"A great deal of what happens in one's life is, I believe, a matter of opportunity and timing: who you meet, when you meet them and whether you seize the opportunities or not".

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From his escape from the Nazis as a baby to his position as Dean of the Faculty of Life Sciences at Tel Aviv University, Yossi Loya engages us in his life history. Through humorous but touching stories, Loya illustrates how he was greatly influenced by two mentors, Larry Slobodkin and Tom Goreau. His detailed quantitative studies of reefs in the Red Sea have enabled him and others to make use of natural and 'man-made' disturbances to learn more about how reefs are organized, but he credits comparative work on reefs in other oceans for broadening his perspective. Loya and others of his generation brought not only their own expertise in science, but also an American academic philosophy back with them to Israel to change the way science is done. Yossi has been a close colleague of mine for almost 25 years.

I was born in Plovdiv, Bulgaria in 1942. One morning in September 1944, when my parents were accompanying friends to the train station, they heard over the loudspeakers that this would be the last train to leave Bulgaria until the war was over. My father was about to be taken to a forced labor camp. On the spot, they decided to flee, leaving everything behind. They had barely 20 minutes. They rushed home. At that time, during the war, we always had a suitcase ready packed for the shelters. They grabbed me, a baby; they grabbed my grandmother. Then, with just this small suitcase with a few clothes, they rushed back to the station, where the train was already moving. They had no official documents, only some papers that "appeared official", bearing the stamp of the youth movement they were members of ("Hashomer Hatzair"- a Zionist youth movement, well known for establishing Kibbutzim in Israel) – no visas, no tickets, no money – nothing. But, these were terrible times we are talking about. Their friends bribed the Turkish border police officer to turn a blind eye - and so they managed to enter Turkey.

In Turkey, the Jewish community, sympathetic with our escape from the Nazis, received us warmly, giving us clothing, food, and milk for me, the baby. We crossed the Bosphorus by boat and then continued by train through Syria, Lebanon, until we finally arrived in Haifa in October 1944. The whole trip took about a month with many frightening moments on the way (as my mother later told me). I was then two years old. My parents had nothing but the clothes they stood up in; no money, no belongings – just me, a sickly infant with an eye infection – and an elderly grandmother.

Jews were fleeing from all over Europe to Palestine, ruled at that time by the British mandatory regime. It is quite a dramatic story, how the State of Israel was established in 1948. There are many heroic stories of that period. The British were preventing people from entering the country and deporting them to closed camps in Cyprus. In Haifa, we lived for a few months in tents provided by the provisional government. My parents then moved to

Jaffa, which, at that time, was mostly inhabited by Arabs. They spent their first night in an apartment they had rented with the small amount of money they were given by the government. That night all their clothes were stolen and they were left with nothing. That's the way life started out in Palestine – with nothing; everything left behind. That is also how the State of Israel was largely created; by those who had escaped from - or managed to survive - the Holocaust.

I went to elementary school in a small village, Giva'at Shmuel. I then attended high school (Tichon Hadash) in Tel Aviv, followed by compulsory army service. In Israel, you are inducted into the army at 18 and serve for three years. I was a communications officer in the army and until the age of 43, I continued to serve 20-30 days every year in the reserves. I took part in the 1967 'Six Day War', fighting in the Sinai desert, and in the 1973 'Yom Kippur' war, in Jerusalem and the Sinai again.

I earned my B.Sc. in Biology and M.Sc. in Zoology at Tel Aviv University. *Why biology?* Well, my parents, of course, wanted me to be a doctor, a physician; doesn't every Jewish mother want her son to become a doctor, an engineer or a lawyer? But I loved biology. Animals always fascinated me, so that's where I headed. I began my M.Sc. in 1965 with Lev Fishelson at the Zoology Department. My research involved growing *Tilapia* (Saint Peter's fish) in two small experimental ponds filled with highly saline water, about half the salinity of seawater. *Tilapia* fish - and especially Tilapia hybrids, were known to withstand such high salinities. During my first year as a Master's student, Larry Slobodkin came over to Israel from the U.S. on sabbatical leave. You probably know Slobodkin – the famous ecologist. I'll tell you a little about him because he is an important figure in my life. At the time he gave a course at Tel Aviv University on population ecology, based on his first famous book*… Growth and Regulation of Animal Populations, right?* Yes. I was fascinated by his personality. He insisted on lecturing in Hebrew, largely gained, however, from the Bible, an English-Hebrew dictionary and some past experience in Israel. As you can imagine his translation of ecological terms could become quite amusing at times… My basic grounding in ecology is from him.

