The Department of Marine Biology

Annual Newsletter

Keeping In Touch Within Our Marine Biology Community

H. Nativ

July 2023

אוניברסיטת חיפה
University of Haifa
جامعة حيفا

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

Prof. Smadar Ben-Tabou de-Leon
Head of the Department of Marine Biology

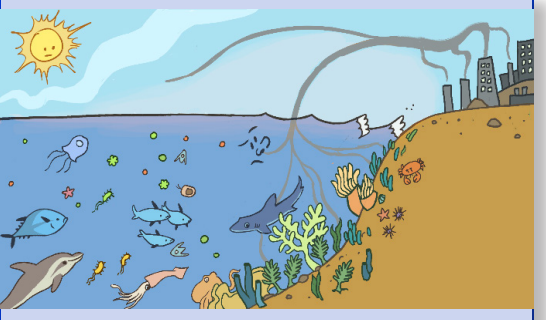
Dear Students, Colleagues, Alumni, and Friends,

It is my pleasure to share this newsletter with you and celebrate all we have accomplished together this year. I would first like to give a super-**huge thank you to Prof. Tamar Lotan**, our legendary former head of the department, that established this newsletter, as well as many other notable departmental traditions. Tami's compassion, dedication, and devotion to pushing this department forward has united and made us the strong community that we are today. Tami is a highly imaginative and innovative scientist; you can read about the fascinating parasites she studies below.

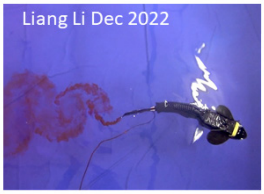
We are the champions, my friends: This year our faculty and researchers have won several **highly competitive grants** to further investigate different aspects of marine life. From monitoring top predators in the Mediterranean and Red Seas, to developing new methods improving coral recruitment, or investigating nutrient cycles in the Pacific Ocean (see table with details below). A closer look on the BSF Climate Solutions project "Enhancement of Coral Recruitment and Calcification for Future Reefs" lead by **Prof. Tali Mass and Dr. Tal Luzzatto-Knaan** is presented below. **Congratulations to all grant winners, and my deepest appreciation to all that applied. Wishing continued good luck to everyone on their important research!**

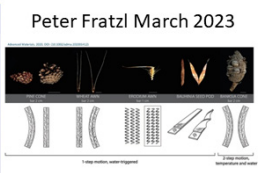
Oh, the places you'll go: It is always sad to say goodbye, so we say "**Lehitraot" to our successful MSc and PhD graduates**! (see list below). Some of our graduates have already started their new endeavors in academia, in industry, as consultants, and as instructors. You can read about the exciting post-doctoral position that our PhD graduate, **Federica Scucchia**, has started at Whitney Laboratory for Marine Bioscience, University of Florida (US). **We wish all of you well in your new adventures and we hope that you keep in touch!**

Nothing is better than a fresh start: **Dr. Igal Berenshtein** has joined us this year and started his new lab! Igal has won the very prestigious Zuckerman Scholarship to establish his new lab. He has already recruited **Debi Ramon**, one of our PhD graduates, as his lab manager. They are joined by a post-doc and graduate students to study marine ecology and ocean health. You can read about their recent discoveries below. **Igal, we are happy to have you on board and wish you good luck!**



Outreaching: We are not only a bunch of great scientists, but we are also a bunch of caring scientists. I am very proud of the efforts made by all of the labs to **disseminate our science to the public**. Our faculty and students educate young (and not so young) minds about the importance of keeping the ocean healthy and also about our research. A great way to deliver a complex message is by illustrations. For example, I used this image, drawn by my daughter, Yarden, when I spoke to middle school students about the ocean and how important marine life is to us. **Dr. Tal Luzzatto-Knaan** has taken it even





further, and initiated a comic about her super cool science titled: "Analytics for Grannies" (guess who made the illustration ☺). **Prof. Laura Steindler's lab** has demonstrated that you are never too young for science (see details below). The clip of their visit to a kindergarten class, made by Alhan Abu Hamoud, can be viewed here. Sharing our science and **making people care for ocean health is a part of our mission as marine scientists, and I'm very proud of how seriously we take that responsibility.**

What a treat: One of the more exciting traditions in the department is our **Annual Retreat**, where we meet and keep each other informed about the great science we do here. This year we started the retreat with a song, followed by exciting talks from faculty, students, and guests including academics and industry professionals. To break the ice, our Fun Committee, **Prashant Tewari, Lior Shimoni, and Alhan Abu Hamoud,** organized a game of "Bingo Around the Department", Kahoot, charades, and dances. It was a retreat to remember and looking forward to next year!

Story is the king: A critical aspect of scientific success is being able to present your research in an enticing way, be it in a talk, a poster, or a paper. If you are able to get the attention of your listeners and excite their imagination, your research will be remembered and recognized. This year we had multiple examples for Examples of great talks in our **school seminars**. Prof. Daniel Wiess explained to us why dolphin cubs swim next to their mothers, Dr. Liang Li shared the lessons he learns from his robotic fish, Dr. Yoav Lehahn told us about the direction of jellyfish swarms, Prof. Peter Fratzl expanded our knowledge on smart materials, and Dr. Noa Sher shared with us her experience as a chief scientist at a biotech start-up company. For the last seminar, it was time for our students to shine; **Osnat Weissberg** from the Sher lab won the 1st place for The Cool Paper Award! Additionally, our students did great in the **3-Minute Thesis competition**, where **Yarra Soussan** from the Sher Lab and **Omri Nahor** from the Luzzatto-Knaan lab won 1st and 2nd place at the school level as well as 3rd and 2nd, respectively, in the final competition. What good story tellers we have among us!

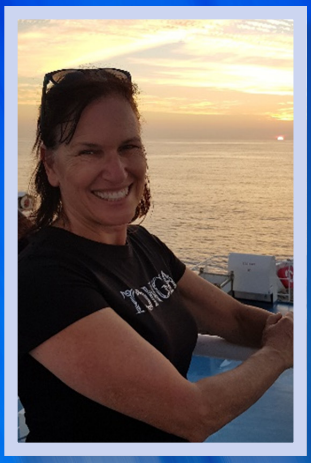
I would like to take this opportunity and thank our head of the school, **Prof. Ilana Berman Frank** for her inspiring leadership over the past five years. Thank you for your dedication, hard work, and persistence that led the school to independence. Thank you for taking the time to get to know us, fighting our battles, and winning the important ones! I would like to congratulate the incoming head of the school, **Prof. Dani Tchernov,** the founder of our department. I'm sure you will lead us to new heights and expand our horizons with your great vision and passion.

