infection. I'm working both in the field and in the laboratory, using advanced molecular and bioinformatics methods.

Life cycle of Myxozoa and a worm host with its released actinospores identified in a fish farm in Beit Shean.

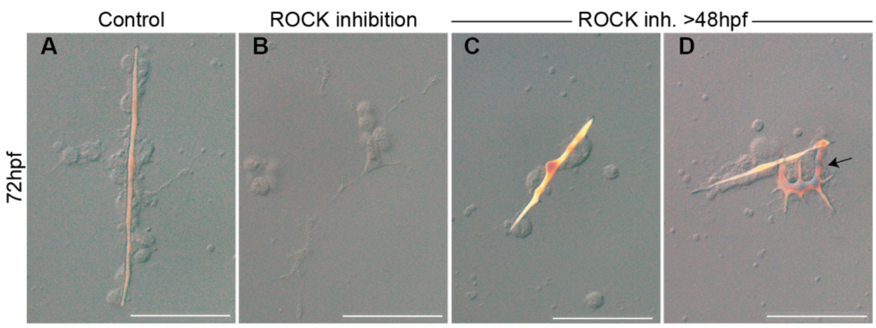
Outstanding poster awards



Majed Layous

I am a Ph.D. student in the department of Marine Biology. My interests in Embryo Development and Gene regulation field lead me to do a research in Gene Regulation in Development and Evolution in the laboratory of Prof. Smadar Ben-Tabou de-Leon, where I also did my MSc degree. Our lab studies embryonic development and molecular mechanisms that control developmental processes and their evolution. We use the sea urchin as a model organism and our main focus is the regulation of biomineralization in the sea urchin embryo.

In my current project, I expand my research to the field of Mechanobiology, where I'm studying how substrate stiffness and the mechanotransducer, Rho-associated coiled coil kinase (ROCK), affect sea urchin skeletogensis. I hope to illuminate the molecular mechanisms that enable cells to sense the rigidity of their environment and translate it into the modulation of developmental gene regulatory network that control skeletogenesis.



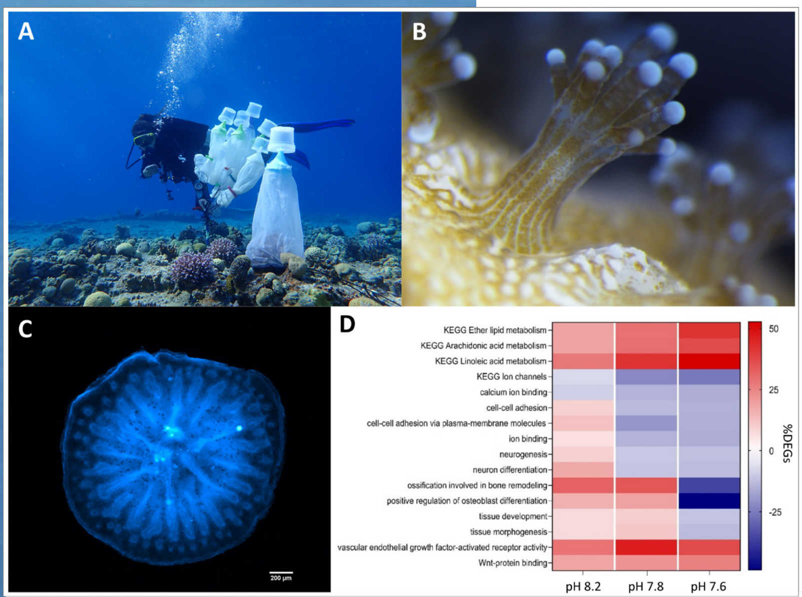
*The effect of ROCK inhibition **in-vitro** at 72hpf. (A) Linear skeletal rod in control skeletogenic cell culture. (B) Addition of ROCK inhibitor before skeletal formation prevents spicule formation, (C) and the addition of ROCK inhibitor after spicule formation reduces skeletal growth, (D) and/or induce branching. Scale bars represent 50 µm.*

Federica Scucchia

I'm a second year PhD student working at the Coral Biomineralization and Physiology Lab of Tali Mass. My research is focused on the response of juvenile and adult stony corals to decreasing oceanic pH. In particular, I'm examining changes in physiological and morphological characteristics, and in gene expression patterns in both the coral and the endosymbiotic algae, to better understand the response of these organisms to ocean acidification.