Larry joined one of my field trips to Neot Hakikar, which was a small settlement in the Arava Valley, near the Dead Sea, where I was working. The study area itself looked like the Wild West, desolate other than for desert shrubs and venomous snakes - and these two experimental ponds situated in the lowest place in the world, close to the Dead Sea. Everything had to be done by hand, and everybody pitched in – my family, neighbors, colleagues and `friends. Oh, the things you do when you are young…Larry viewed this as a major Zionist endeavor – "a young Israeli biologist blossoming the desert!" … There was wonderful chemistry between us. He invited me to do a Ph.D. with him at the University of Michigan after completion of my M.Sc. degree. Finally, I went from being a fish biologist – essentially a fisherman, if you like – to a coral biologist, as I shall shortly tell you.

The Six Day War broke out on June 6, 1967, towards the end of my M.Sc. studies. That's also when I met my wife to be Shoshana (Shosh). Two months later we decided to get married. I had been fighting in the Sinai desert and, like many of my friends, had to remain there on reserve duty for two months. I completed my Master's degree four months later.

In your Master's, were you basically doing everything you needed to understand how Tilapia survived in its environment? Not exactly, the purpose then was mainly to perform a study of economic value. It's necessary to understand the infancy phase that ecology was in Israel in 1965. What we wanted to find out was whether we could grow fish in the desert without needing to invest any money other than in digging ponds to be filled with the otherwise useless highly saline water that flow into the Dead Sea. The idea was to grow *Tilapia* hybrids obtained from a cross between *T.*

nilotica and *T. aurea* resulting in about 100% males, which are almost double the size and weight of females. The experimental design was such that one pond received additional food – as practiced by the fish growers in the north – while the other pond had only the natural phytoplankton developing in the pond. Every two weeks I measured the growth of the fish, performed water analysis, nutrients and oxygen analysis – that sort of things – the whole chemistry of the water, with the procedures we knew then. Our fish were growing at a rate of knots – within three months we had fantastic fish that grew from about 20 grams to 600 grams! We then emptied the ponds completely, measured and weighed large fish samples and restocked the ponds with fingerlings. There was no significant difference between fish growth in the pond that got added food and the one that didn't! In terms of commercial value to fisheries, this was extremely successful compared to the fish yield in similar ponds in the northern part of the country. The economic benefit of using the waters near the Dead Sea is obvious: besides being free (their high salinity makes them useless for agriculture), since they remain very warm throughout the year (25°-30°C), which is ideal for Tilapia growth, it enables up to 3-4 fish stockings per year. In the northern part of the country, which has a relatively cold winter, the growth rate is much slower, permitting only one stocking of the ponds per year.

We arrived at Ann Arbor, Michigan in November 1967. It was snowing – the first time I'd seen snow in my life, and also the first time I'd seen television. Coming directly from the hot Israeli summer, we were terribly cold and I remember telling Shosh that "I'm not going out, look it's all white outside; it is snowing!" … Of course, I had to go out eventually. Otherwise, I would have stayed there the whole winter…In the coming months I took the required basic courses in the Ecology Program. I remember especially Nelson Hairston's excellent laboratory course in community ecology of soil mites, where I first exercised the concepts of species diversity. At that time Slobodkin was invited to Chair the Ecology and Evolution Department at the State University of New York (SUNY) at Stony Brook. He gave me the choice of either staying in Michigan or going with him to New York. We went with him. He inspired me greatly with his unusual and warm personality, wisdom, intellect, ingenuity, novel ideas and ecological philosophy. Later on this also affected my own approach to coral reef studies.

So, why reefs and corals? This was all quite by chance. While working on my M.Sc. I had also helped other students who were working at the Coral Nature Reserve at Eilat. From the moment I saw the coral reef at Eilat I was overwhelmed. It was incredible. I was captivated by its fantastic richness and beauty. In the back of my mind I instantly knew that this was the environment I'd like to work in the future. I had gone to study with Slobodkin on a research grant he had at that time to study coral reefs with Lev Fishelson at Tel Aviv University. I had a perfect arrangement: obtaining my formal education in the U.S. and doing coral reef fieldwork in Eilat.

Larry, it turned out, brought me to the U.S. not only because I had struck him as "a nice fellow", or because he thought I would be a good graduate student, but because he also wanted to take on an Israeli student, train him in the U.S., and send him back to pass on his knowledge in Israel. Slobodkin's first Israeli student, Uzi Ritte, (who helped us greatly in our first steps in Ann Arbor) was about to finish his Ph.D. and return to Israel to join the Hebrew University in Jerusalem. At that time, the Israeli academic system was greatly influenced by the German system, with traditionally rigid teaching approaches. The American philosophy of education was very different, as you undoubtedly well aware. This demands a book of its own, so I'll not go into it here. However, I do I believe that my generation brought about the big revolution in Israeli university life, because whoever returned from the U.S. brought back with them the American idea of how science should be approached and university life managed. I was therefore lucky indeed to meet the Slobodkins, who became later like family, and to have the opportunity to study in the U.S. A great deal of what happens in one's life is, I believe, a matter of opportunity and timing: who you meet, when you meet them and whether you seize the opportunities or not.