On a personal note: this is my first year as the head of the department and it was both challenging and rewarding. One of the best parts of this position is to get to learn about the exciting research that takes place here. From

saving whales, and improving reef health, to discovering new drugs, and better understanding marine life as well as life in general. We are pushing the boundaries of human knowledge to protect life in the ocean for a better future and it feels great to be a part of this force. Another thing, of equal importance to me, is the community spirit that we have here. The lab heads, the lab managers, the students, and the administrative staff go out of their way to help each other in every aspect of our academic life. This makes our department a ***simply awesome*** home for us all.

Have a great summer!

Smadar



Prof. Ilana Berman-Frank
Head of the Charney School of Marine Sciences

Dear Students, Faculty, Graduates, and Friends from near and far,

My congratulations to all students, faculty, and staff for completing another academic year. I especially want to **congratulate the recent MSc and PhD graduates** that have worked hard and produced excellent research that have been summarized in theses, presented at national and international conferences, and in published scientific papers. I hope that you, our graduates, have had a positive and productive experience at the Charney School of Marine Sciences and that you will continue to be a part of our growing community wherever you go. I hope that you will take with you the responsibility that comes with being marine scientists. Be fearless in your pursuit of knowledge and unwavering in your dedication to the marine systems around us. I encourage you to use your expertise to make a positive impact on the world, to inspire change, and to ensure a sustainable future for all.

Having a positive impact on our society and ecosystems is an important part of the University of Haifa's strategy that has adopted the UN sustainable development goals (SDGs) (https://sdg.haifa.ac.il/?lang=en). Work and research by the Leon H. Charney School of Marine Sciences aligns well with many of the SDGs. This was reflected in this past year's ranking (2023) by the Times Higher Education (THE) Impact Rankings, a global university ranking which measures the success of academic institutions in delivering the United Nations SDGs. The University of Haifa was ranked in the top 101-200 universities worldwide, **while the school's predominant contributions to SDG14 (Life Under Water) earned us a ranking of 28 out of ~600 institutions worldwide.**

To those of you graduating and going off to post-docs or the new paths off the academic track, we wish you good luck in your future paths and hope to keep in contact as well as see you here often.

Enjoy the summer,

Ilana

Daniel Sher and our PhD student, Tal Ben-Ezra, presenting her results at the international Association of Limnology and Oceanography (ASLO) meeting in Spain.

Congratulations to our faculty and researchers for their newly funded grants:

Principal Investigators	Project Title	Funding Agency
Dan Tchernov	Assessing Population Biology Blackchin Guitarfish	Blue Marine Foundation
Tali Mass and Tal Luzzatto Knaan	Biological and Geochemical Enhancement of Coral Recruitment and Calcification for Future Reefs	BSF-Climate Solutions
Laura Steindler	Coupling Organic Nutrient Cycling to Methane Production in the Oligotrophic North Pacific Ocean.	NSF-BSF
Aviad Scheinin and Dan Tchernov	Where Do They Come From, Where Do They Go? Tracking Sandbar Shark Movements and Habitat Use	National Geographic
Tali Mass and Ziv Zemah-Shamir	Effects of Climate Change on Ecosystem Services in the Gulf of Eilat- An Environmental-Economic Assessment	Ministry of Environmental Protection
Aviad Scheinin and Dan Tchernov	Survey of Deep Sea Marine Mammals in Israel's Economic Waters	Ministry of Energy and Infrastructure
Dan Tchernov and Aviad Scheinin	The Distribution of the Bluefin Tuna and its Living Conditions in the Mediterranean Region of Israel	Ministry of Energy and Infrastructure
Igal Berenshtein	Zuckerman Faculty Scholars program	Zuckerman STEM Leadership Program

* To everyone who applied and didn't get funded: **Don't stop believing! Keep applying. The funds come to those who keep trying.**

Congratulations to our graduates:

MSc

Hagai nativ

Irina Irit Shaim – Dean of Graduate Studies Honor

Barbara Muller – *cum laude*

Goni Bregman – Dean of Graduate Studies Honor

Alex Wajnerman

Vanessa Maria Bachmann Caller – *cum laude*

PhD

Martina Mulas

Tal Eli Zaquin

Eyal Bigal

Federica Scucchia

Rami Tsadok

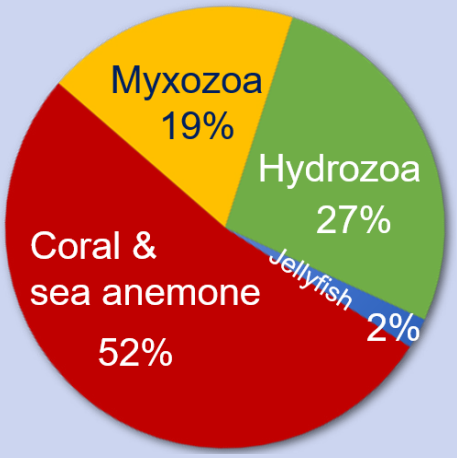
MSc graduation ceremony

Fascinating Parasites: Myxozoa, a New Addition to an Old Phylum

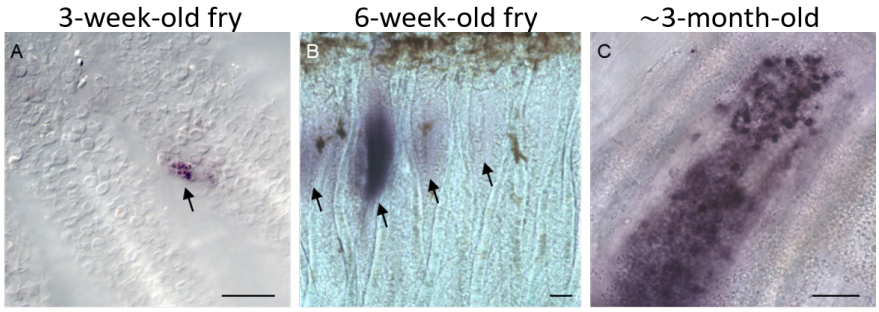
Prof. Tamar Lotan

The Cnidaria phylum is comprised of over 10,000 free-living species, around ten organisms that combine parasitic and free-living life stages, and over 2,400 obligate microscopic parasites belonging to the Myxozoa group. For the past twenty years, I have been fascinated by the immense plasticity and diverse life stages displayed by cnidarians. Upon returning to academia, I faced the challenge of selecting a model organism for my studies. Ultimately, **I decided to focus on biological phenomena that trigger my scientific curiosity, rather than on a specific organism**. Thus, over the past decade, my lab and I have investigated diverse processes such as planula-to-polyp transformation in sea anemone (*Nematostella*), regeneration and pulsation in coral (*Xenia*), and swimming patterns and strobilation in jellyfish (http://marsci.haifa.ac.il/labs/lotan). To enhance our expertise, we have established strong scientific collaborations, for which I am immensely grateful. In the following, I would like to share with you our research of the myxozoan group.