I'm also interested in coral adaptation to different depths and light environments, and in particular I'm exploring the changes in physiology and gene expression of corals across broad vertical gradients, from shallow to mesophotic reefs, investigating how these phenotypic variations may drive differential tolerances to environmental change.

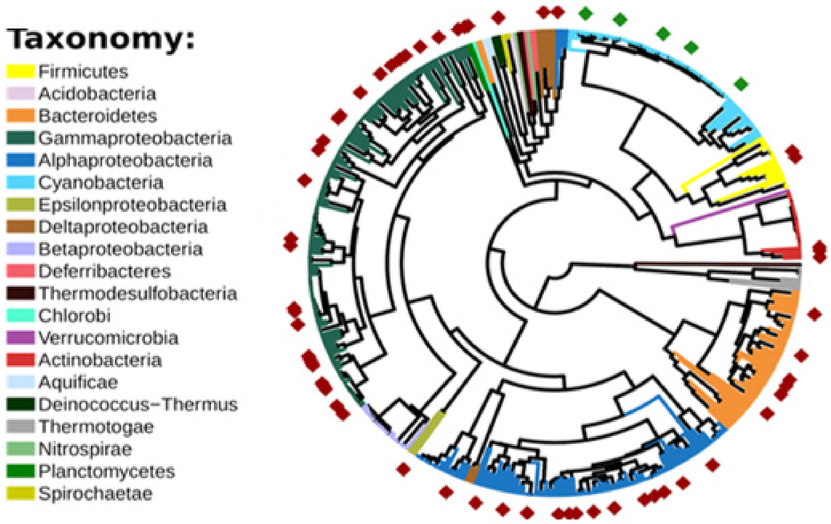
Coral reefs are facing significant challenges due to anthropogenic activities and climate change, and this highlights the urgent need to understand if corals will be able to persist under such increasing threats. My goal is to provide a comprehensive understanding of how early and adult stages of corals will respond to climate change impacts, in particular ocean acidification, to assess the capacity of these organisms to adapt and/or acclimatize to a future acidified ocean.



(A) Collection of coral larvae from the coral reef in Eilat using larval traps. (B) Microscope image of a polyp of the coral Stylophora pistillata from the Red Sea. (C) Microscopy image showing the Calcein Blue fluorescence in the skeleton of a coral primary polyp. (D) Heatmap showing enriched Gene Ontology terms and KEGG pathways across pH conditions in mesophotic versus shallow corals. DEGs, differentially expressed genes. Red indicates up-regulated genes, blue indicates down-regulated genes.

Waseem Bashir VK

Prochlorococcus is the most abundant photosynthetic marine microorganism. Since its discovery in the 1980s, many scientists have tried to understand the cause of its dominance in the marine ecosystem. However, these efforts failed due to the high mortality of Prochlorococcus when exposed to trace levels of toxic metals or ROS in culture, long doubling time and growth curves, and the absence of genetic manipulation protocols. Interestingly, growth phenotypes have been reported upon the co-culture of Prochlorococcus and a diverse set of marine heterotrophs. This approach to understanding the phenotype of Prochlorococcus growth in co-culture could be upgraded by taking into account the growth of the heterotroph using a distinct fluorescent signature. To do this, the first challenge would be providing a template representation of the diversity of microbial life forms in the global oceans. We hope to achieve this through our diverse assembled library of bacterial strains isolated from oceans around the world. While the growth of Prochlorococcus can be tracked by its autofluorescence, in this study we are attempting to exclusively track the growth of the heterotrophs by CRISPR-tagging the genome of these strains with a fluorescent protein whose signature is distinguishable from the Prochlorococcus autofluorescence. This would be an even greater challenge. To do this, we propose to develop a holistic approach that includes identifying downstream flanks of single-copy, highly conserved core genes as the target site, using antibiotic resistance genes as mutant selection markers, and recombinantly expressed electroporation grade CAS9 (with gRNA) for tagging.