We arrived as students in the U.S. with almost no money Shosh, my wife, intended to complete her B.Sc. studies in Biology. Our entire income was $220 per month from my fellowship. While in Ann Arbor we had managed somehow to survive by renting a tiny inexpensive University apartment. However, at Stony Brook there was no way we could survive at such a low level of income. Ever the caring advisor, Larry discovered, after some enquiries, a big deserted house owned by the University, which was offered to us for free. It was a sort of huge mansion three stories high, reminiscent of those seen in "Gone with the Wind". *One of the big old estates?* Yes, indeed, it was the Child's Estate! The original owner even had a private train from his own courtyard to the beach. Having been vacant for many years the house needed "a little work" to make it livable. After fixing up two of the rooms, we finally moved in. Our first night in the house was a nightmare. It was a stormy night, and we went out to a movie, "Rosemary's Baby"; have you seen it? *Yes! Scary, isn't it?* … So back we went to sleep in our new home that first night. We did not yet have shades for the windows and the house was close to the beach, with a lighthouse nearby. The nearest other house was half a mile away. We were surrounded by woods; an incredible place. In the middle of the night we woke up to hear screams and scratches on the ceiling. The beacon was flashing on the window and the howling wind was rattling the shutters, which started to collapse; we felt like the whole place was about to blow apart. Of course, we got no sleep that night. In the morning, somewhat shaking, we hurried to talk to the person at the university responsible for the property, but he merely noted laconically: "Sure, didn't you know? The place is full of raccoons. The screams you heard were the raccoons!" … We lived there happily, with the raccoons, for three years. Our daughter Yael was born in May 1971, a few months before I finished my Ph.D. and a week before Shosh completed her Master's. Superb timing. Baby Yael was very content in the "raccoon house", except for screaming from time to time, in the middle of the night, sympathizing with the raccoons. That's how we managed to survive economically at Stony Brook. It was a joyful and wonderful period.

I spent the summer of 1968 in Woods Hole, at the Marine Biological Laboratory. Larry taught the Marine Ecology course there. What a stimulating, and exciting summer it was. Then came the opportunity to go back home and work on corals. At that time, questions like – "what generates and maintains a high diversity of organisms?" - were a hot issue as they are today in fact. I was struck by the concept of information theory and enthused by quantitative indices developed to describe communities. Where could I use it? For coral reefs, of course! That's what I wanted. My Ph.D. research proposal was to study species diversity of corals at Eilat. Very little was known about community ecology of corals at that time, and almost nothing was known about the corals of the Red Sea. The proposal was to perform line transects for a quantitative study of the coral community structure at Eilat. I was lucky because I had the opportunity both to work with Slobodkin and to get funded by a Smithsonian grant. Such grants were being awarded to developing countries, like Israel at that time. Today, we have the Bi-national Science Foundation, established by the two countries, but at that time the U.S. was helping to advance Israeli science by directing funds for this purpose.

I was looking forward to returning to Israel. I had passed my preliminary exams, as well as and the remaining formal courses required in the Ecology and Evolution Program at SUNY Stony Brook. For two summers, I carried out my fieldwork in Eilat, took courses and analyzed the data back at Stony Brook. Remember, at that time, computers were in their infancy. We studied and wrote programs in Fortran IV, which was the "state-of-the-art" at that time. I sometimes wonder what we would do today without computers, so taken for granted. The work was mainly to study stony corals and their zonation in Eilat. We knew nothing about their biology; we hardly knew the genera. I started from scratch, performing the line transects and measuring every coral beneath the line. I had to sample a small piece of almost every coral and put it in a bag, number it and give it a tentative name of my own, according to whatever it looked like to me. Since I was not familiar with coral taxonomy, in order to be on the "safe side", I ended up with a huge collection of coral samples

totaling about 200 “species” (…as I described them). Working later on the collection at Cornell University with John Wells, to whom I owe my taxonomic training, we reduced the number to about 115. This coral collection is now exhibited in the Natural History Museum of Tel Aviv University. It was Tom Goreau, who connected me to John Wells.