Our interest in myxozoan parasites began a decade ago when their taxonomic placement was still being debated. We were intrigued by the similarity between myxozoan polar capsules and nematocysts, the characteristic ultra-fast stinging organelles that free-living cnidarians use for prey capture, defense, and locomotion. **The nematocyst is a syringe-like capsule containing a long needle-like tubule. Once activated, the tubule is fired at a high acceleration, penetrating the target in a fraction of a second**. At the time, it was known that polar capsule discharge initiates host infection. To explore these interesting organelles, we assembled a multidisciplinary team of scientists specializing in fish pathology (Jerri Bartholomew and Stephen Atkinson, Oregon State University), microfluidics (Gilad Yosifun and Sinwook Park, Tel Aviv University) and numerical and mathematical modeling (Uri Shavit, Technion). Our findings have provided the first proteomic characterization of myxozoan capsules, demonstrating the adaptation of their injection system to parasitic life. We discovered that the myxozoan tubule has high elasticity, which enables fast host anchoring (see clip https://www.youtube.com/watch?v=VG_r2KQgljQ), a phenomenon that is unknown in nematocysts of free-living cnidarians. Additionally, we have developed a lab-on-chip microfluidics apparatus, which enabled us to uncover an unknown mechanism that drives tubule firing and elongation. While the common paradigm suggested that the cnidarian capsule acts as a pump that pushes the tubule out, our results show that the tubule is propelled forward by the high osmotic potential generated at its moving front (see clip https://doi.org/10.6084/m9.figshare.c.3693214.v2).

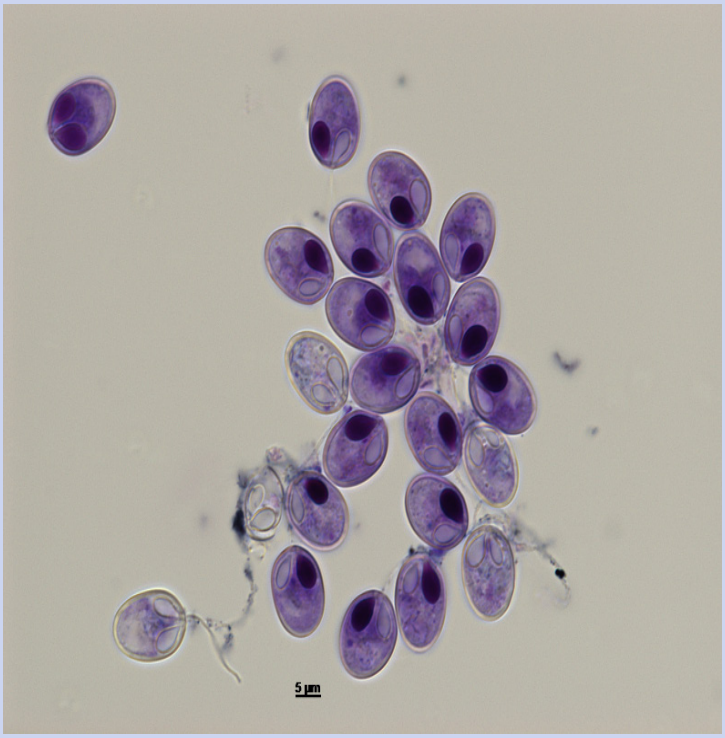


***The highly diverse Cnidaria** phylum consists of about 20% Myxozoans*



The progression of myxozoan infection, from newborn fry to 3-month-old fish*. Whole mount in situ hybridization with myxozoan probe demonstrating early cyst forming (arrow in A,B) and spore formation (C) in fish gills.*

Having established that polar capsules are in fact nematocysts that have adapted to parasitism, we wanted to learn more about the infection process. This led us to collaborate with Margarita Smirnov, a fish pathologist at the Central Fish Health Laboratory of the Ministry of Agriculture. Together, we have identified a new species of Myxozoa that causes high mortality in cultured tilapia. Using this newly identified species, named *Myxobolus bejeranoi*, we then conducted an in-depth temporal analysis of myxozoan infection by studying both early gene expression in the parasite and host response. Using transcriptomics and spatiotemporal analysis, we found that the invading myxozoan plasmodia rapidly divide, while the host reacts by encapsulating the invaders within a cyst. As the infection progresses, the parasite begins to express specialized genes that are needed for nematocyst synthesis and sporulation, as well as genes that may affect the host immune system. **Indeed, we discovered that the parasite employs an evasion strategy of a thorough shutdown of the host immune response, rendering the fish highly susceptible to other pathogens (**https://doi.org/10.3390/microorganisms10101893). Our current goals are to understand host specificity of myxozoans and identify the receptor that recognizes host signals. Throughout this journey, I have been fortunate to work with excellent students and colleagues, who have made valuable contributions to our collective efforts. Together, we shed light on an aquatic phylum that is not only colorful and beautiful, but also incredibly fascinating. Want to know more? See: http://marsci.haifa.ac.il/labs/lotan



Myxozoan spores *with ready-to-shoot nematocysts (dark blue) and ones that have already discharged.*

Saving the Reefs: Enhancement of Coral Recruitment and Calcification for Future Reefs, BSF-Climate Solutions Grant

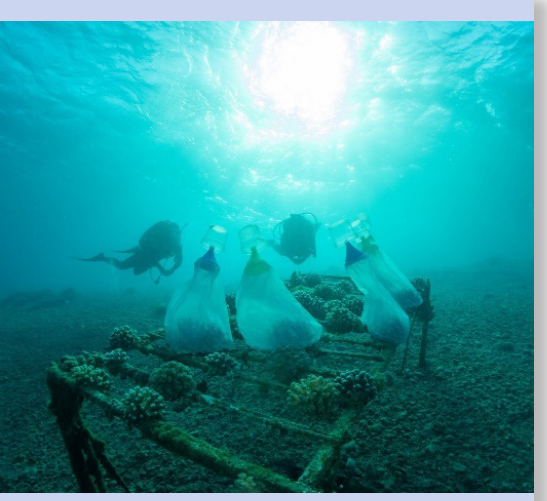
Prof. Tali Mass and Dr. Tal Luzzatto Knaan

BSF-Climate Solutions Grant aims to make a positive contribution to the development of climate solutions through cross-disciplinary and collaborative research projects between the United States and Israel. Prof. Tali Mass and Dr. Tal Luzzatto Knaan from our department, together with their colleagues have received this grant to develop novel solutions to improve coral recruitment and calcification.