Radial taxonomic tree of the large heterotroph library of marine bacteria with complete genomes available, showing the strains that are currently in culture marked with squares on the periphery.

Congratulations to Prof. Ilana Berman-Frank or winning the "Helmholtz International Labs" program for studying the biogeochemical and ecosystem transitions in the Eastern Mediterranean Sea.

What a year it was!

Tal Shiftan Fortis and Shani Gerbi

We started an academic year with the limitations of the corona virus, working from home with children around us in distance learning. We experienced for the first time closure, isolation and social distance in a country characterized by closeness, "togetherness" and family. Thanks to vaccines and public discipline, we gradually returned to campus. Despite the difficulties and the challenge, we did our best and continued to provide service to the students in the country and overseas. No doubt, we thank Corona for teaching us an important lesson for life, which is to cherish and be grateful for what we have and take nothing for granted. In terms of advanced studies, we have drawn conclusions and we carry with us what worked better, leaving behind what is less successful. We look forward with great anticipation and optimism to the coming academic year.

Where are they now? Our alumni today

Adi Zvifler PhD Candidate, School of Earth Sciences and Oceans Institute, University of Western Australia, Perth, Australia

In my master degree at the Marine Biology Department and the Marine Technologies Department I designed the use of a fluorescence camera specifically for coral recruits daytime. My research interests are coral reefs biology and ecology, as well as conservation and management strategies for the future of our reefs. I am passionate about working on unique and less well-studied reef systems where I feel my research could make the greatest contribution to improving our understanding of reef response to anthropogenic impacts. This is why I have looked to Western Australia's reef systems which host some of the most pristine naturally functioning inshore turbid reefs in the world.

My PhD research project titled "Resilience, Restoration and Refugia – the future of Ningaloo and Exmouth Gulf coral reefs", focuses on the unique turbid reef systems of Exmouth Gulf, Western Australia. The frame work for this project is the recent observations by scientists, that some turbid reefs coral are more resilient to rising sea surface temperatures. By means of laboratory experiments (e.g. molecular and physiology analysis) and in-situ measurements (e.g. coral growth rate, environmental parameters monitoring), I am assessing and comparing the current status of key coral species along a turbidity gradient from Ningaloo clear-water coral reef to Exmouth Gulf turbid water reefs. My aim is to explore the potential of these turbid reefs to function as coral refugia or recruitment source to facilitate the ongoing management, resilience and restoration of the Ningaloo Reef, a UNESCO World Heritage Site, should it become severely impacted by the ongoing effects of climate change.

Dr. Michal Grossowicz, PostDoc in GEOMAR Helmholtz Centre for Ocean Research Kiel

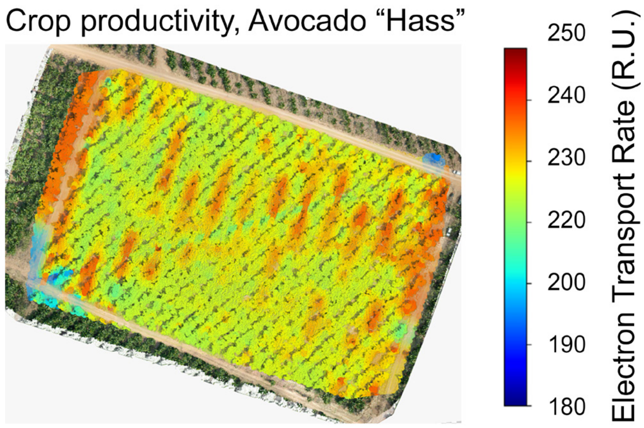
I am a marine ecologist specializing in ecological modeling. Fascinated with integrating ecological processes with mathematical equations, I joined the CSMS Department of Marine Biology for my PhD studies. There, I studied marine phytoplankton interactions modeling, as well as food web and Lagrangian modeling. Later, during my first postdoc at the IOLR, I modeled Mediterranean food webs and invasive species population dynamics. Now, at GEOMAR Helmholtz Centre for Ocean Research Kiel, I study zooplankton behavior during seasonal vertical migration in high latitudes. In this project, I couple a trait-base physio-ecological model with a biogeochemical model, using high-performance computing techniques such as cutting-edge parameter optimization methods for rigorous model evaluations. The results from this project will help in investigating the sensitivity of the ecology and biogeochemistry to global changes and, in particular, to climate change. Generally, GEOMAR is a really fantastic place to be in, as it is a world-wide leading institute of marine research, with research conducted in all oceans and adjacent seas. The institute is equipped with state-of-the-art research vessels, a manned submersible, deep-sea robots, as well as several major laboratories, making it an awesome place in which to do science!