Tom came into my life in the summer of 1969. As you know, Tom Goreau was the founder and Director of the Discovery Bay Marine Laboratory in Jamaica. He was the “dream-mentor” of any student who wanted to study coral biology at that time. Tom came to Eilat for a short visit and to work in the Red Sea on the “crown-of-thorns” starfish- Acanthaster. He was very enthusiastic of my work, enabling quantification of coral communities. At that time, all the research on coral community ecology was qualitative. I remember Tom coming to Eilat. He was so excited about the methodology of quantifying coral communities that he became “my assistant”. I was all of 26 years old, and here was the great Tom Goreau coming to work with me; my diving buddy! He would hold the small nylon bags, give them to me, and I would put in a little piece of coral sample. Tom was my diving partner in Eilat for a week, just doing these transects. Then we went south to the Sinai. This was shortly after the Six Day War, so the area was still mined. Today, the trip only takes three hours to drive from Eilat to Sharm-el-Sheikh. But then, there were no roads, so we drove along the beach, accompanied by armed soldiers, who had volunteered for the job, in armored vehicles; the place was still aflame and dangerous, lots of field mines. It took us about a week to get there. We dived at different spots along the stunning reefs of Sinai, doing transects. In retrospective, when you think of it, we must have been mad indeed…

After returning to Stony Brook Tom invited me to Jamaica, to quantitatively study the community structure of the Discovery Bay corals. This was another “first” for me – after my first trip to the U.S., first time of encountering television and first time feeling the delight of snow... being invited by Tom Goreau, ‘the guru of coral reef research’, was a great honor. I arrived at his lab to find a whole gang of enthusiastic, hardworking graduate students, among them was Judy Lang, Jeremy Jackson, Dave Barnes, Henry Reiswieg, and Bob Kinzie. Today, they are all famous coral reef biologists. All were Tom’s students or descendants if you like.

On in my first day at the lab, Tom already decided to teach me the deep corals of Jamaica. It was quite stormy, that day, with rough seas. I can’t stand rough seas! White and pale from snowy New York at Christmas, I arrived straight into the tropical Jamaican heat. Tom dove, dropping like a stone to 60 meters, and I followed headlong. Diving was fanatical there at that time. Well, perhaps I exaggerate - maybe it was 50 meters, but still deep. I tried to keep up with him, looking up from time to time towards the distant light. Would I ever surface again? I was fine in the water, but seasick immediately we got back in the boat. He drove me hard, to the limits. We surveyed these line-transects exactly as we had in Eilat, at different depths, diving twice a day for two weeks. Each time we returned to the lab, Tom would complain about terrible stomach pain, go to his room and close himself in. We believed he had a stomach ulcer. I thought at the time that the reason for his pain was his eating habits: In order to regain his energy after diving he used to eat those terrible fish in cans – what do you call them? *Sardines?* Yes, oily sardines and hard-boiled eggs, was what he was always eating…. We continued to work hard every day. Tom felt wonderful under water; no pain, very happy. Out of water he suffered terribly

Three months after returning to Stony Brook, Tom called me from New York to tell me that he had been hospitalized and asked if I could come to visit him. He wanted to talk about our work in Jamaica. I went to see him and was told that he had stomach cancer.

A week later, he was gone.

Tom was to have given a paper on the coral reefs of the Sinai at the meeting that David Stoddart and Sir Maurice Yonge organized in London in May 1970 ("Regional variation in Indian Ocean Coral Reefs"). While still in hospital, Tom asked me to go instead. "Would you go?" he asked. I said, "Of course!" He requested Stoddart to invite me in his place to talk about the coral reefs of Eilat. This was my first international symposium, which resulted in my first paper on coral reefs. Sir Maurice Yonge paid a tribute to Tom's memory, summarizing his huge contribution to coral reef science. The entire conference was dedicated to Tom Goreau's memory.

My first publication was thus on coral species diversity in Eilat. The coral survey methodology used in this study became what people now sometimes call - "Loya transects". I am still amazed to see that in many reef monitoring programs these very simple but highly informative and efficient methods are still being used with the latest photography and video techniques.

After completing my Ph.D. in summer 1971, as the first Ph.D. student to graduate from the Ecology and Evolution Department at Stony Brook I obtained a post-doc position at Woods Hole Oceanographic Institute with Howard Sanders and Fred Grassle. From diving in warm tropical waters, I went on to diving in the cold waters of Buzzard's Bay with Fred as my buddy. As you know Betsy, January in Woods Hole is not the most pleasant time for diving. It was bitterly cold under water. We studied species diversity of polychaetes settling in mud trays polluted by oil, compared with clean mud trays. The experience and knowledge I gained from this study was to help me greatly in my studies on oil pollution effects on corals. In October 1972 I began my work at the Zoology Department of Tel Aviv University as a lecturer, "closing the circle" in the same place that I had started my academic career, and where I still continue to work up to the present.