As anthropogenic climate change progresses, corals, the ecosystem engineers of tropical reefs, are increasingly exposed to conditions beyond their biological limits. This has resulted in a rapid decline in reef health and coral cover worldwide. The physical stressors of climate change impact not only corals' persistence, but also their ability to repopulate degraded reefs through recruitment of juvenile corals and regrowth of adult corals. **In this project, we aim to enhance the settlement and biomineralization capacity in the earliest life stages, as well as calcification in the adult stages**. Our aim is to study corals that differ in their growth rates and growth environments in Hawai'i, the Atlantic Ocean, the Red Sea, and the Mediterranean Sea.

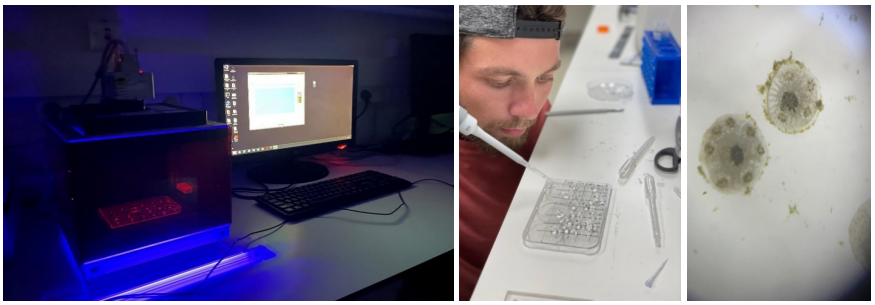
The research team includes the coral biologists Hollie Putnam (URI) and Tali Mass, analytical chemistry and proteomics expert Tal Luzzatto-Knaan and material scientist Boaz Pokroy (Technion). Collectively, our solution-focused work will help to improve ecosystem resilience, coastal protection, and food security.

Over the past few weeks, we began the project in Israel, with a visit by Hollie Putnam and her team. We collected corals and larvae in the Red Sea, manipulated their growth condition, analyzed their physiology, and collected many samples for future analysis. As a part of this visit Hollie gave a fascinating and well received talk at our departmental seminar.



Planula nets are set over adult corals at night during spawning season in the Red Sea.

Tali Mass and Tamar Palti collecting settled polyps for further physiologic and morphologic analysis.



Left: Photosynthesis measurements of the settled polyps. Middle: Pierrick (PhD candidate) prepares individual larvae for metabolic measurements. Right: Weeks-old colonies that are grown in the lab.

The New Kid on the Block: Marine Ecology and Ocean Health Lab

Dr. Igal Berenshtein

The Marine Ecology and Ocean Health Lab addresses fundamental questions concerning the health and functioning of the marine environment, with an emphasis on the role of early life stages of fish. The laboratory investigates **larval dispersal and connectivity, and the effects of marine pollution and climate change on the marine environment.** Our methods include the use of advanced modeling techniques, applied oceanography, ecological surveys, and behavioral experiments. Currently, the laboratory is under construction and should be up and running in a few months.

Though our lab is still in the making, we have been quite busy. Recently, we have been mapping connectivity patterns between proposed Marine Protected Areas (MPAs) in the Israeli Mediterranean and Exclusive Economic Zone (EEZ) regions, focusing on deep-sea species. Additionally, we are studying the effects of oil spills on the marine environment, developing an oil slick detection algorithm, and investigating larval fish orientation capacity globally. Our EEZ MPAs connectivity work indicates that the proposed MPAs largely capture the areas that have high contribution to demographic connectivity of sensitive deep-sea species such as: *Lamellibrachia anaximandri* (Annelida; cold seeps), *Rhizaxinella shikmonae* (Porifera; sponge grounds), *Isidella elongate* (Cnidaria; coral gardens), *Swiftia pallida* (Cnidaria; coral gardens), and *Thyasira flexuosa* (Mollusca; cold seeps (Fig. 1). For more details see the father plan for EEZ MPAs).

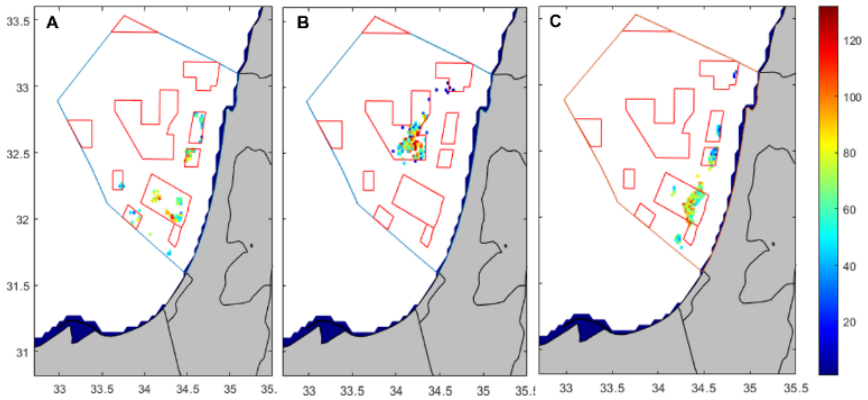


Figure 1: Contributions of the (A) cold seeps, (B) sponge grounds, (C) coral gardens habitat polygons to various aspects of demographic connectivity. Color bar represents the ranked degree of contribution. The proposed MPAs are red polygons.