MIGAL Galilee Research Institute LTD.

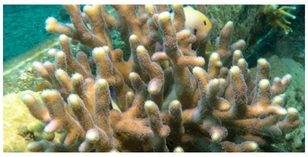
Dr. Oded Liran, Principal Investigator at MIGAL-Galilee Research Institute

During my direct PhD track (2009-2013) in the laboratory of Prof. Dan Tchernov, I was fortunate to spend 2 years in the Czech Republic with the generous support of the prestigious Marie-Curie Early Career Training Network scholarship. There, I succeeded in designing a new conjugated system that combines membrane inlet mass spectrometry (MIMS), originally developed by Dani, and photo bioreactor, which is now sold worldwide. I am grateful to Dani for his enormous investment and support during and after my studies. We keep meeting, discuss science and collaborate on exciting new frontiers in photosynthesis physiology.

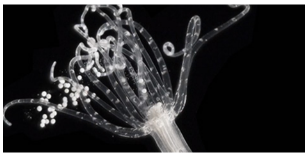
Precision agriculture is concerned with ways to increase crop yield in times of global population that reaches beyond the feeding capacity of traditional agriculture. The first step in increasing the yield is to detect anomalies over a geographical area. Remote Sensing (RS) answers this challenge by detecting, analyzing and quantifying plant traits via their optical properties. Traditionally, RS uses satellites with sophisticated sensors, which are able to detect information in the visual, near-infrared and short-wave infrared regions of the electromagnetic spectrum. Each of these regions reports on different chemical constituents within the crop – pigments composition, canopy structure, and water, cellulose and even nitrogen concentrations, respectively. However, these reporting indices tend to be inaccurate due to attenuations in crop geometry, type, and different growing stages. With the introduction of ultra-spectral resolution point spectrometers, together with machine learning techniques, it is now possible to bypass chemical constituents and search directly for their attenuations in the crop, chemical reactions that change in time and space. My group at MIGAL – Galilee Research Institute is concerned exactly with this challenge of isolating physiological cues in spectral properties of crops. To this end, the group is interdisciplinary, with computer scientists working alongside plant physiologists and remote sensing experts. In three years, we managed to patent two important traits of plant physiology that are related to biomass production rate: photosynthetic electron transport of a whole plant and its transpiration rate. These indices let us ask questions that are at the center of the grower's attention, such as when to harvest, what will be the produce quantity at the end of the season and what will be its quality. With these innovative solutions, we equip mankind with beyond-state-of-the-art tools to judge crop yield and we advance precision agriculture to its next phase, which is remote sensing of plant physiology in times of uncertain future of food security.



Selected popular interviews and reports (click the image for the link):



ממה מורכב אלמוג? אטלס תאים ראשון מסוגו יסייע להציל שוניות בים סוף



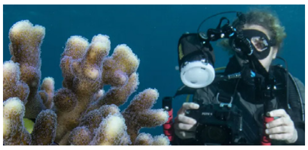
אולי אין לה מוח, אבל את התרופות הבאות לדיכאון וחרדה יפתחו בעזרתה

בסיוע בינה מלאכותית: פרויקט חדשני ינסה לפענח את שפת הליוויתנים

הזיהום בחופי ישראל: "ישפיע בוודאות על איכות מי השתייה שלנו"

"צריך להכניס לכאן את הצבא": ארבעה סיפורים מחזית ניקיון הזפת בחופים

אחרי 6 שנות מחקר: ברישה סנפירתנית זוהתה מול חדרה



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H. Nativ

Have a great summer

מאחלים לכולם חופשת קיץ מהנה