To return to the detailed data set from Eilat: I was now able to use these data in different studies, as baseline information for comparison with what had happened to the reefs over the next 20 to 30 years. The initial data were obtained in 1968 and 1969. In 1970, there was an extreme low tide in Eilat – totally unpredictable, never having happened before. Water dropped to 40 cm. below the reef flat, exposing the reefs to 40ºC for four days in a row, between 11 a.m. and 3 p.m. The result was 90% mortality of the shallow reef corals along the Sinai beaches, as could be ascertained from comparison with my earlier records.

Then another catastrophe occurred…of man-made origin. Many oil-transporting supertankers arrived in Eilat between 1972 and 1975 (after the Yom-Kippur War), mostly from Iran, at that time still under the rule of the Shah. From Eilat the oil was pipelined to the Mediterranean and from there it was transported to other countries. Two or three large oil spills occurred every month, for five or six years. Unfortunately, the Nature Reserve is situated very close to these oil terminals and during such oil slicks it was covered black by crude oil. It was disastrous. What does oil do to corals? At that time there was little information available. What could be found in the literature, in brief, was something like: "I visited a coral reef near an oil terminal in Saudi Arabia, where I saw lush coral growth. Conclusion: – oil does not harm corals." … The author's address: – Shell Oil Company, Houston, Texas… This reminded me of Sanders' oil pollution studies in Buzzard's Bay, where oil companies tried to re-examine his studies in an (unsuccessful) attempt to prove that no harm had been done to the environment.

Since so little was known, at that time, about the life history of corals, we had no direct evidence to prove that oil harms corals. Oil may be spilled above coral heads and not appear to affect them. However, although it does not kill them instantaneously, it does harm what goes on inside them. At that time, we were also studying coral reproduction. In the textbooks we read that most corals reproduce by brooding, releasing planulae larvae. We knew so little then on the mode of reproduction of stony corals. We began to study the reproduction of *Stylophora pistillata*, which is

the most abundant coral in Eilat. We tried to capture the planulae by putting plankton nets over coral heads. I remember well the first we time we saw under a stereoscope how the *Stylophora* planula looks like. It was one night in January 1974; definitely an exciting moment. It looks trivial today, but then it was in fact a major drive in our research. At that time, I already had many graduate students, who did the main work. Buki Rinkevich for example, worked on oil pollution effects on *Stylophora* *… He was one of your first graduate students, wasn't he?* Yes, both Buki and Hudi Benayahu, working on soft corals, were my first graduate students. In the coming years many more joined the crew.

Since we already had data on growth rate and knowledge on the reproductive biology of *Stylophora*, we did most of the experiments on *Stylophora*. Our findings gave us many reasons to worry about the fate of our coral reefs. In a series of field and laboratory experiments, we showed that crude oil was harming corals by affecting different stages in their life history, mainly their reproductive system. We found that fewer eggs, sperm, and planulae were produced per coral head in areas affected by oil pollution, compared with colonies in clean areas. Moreover, during the reproduction season, colonies aborted immature planulae, which failed to settle. To make a long story short, even today, over 25 years after the oil spills and the fatal low tide, the Nature Reserve of Eilat has still not returned to its former coral community structure. In 1969, we had in the Nature Reserve of Eilat high diversity of 15 different coral species per 10 m transect in shallow water; today, there are only about seven species.

The chronic oil spills that occurred every month, for years, caused a community phase shift and the shallow reefs of Eilat's Nature Reserve were taken over by algae. The situation was and still is very different, however, in other places along the Sinai coasts, where corals suffered similar mortality during the fatal low tide, but were free from oil pollution. Within three years, these clean reefs had more colonies and more species, as recorded in the same 10 m transects. With time, 4-6 years later, the coral community in the non-polluted reefs recovered and gained its original composition. It took, however, an additional 20 years for the non-polluted area to regain its original coral living cover. In fact, today, coral living cover in the pollution-free, shallow reefs of the Sinai, is even higher than before the devastating low tide. I regard this example of a long-term field study as my most important contribution to coral reef field studies.

Stylophora became the major species to be studied in my lab, for years to come, on many aspects of its life history and physiology including: population dynamics, reproduction strategy, growth rates, colony integration during regeneration, pollution effects, predation (by *Drupella*), competitive networks, histocompatibility, spatial heterogeneity and fish diversity, relationship with ectosymbionts (*Dascillus, Trapezia, Hapalocarcinus*), bioerosion by boring organisms (*Lithophaga*, boring sponges), relationship with its endosymbiotic zooxanthellae, energy budgets (autotrophy vs. heterotrophy), calcification and productivity, hydrodynamics (diffusive boundary layers), Heat Shock Proteins, in situ colony stress assessment (using PAM), bleaching effects and others. There is no way I can describe to you now the results that came out from all this research. I hope to be able to summarize one day, perhaps in a book, the significance of *Stylophora pistillata* in reef research. I cannot refrain from saying that this is definitely my favorite coral species … "since it fed my graduate students for many years".