We are currently working on several projects related to the effects of oil spills on the marine environment and on global larval fish orientation capacity. Oil pollution is highly abundant and frequent in the marine environment and is being extensively detected by satellites. However, **despite our ability**

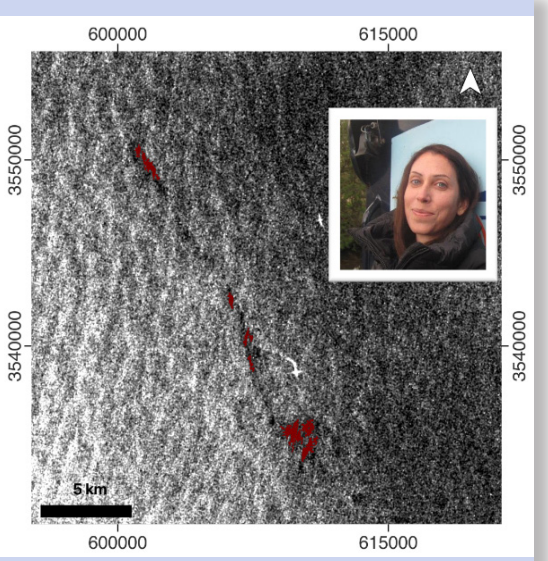


Figure 2: Example of oil slick detection algorithm output led by Adi Neuman.

to spot these pollution events, the knowledge about their impact on the environment is very limited. PhD student Omri Lapidot will develop quantitative methods to account for the impacts of oil pollution on the marine environment, from global and local perspectives. To support our oil pollution research, Adi Neuman (spatial analyst) is leading the development of an oil slick detection algorithm/pipeline from satellite imagery (Fig. 2).

As part of our efforts to understand the impact of the recent tar pollution event which occurred in Israel during Feb. 2021, we investigate which larval fish were present at the time-of-year when this event occurred. For this purpose, we carried out a short larval sampling cruise capturing a multitude of larval fish, in collaboration with Dr. Nir Stern from IOLR (Fig. 3, 4). The processing of the samples and the identification were carried out by Vladislav Dzhurinskiy with the support of Stern's lab (IOLR).

Figure 3: Lab cruise. Participants: Debi Ramon (Lab manager and photographer), Omri Lapidot, Igal Berenshtein, Vladislav Dzhurinskiy, and Nir Stern (IOLR).

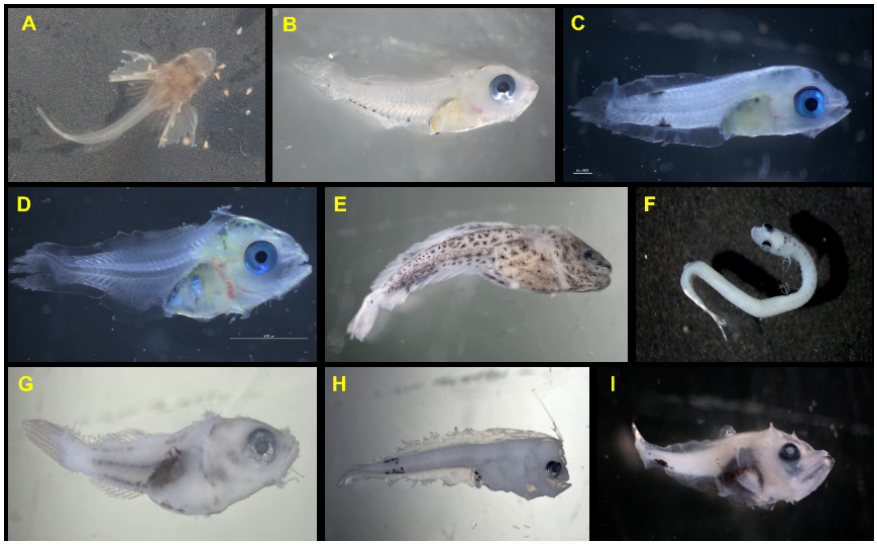


Figure 4: Examples of larval catch from the Feb. 2022 cruise. (A) Chelidonichthys lucerna, (B) Boops boops, (C) Pagellus acarne, (D) Pagrus pagrus, (E) Solea aegyptiaca, (F) Sardina pilchardus, (G) Callionymus filamentosus, (H) Arnoglossus laterna, (I) Helicolenus dactylopterus.

Additional work of our lab, led by the post-doctoral fellow, Dr. Assaf Pertzelan, focuses on the orientation capacity of larval fish based on a recently collated global database of larval orientation experiments. In this study **we use advanced quantitative methods and machine learning approaches to identify common patterns in larval fish orientation strategies across a multitude of species and locations worldwide** (Fig. 5). We are extremely excited to tackle key scientific questions related to the functioning and health of our marine environment!