For my first sabbatical in 1979, I was privileged to win a Queen Elizabeth Senior Fellowship to work at the Australian Institute of Marine Science (AIMS) and at James Cook University. Michel Pichon and Carden Wallace were there at that time, leading an enthusiastic group of graduate students including Bette Willis, Peter Harrison, Russ Babcok, Vicki Harriott, Andrew Hayward, Jamie Oliver, Gordon Bull and others, many of whom were studying coral reproduction. Today, several of them are internationally recognized leading coral scientists.

I had a very enjoyable and stimulating time in Australia, learning from the field experience and frequent constructive interactions with students and faculty. One of my publications from that period deals with tumors in corals. In a way, it bears some relation to what I am studying today. I participated in several cruses led by my "mate" Charlie Veron, together with good friends like Terry Done, Carden Wallace and many others, cruising all over the Great Barrier Reef. I also spent a lot of time in the field with Roger Bradbury and Russ Reichelt (who became the Director of AIMS 15 years later), doing line transects for a study of coral community structure in several GBR reefs. These studies yielded two joint publications. It was an incredible year. Later, John Bunt, then Director of AIMS, invited me to visit the Institute several more times. At that time, AIMS was focusing on a large-scale study of coral communities along an inshore offshore transect. This resulted in a very productive and successful project, due to all those enthusiastic young scientists recruited at the time by AIMS, all working within the same reef region, on a wide variety of exciting aspects of coral reef research. Since then, AIMS and James Cook University have grown rapidly and become a world focus for coral reef research.

In science, my major contribution is to the field of biology and ecology of Red Sea stony corals. To date, I have published over 130 papers on corals from the area including a book on coral reefs (in Hebrew, now also translated into German and Dutch, together with Ramy Klein, my graduate student then and very special friend and colleague today). A great deal of this publication record is largely due to the excellent group of students that joined my laboratory throughout the years. It was working at the Great Barrier Reef, however, that gave me a wider perspective of the dimensions, complexity, immense diversity and significance of coral reefs. I had visited and worked in many reefs around the world, but none, I believe, matches the GBR with its colossal 2300 kilometers of reef systems. Charlie Veron describes it as 'the biggest structure ever made by living organisms on Earth'.

One of the most amazing discoveries to excite many coral reef researchers was the spectacular annual event of coral mass spawning in the GBR. This is one of the most dramatic events on the reef's calendar. More than 150 species of corals release their gametes after dark, five days after the full moon in late spring. The "James Cook reproduction gang", that fantastic group of students I mentioned before, first observed this incredible phenomenon only in 1982. During one of my visits to Australia, I heard about this from them. I was astonished not only by their amazing discovery, but also because our own studies on reproduction in Red Sea corals had indicated exactly the opposite pattern. Although in the Red Sea we have the same coral species as in the GBR, "our" coral species reproduce in different seasons, different months, or different moon phases within the same month; that is, they show clear temporal reproductive isolation. This was the Ph.D. dissertation subject of my student Yechiam Schlesinger. It is easy now to report the facts, but much harder to determine them. Most of the Red Sea coral species reproduce during summer, starting in May and continuing through September with almost no overlap in their reproductive timing.

When met up again with my Australian friends and we exchanged our coral "sex stories", their story was somehow more *… dramatic?* Yes, definitely, I'd even say "sexier". Really stunning! A good story for *Science* magazine, which is, indeed, where they published it in 1984. We decided to wait with our contrasting story until after their publication had come out. To tell the truth, I was not sure that our own study would even get into *Science*, if our story was simply that Red Sea corals exhibit temporal reproductive isolation. Such a story could be interesting but was certainly not so sensational and would probably have a better chance of acceptance if the GBR story made it first. Temporal reproductive isolation makes sense evolutionarily and ecologically (less inter-specific competition, higher chances of successful fertilization, less hybridization; but I'll not go into that now); *so, it is not "earth-shattering" compared with the GBR astounding tale of the "coral sex orgy".* We all know that the editors of *Science* like "contradictory stories", to provoke discussion and

stimulate further and broader research. In short, we succeeded, and our story came out in **Science** in 1985. I am sure that you are familiar with both these publications, which I believe stimulated many additional studies on coral reproduction. Since then, coral reproduction research has increased exponentially in many areas as has our knowledge of the subject.