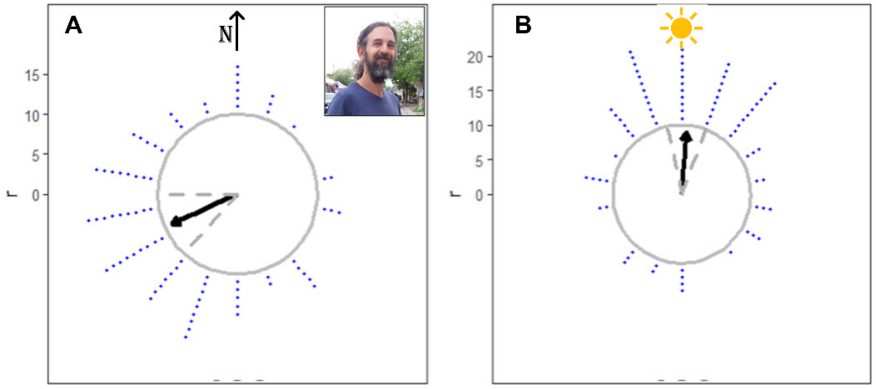


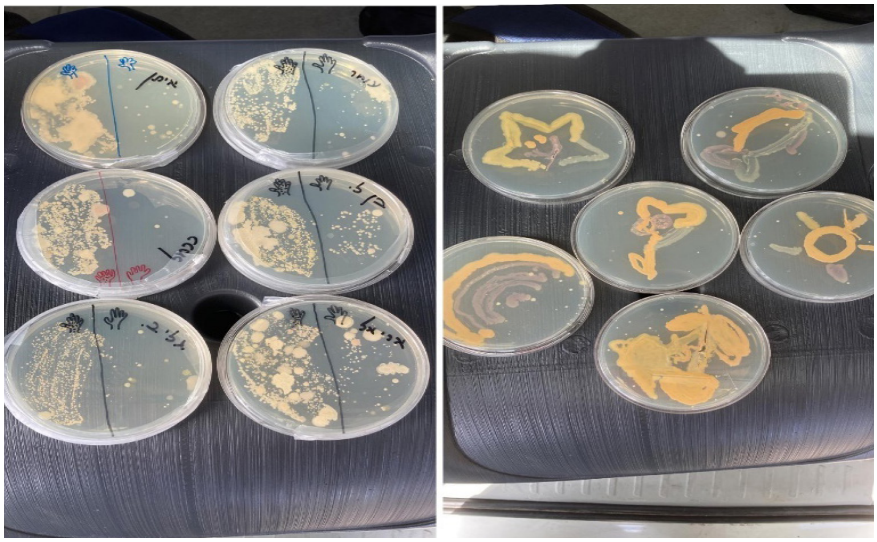
Figure 5: Larval fish orientation relative to the north (A) and relative to the sun (B) led by Dr. Assaf Pertzelan.

Microbiology for Kindergarteners: The Steindler Lab Plays Hard!

by Alhan Abu Hamoud

Not only students can enjoy enriching and informative activities about the sea, bacteria, and the environment, but so can kindergarteners! This month, the Marine Microbiology lab volunteered at the Hod HaCarmel Kindergarten, near the University. We taught the children about how bacteria are found in all places, even if they can't see them. The children learned that they can see invisible bacteria by growing them on a rich medium "full of sugars". When some of the kids heard this, they wanted to lick the agar-plates!

The children saw the difference in the amount, shape, and color of bacteria growing on the petri dishes. Then they did an activity on "hand hygiene", they touched agar plates before and after washing their hands and saw how that influenced the number of bacteria that grew. As a result of the experiment, they now understand why they wash their hands before eating!



The kindergarteners' bacterial creations

Finally, for some fun, they drew various pictures on the agar plates using colorful bacteria. The clip of our visit to the kindergarten can be seen here: https://youtu.be/MPDes502kJo.

At the end of the activity, the hardest thing was to get Chiara back to the university… she wanted to stay at the kindergarten ;-).

In the image from right to left: Alhan, Claudia, Abdiel, Olga (kindergarten teacher), Laura and Ben, Chiara, and Prashant.

What a Treat: The 9th Annual Retreat of the Marine Biology Department

We had a full house at our 9th Annual Retreat that took place on January 19th, 2023. Around 100 participants, including PhD and MSc students, post-doc scholars, principal investigators, lab managers, research associates, and representatives of five sponsoring companies, came to share their excellent science. The retreat began with a musical tribute to the efforts of organizing team and to thank participants for coming to the awesome event. Following that, Dr. Rotem Kadir from the foodtech company, Mermaid Foods, gave a talk about the foodtech industry in Israel and the opportunities for culture-based seafood development. The exciting talks and posters presented by students and researchers demonstrated **the multidisciplinary research in the department that advances the understanding of life in the oceans, from genes and proteins to organisms and ecosystems**.

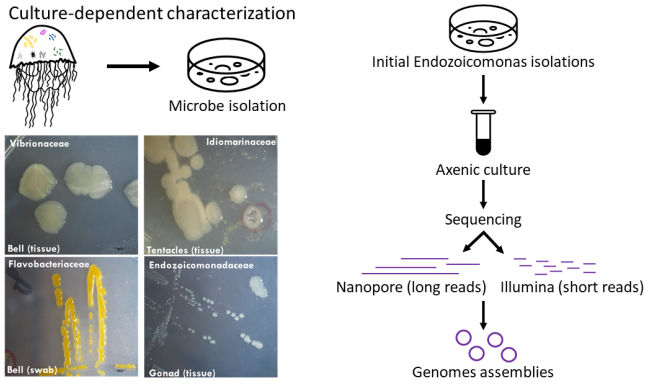
Cláudia Ferreira designed the beautiful **logo** that was used for the swag and the program brochure. **Prashant Tewari, Lior Shimoni, and Alhan Abu Hamoud** organized a game of "Bingo Around the Department", Kahoot, charades, and dances. **Hagai Nativ** took beautiful **photographs and videos** of the event.

Outstanding Talk Awards

1st Place: Noga Barak, Endozoicomonas - A Glimpse into the Most Abundant Bacteria of the Eastern Mediterranean Jellyfish Bloom

I am a PhD student at the labs of Prof. Tamar Lotan and Prof. Daniel Sher. My research focuses on the interactions between *Rhopilema nomadica* jellyfish and their associated bacteria. Examining an organism alongside its associated microbiome can be crucial for understanding its biology. Bacteria play a significant role in shaping an organism's phenotype, development, and fitness. When studying large-scale natural phenomena such as jellyfish blooms, host-bacteria interactions are essential.

Here, **we explore how jellyfish-bacteria interactions influence bloom initiation and collapse**. Our initial focus was the Endozoicomonas, which we discovered to be one of the most abundant bacteria in Eastern Mediterranean blooms. We isolated, sequenced, and assembled eleven complete genomes; ten showed high similarity, while one contained unique genes. Our analysis also revealed several distinctive gene clusters belonging to either the jellyfish-isolated bacteria or other host isolates, implying that these genes could be relevant in our ongoing research. This is the first step toward gaining a better understanding of the potential functions of these genes.

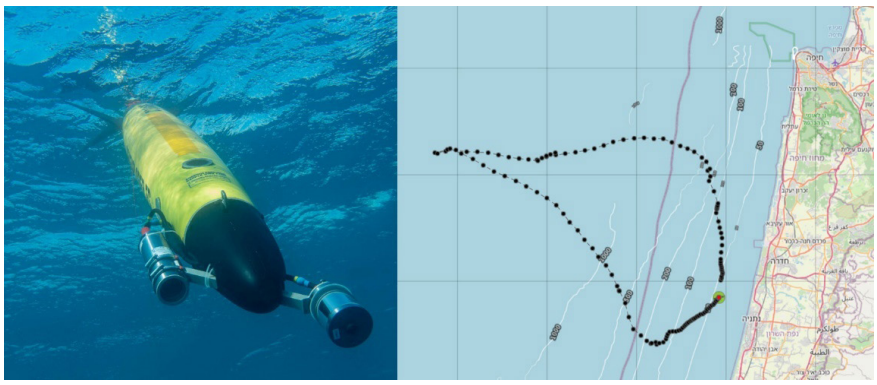


Using Endozoicomonas isolations for exploring different bacteria traits

2nd Place: Merav Gilboa, Cyclonic and Anticyclonic Eddies as Ecological Refugia and Bio-Invasion Vector in the Southeastern Mediterranean Sea

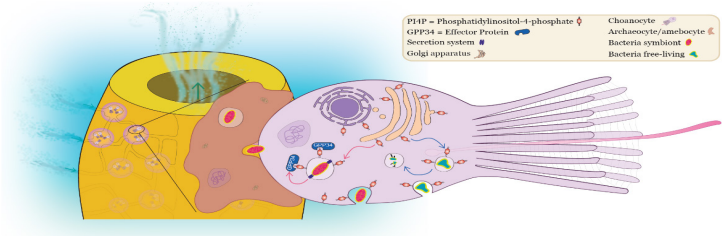
I am a Ph.D. student under the supervision of Dr. Guy-Haim, Dr. Ayah Lazar, and Prof. Ilana Berman-Frank. I study ocean eddies that play a significant role in the transport and mixing of heat, carbon, and nutrients. They form unique habitats characterized by distinct physical and chemical conditions, supporting a wide variety of planktonic organisms. I have analyzed 19 years of satellite-based eddy data and found that the mean lifetime of cyclonic and anticyclonic eddies in the Southeastern Mediterranean Sea are 122±25 and 98±9 days, respectively. This timeframe is sufficient for detecting plankton

community composition changes due to increased or decreased reproduction and selection processes. I hypothesize that cold-core cyclonic eddies can serve as thermal refugia to native Mediterranean species, whereas warm-core anticyclonic eddies can facilitate the introduction and dispersal of alien Indo-Pacific species. To test these hypotheses, I am sampling and characterizing meso and submesoscale eddies. Aboard research vessels, I employ gliders enabled with a novel camera-based vision profiler coupled with in-situ mapping of particulate matter and zooplankton. DNA metabarcoding of net samples provides species-level identification of zooplankton taxa. Contrasting habitats created by ocean eddies can offer insights into the future ecological impact of climate change on planktonic communities, as well as help identify the attributes that support refuge for sensitive species.



3rd Place: Cláudia Ferreira, Golgi-related Protein in Symbiotic Bacteria May Enable Evasion From Host-Phagocytosis

I am an MSc student at the Marine Microbiology Lab under the supervision of Prof. Laura Steindler. My master's focuses on **exploring novel molecular mechanisms that enable recognition between marine sponges and their microbial symbionts**. For this purpose, I used comparative genomics on the phylum Actinobacteria to determine differences between sponge symbiotic and water-column free-living bacteria. This led to the discovery of a new eukaryotic-like protein in sponge symbionts which is absent in their free-living counterparts. Interestingly, a protein with the same function was previously reported in a pathogen-host system interfering with phagocytosis related mechanisms. We hypothesize that sponge symbionts may use a similar strategy to be able to inhabit sponges. Currently, I am writing my MSc thesis (and an article) on this topic. I also love art and incorporating it into my research by being the scientific graphic designer of our lab, see my cool drawing that summarizes our findings!



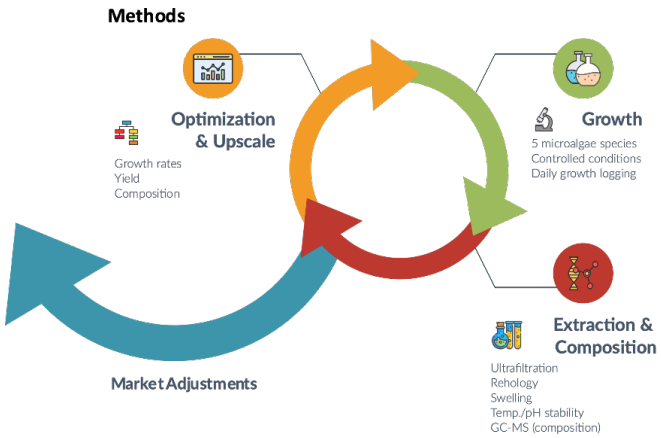
Outstanding Poster Awards:

1st Place: Itai Kolsky, Characterizing Extra-cellular Polymetic Substrates From Microalgae Toward Industrial Use

There is a growing need for eco-friendly and renewable alternatives to conventional colloids on a global scale. Colloids are bulky molecules that are insoluble in a substance but are suspended in it, altering its properties. For instance, saccharides and proteins can create hydrogels with water. The colloids field is highly incentivized, with an estimated market size of 12 billion USD in 2020 and a compound annual growth rate (CAGR) of 8.1% until 2030.

My research aims to find new alternatives to traditional colloids using microalgae polysaccharides (Phycocolloids). Adding Phycocolloids can complement existing algae farms' products and increase profitability by allowing them to use their raw product as a biorefinery and extract multiple products.

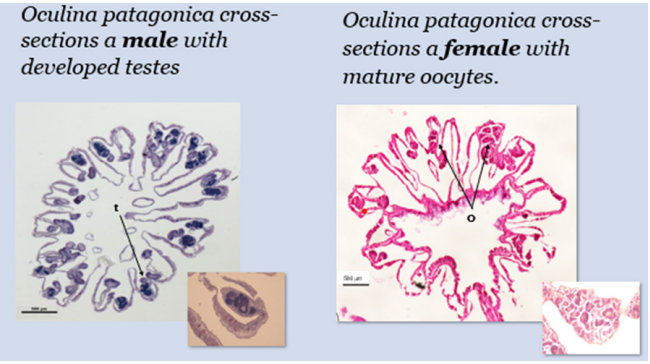
Numerous microalgae species release polysaccharides into their environment, and my research focuses on five potential species. I will manipulate their growth conditions to try and increase the amount and variety of polysaccharides in the growth medium, making substance extraction easier.