Coral reproduction continues to be a major subject in my lab, not only of Red Sea corals but also, of Mediterranean corals. For example, we made the cover story in a recent edition of *Nature*. I'll tell you about it, briefly. Probably one of the reasons why corals are among the most successful organisms in the marine tropics is due to the high plasticity of their reproductive patterns. In a general and simplistic way of describing it, they exhibit either hermaphroditism (where both sexes occur in one coral) or gonochorism (separate sexes). They may be hermaphroditic or gonochoric brooders (with internal fertilization), or hermaphroditic or gonochoric broadcasters (releasing their gametes into the water), where external fertilization takes place. Within these general patterns there is a wide variety of different patterns that we'll not go into here. Corals, however, exhibit, also asexual reproduction, such as fragmentation, and polyp bailout. Our cover story in *Nature* (May 1997) reports on yet another asexual means of reproduction in corals, which we termed polyp expulsion. This finding was first observed by two of my graduate students, Esti Winter (in the Red Sea) and Maoz Fine (in the Mediterranean). We noticed that in extreme and unfavorable reef areas with a lot of sedimentation and wave action, some corals like *Favia* (in the Red Sea) and the encrusting coral *Oculina* (in the Mediterranean) are quite abundant, while other corals are scarce. We wondered how and why these specific corals managed to occupy such areas, especially because they don't fragment like branching fragile corals. One could expect that asexual reproduction would have an advantage over sexual reproduction in such a harsh environment that induces wastage of gametes

We discovered that in harsh environments, corals that do not fragment are able to expel whole polyps from the colony. In these corals, some polyps, including their calices, rise up elongated calcareous stalks before detaching, and "taking off". *So, the skeleton grows too?* That's right, these polyps contain both tissue and skeleton*… I've seen that! …*You've seen it, of course! I've seen it too many times, but thought it was some sort of a tumor or an abnormal growth. I had never given any thought to the significance of this phenomenon; why, when and how it takes place. That's what I wanted to show you Betsy, in this cover photo: a polyp just taking off from the coral surface. *Wow!* The lesion left on the surface of the colony regenerates within two weeks. You can clearly see the hole left in the mother colony, where the polyp had resided. The expelled polyp usually falls near the mother colony and grows into a new colony. *That is incredible!* Yes, I think so too. Polyp expulsion differs from the polyp 'bail out' process (described by Sammarco), where dying corals release whole polyps from their calices, some with planulae. Polyp expulsion occurs in healthy corals, and whole polyps, including their calices, are expelled. You need to have wonderfully "crazy" graduate students like Maoz, who spends many hours underwater, to be able to be there and witness the very moment an event such as polyp expulsion occurs.

Another subject, which I have been pursuing in my lab, is the use of stony corals as proxy indicators of regional climate change. This was the Ph.D. thesis subject of Ramy Klein, who worked on the sclerochronology of contemporary and fossil Red Sea corals. As you know, skeletal bands of alternating high and low density in *Porites* coral colonies have been widely used to record their growth history. Ramy found periodic sequences of yellow-green fluorescent bands in fossil corals he collected from Quaternary reef terraces in southern Sinai. Collaborative work on the fossil coral samples with Peter Isdale from AIMS, Australia, yielded another *Nature* cover-story in May 1990. In this study we provide evidence that during the late Quaternary reef-forming peaks, the climate in the Sinai was wetter than today's extreme desert conditions, with possible summer rainfall regime! Incidentally, the beautiful cover photo accompanying this article of the Sinai fossil terraces at Sharm-el Sheikh, as well as the 'polyp expulsion' cover photo, were taken by our departmental

photographer and my good friend Amikam Shoob. Amikam proves indeed that "a good photo is sometimes worth more than a thousand words".

After becoming a Full Professor (1985), I was asked to take my turn as Chairman of the Zoology Department. All academic-administrative posts in Israeli Universities are based on a rotation system. During this period, we also needed to elect a new Dean for our Faculty of Life Sciences (every five years). Two members of the Department of Plant Sciences were running for the post. The tenured Professors of the faculty elect the Dean. Three weeks before the elections one of the contestants retired from the race. At that time (1990), our Faculty was going a similar process to that taking place in many universities around the world, where Molecular and Cellular Biology were taking over the Organismic Biology Sciences. It was a critical point for the fate of Organismic Biology studies in our Faculty and various members approached me to enter the race and save the "homeland", as they said. I had no plans whatsoever to become Dean, which usually takes a year of political canvassing. I had a very successful lab, very interesting and fulfilling research and felt still too young to run for such a position and take on the vast commitment. Our Faculty numbers 125 members and about 150 technicians and administrative staff, incorporating five Departments: Plant Sciences, Zoology, Molecular Microbiology and Biotechnology, Cellular Biology, Biochemistry and Neurobiology have around 200 M.Sc. students and 130 Ph.D. students. In a family consultation, my wife said: "I have never stopped you from doing anything, why should I stop you now?" My graduate students then (Micha Ilan, Ramy Klein, Avigdor Abelson and Ofer Mokady) said "go for it, we are behind you". In the end, I gave way to popular pressure and decided to raise the "Organismic Biology flag". The long and short of it was- that I was elected by a vast majority. Within two weeks, I had suddenly become Dean of a very large Faculty, something I had never even considered before. I remember the following days, waking up in the morning, holding my head and asking myself "What do I need this for"?