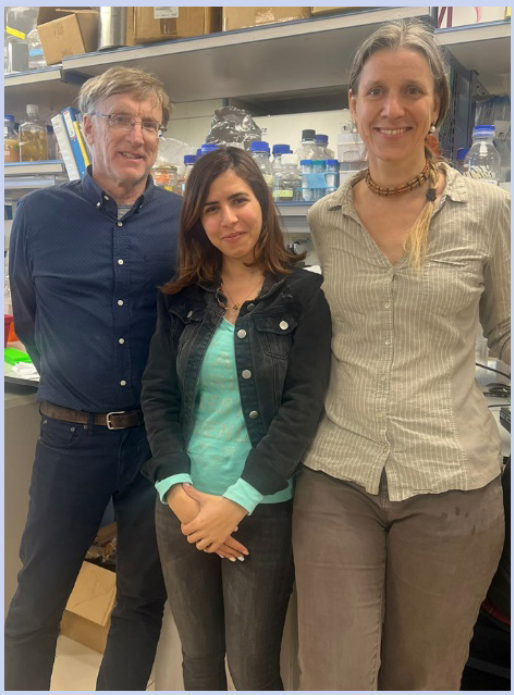


2nd Place: Tamar Shemesh, Seasonal Patterns of Oculina patagonica: Physiology, Gametogenesis, and Gene Expression

I am a MSc student at the Coral Biomineralization and Physiology lab under the supervision of Prof. Tali Mass. Climate change has significant impacts on coral reefs, causing bleaching events, breakdown in reproduction synchrony, and mortality. Stony coral has a mutual endosymbiotic association with photosynthetic dinoflagellate of the Symbiodiniaceae family. Rising sea surface temperatures have a detrimental effect on the stability of the coral-algae symbiosis. Annual severe bleaching events, a breakdown of the

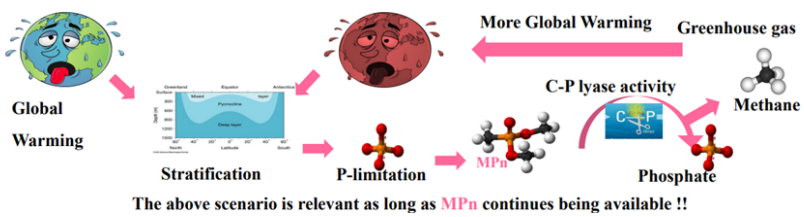
symbiosis and loss of the symbiotic algae from the host, are predicted to occur worldwide more frequently and on a larger spatial scale. *Ocullina patagonica*, a stony coral dominant in the Mediterranean coastal waters, displays high resilience to repeated seasonal bleaching events. Moreover, during those bleaching events, gametogenesis, a high energy demand process, is sustained. However, it is possible that rapidly warming sea surface temperatures on the Israeli Mediterranean coastline may cause changes in the timing and intensity of bleaching events and effect *O. patagonica* reproduction cycle. This study aims to update our knowledge of the seasonal physiology and reproduction patterns of the coral *O. patagonica*. Studying the mechanisms that enable this species to thrive and even invade new habitats with different environmental conditions can provide further insight into predicting corals' adaptive potential and long-term success.





3rd Place: Alhan Abu Hamoud, The Role of SAR11 in Phosphonate Cycling and its Potential Contribution to Global Warming.

Many marine regions are characterized by extremely low concentrations of bioavailable phosphate (P), thereby limiting primary and secondary microbial productivity. Nevertheless, bacteria thrive in these conditions by utilizing alternate forms of phosphorus such as phosphonates (PHNs). Interestingly, when one such PHN type, methylphosphonate (MPn), is degraded by bacteria to retrieve P as a nutrient, methane is also released, and the latter is a potent greenhouse gas. The main source of MPn in dissolved organic matter (DOM) is still to be discovered. Here, I propose to test whether the most abundant heterotroph of the global surface ocean, the SAR11 clade, represents the primary source of PHNs that accumulate in marine DOM, and thus may play a role in global warming via both MPn biosynthesis and degradation. To reach this objective I will combine microbiology techniques and advanced organic chemical analysis. For the chemistry, we are collaborating with Prof. Dan Repeta from WHOI, who also came to visit our lab (see picture).



What is she up to now? Our star alumni, Dr. Federica Scucchia: Postdoctoral Research Associate, Whitney Laboratory for Marine Bioscience, University of Florida, US.

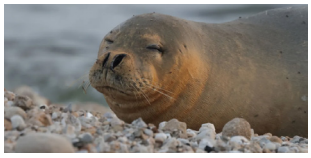
During my PhD at the Marine Biology Department, under the guidance of Prof. Tali Mass, I focused on exploring the influence of environmental factors on the physiology, morphology, and gene expression of stony corals across life stages. In particular, I've examined changes in physiological and morphological characteristics, and gene expression patterns in juvenile and adult corals as a response to ocean acidification. I've also studied coral phenotypic plasticity across depths and light environments, exploring the changes in morphology, physiology, and gene expression that enable corals to thrive across broad vertical gradients, from shallow to mesophotic reefs. During this PhD journey I learned to use many different techniques, both in the lab and in the field, and established a strong network of collaborations.

I'm currently a Postdoctoral Associate in the Martindale Lab at the Whitney Laboratory for Marine Bioscience, University of Florida (US). **My research focuses on utilizing the starlet sea anemone *Nematostella vectensis* as a universal expression platform to investigate various aspects of the evolution of biomineralization for environmental restoration purposes** (e.g. coral reef enhancement). I'm using a variety of techniques including molecular biology, protein engineering and high-resolution *in vitro* and *vivo* characterization of biomaterial properties. With my work at the Martindale Lab I hope to advance biomineralization studies, demonstrating the utility of transgenic systems for generating biominerals.

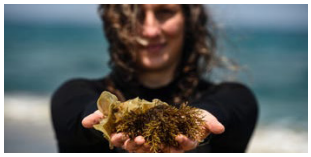
Selected popular interviews and reports (click the title for the link):

משלחת ישראלית במסע בעקבות לוויתן בחופי חיפה

המים הכלכליים של ישראל מהווים בית עבור דולפינים ולוויתנים



מכל המקומות בעולם, כלבת הים יוליה נחתה ביפו והפכה לשיחת היום בעיר



ד"ר טל לוצאטו־כנען נבחרה על ידי עיתון הארץ כאחת מחמישה חוקרים וחוקרות שמחקריהם פורץ דרך

המחיר הכבד שהאלמוגים עלולים לשלם בגלל שינויי האקלים

בתוך חמש שנים, אוכלוסיית הדולפין המצוי בחופי ישראל הצטמצמה ב־40%

Physiology and gene expression response to ocean acidification in shallow vs. mesophotic corals

Analytics for Grannies 001: Metabolomics

Analytics for Grannies 002: Extractions

Have a great summer

מאחלים לכולם חופשת קיץ מהנה