Today, three years after completion of my Deanship, I would still do it again. I believe that I achieved the major goals I had worked for. This is not the place, of course, to recount this most interesting period in my life. I would, however, like to mention the most important achievement of this period. During my post as Dean I managed to obtain from the government 25 permanent fellowships directed to a new to be M.Sc. program to Ecology and Environmental Studies. *But you must have had to do some politicking – how did you convince non-scientists that this was important?* Oh, it was a very long and complicated process. Starting within our Faculty, I had to convince first our Departments to approve the establishment of a new academic program in ecology. This was not easy, because it stood in conflict with their immediate interests in the thin University "budgetary cake" Then I had to compete with other programs, proposed by my "rival" Deans representing other Faculties; to convince the University leadership that our program was unique, timely and had the best chances of being approved by the 'National Council of Higher Education' (NCHE); to go through many other academic procedures, which I'll not bore you with, and finally, if successful in the internal University race, to compete with other academic institutions in the NCHE. In the Israeli system, the government channels funds to the NCHE, which allocates it to the Universities. Each University gets its share in accordance with its number of students, novel teaching programs it proposes, and many other academic criteria. Clearly, there is fierce competition between academic institutions on these funds, which are their major source of support. My main task, therefore, was to convince the NCHE that TAU was the best University in the country for ecological studies (which is true). Needless to say, that they were convinced. We were generously granted with additional faculty positions, student fellowships, equipment and more. It took me almost three years of hard work to complete the whole mission. We now have a very strong program in Ecology and Environmental Studies, including a new M.Sc. degree in that field. Currently, there are more than 50 M.Sc. graduate students in this program. Many of the outstanding students graduating this program continue their Ph.D. studies in related fields dealing with environmental problems. I feel that this was my greatest

achievement and contribution to the advancement of ecological and environmental studies at TAU and to a large extent in Israel as a whole.

Coral reefs had been the most important thing in my "scientific" life, but now I began to learn that there are other things too… *I know for you your family is important.* Of course, it is. I have three children. *I've met the "little urchin" who has eyes like you when I visited Israel in 1990; he must have been six or seven.* Yes, his name is Assaf; he is now 14 and fills our lives with joy. We call him our own "grandson", because of the big age gap (12 years) between him and our adult children, who at times play the role of "acting parents". Our daughter Yael was born in New York. She is 26, an ambitious, very busy, hard-working lawyer. Our middle son, Shay is 25, a pianist, a real scholar, studying Musicology at the Music Academy of Tel Aviv University (TAU). My wife Shosh earned her Ph.D. in Microbiology at TAU and works at the Medical School at TAU on AIDS research. We are both collaborating now in a large consortium composed of many scientists, from different biological, chemical and medical fields, in a large-scale project dealing with novel bioactive compounds derived from coral reef organisms. A great deal of whatever I have been able to achieve in my academic life is due to Shosh, who has supported me all the way…. *Certainly, your scientific family is important too – just the way you've talked about your graduate students.* Absolutely. I'm very proud of my present and past graduate students, four of whom have joined our faculty at TAU, after completing their post-doc training at U.S. universities. Others obtained positions in other Israeli universities, research institutions, government agencies and NGOs dealing with environmental protection and conservation. As a matter of fact, to date, 25 M.Sc. and 14 Ph.D. students have graduated under my supervision. It is very gratifying to watch my past graduate students developing their own successful scientific careers, gaining international reputations, and leading busy labs with crowds of graduate students, most of whom significantly contribute to coral reef research.

I'm proud to have been a student of Larry Slobodkin, and a descendent of the Hutchinson School. You are probably familiar with the Hutchinson "scientific family tree" (published in Limnology and Oceanography) – including many famous ecologists like Deevy, MacArthur, Riley, Sanders, Slobodkin, Edmondson, Goreau, Odum, Paine, Kohn, Smith, Klopfer, Hartman, to mention a few. I appear on the Hutchinson tree as a tiny leaf branching from the Slobodkin trunk.

You're not a leaf now; you are a branch with lots of leaves on it! Yes, today, 30 years after my first steps in science, it is wonderful to observe how the Hutchinson tree has grown to produce so many generations of ecologists all over the world. As to my "scientific family", I must say that I am very happy to have already "grandchildren" in coral reef science.