



## Preface

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A volume on Atlantic-Mediterranean deep-sea and cave sponges dedicated to Klaus Rützler and Jean Vacelet to celebrate the publication, sixty years ago, of the first works on the biodiversity of marine caves (Laborel & Vacelet 1958; Russ & Rützler 1959).

In the fifties, to observe life in an underwater cave was a real adventure. SCUBA-diving was just in its infancy and at that time, little was known about marine life *in situ*. The 1<sup>st</sup> underwater movie ever produced was a film on marine life, filmed in 1939 in the Antilles by the Austrian Hans Hass, a scientist fascinated by coral reefs. He was followed in 1942 by a group of French marine officers, Philippe Tailliez, Jacques-Yves Cousteau and Frédéric Dumas, who produced several underwater movies. The same year, Emile Gagnan and Jacques-Yves Cousteau designed the first successful and safe open-circuit SCUBA. After the 2<sup>nd</sup> World War, there was a burst in the use of SCUBA for oceanographic research, thanks to Pierre Drach, Jean-Marie Pérès and Jacques Picard, in France, and to Rupert Riedl, in Austria. In this context, the young students Jean Vacelet and Klaus Rützler began respectively in Marseille and in Vienna a long career of naturalists.

Jean Vacelet was born in 1935 in Marseille, France, on the Mediterranean seaside. During his youth, he was fascinated by insects and the “Souvenirs entomologiques” from the famous French naturalist Jean-Henri Fabre (1823-1915). Therefore, he joined the University of Marseille in 1954. The same year, he participated with his friend Jacques Laborel to a SCUBA-diving course in St Florent, Corsica. The year after, both returned to St Florent as diving instructors! In the meantime, a course in oceanography started in Marseille, taught by Jean-Marie Pérès and Jacques Picard, two French pioneers, with Pierre Drach, of the use of SCUBA for the direct observation of marine life. Jean Vacelet decided to follow this new speciality and soon began to work on marine organisms. At that time, Jean-Marie Pérès and Jacques Picard were studying the distribution of species in the Mediterranean Sea and lacked a sponge specialist. Jean Vacelet then decided to specialize in this animal group. He learnt about the classification of Porifera with the French sponge biologist Claude Lévi. He defended his Master's dissertation in 1959 on the ecology and systematics of keratose sponges (Vacelet 1959). With Jacques Laborel, he decided to make an inventory of animals within a small cave accessible from the coast without a boat, in Niolon, in the North Bay of Marseille. They published then their first work describing the distribution of species from the entrance to the darkest parts of the cave (Laborel & Vacelet 1958; 1959). In this cave, Jean Vacelet discovered a new hypercalcified sponge, *Petrobiona massiliana*, which was supposed at that time to belong to a group only known from fossil records (Vacelet & Lévi 1958). The detailed morphological, histological, embryological and ecological description of this species was the subject of his Ph.D. (Vacelet 1964). This finding influenced most of his later research work and convinced him of the necessity to explore marine caves throughout the world, from the Mediterranean Sea to Tuléar (Madagascar), New Caledonia, Hawaii, Jamaica, Guadeloupe etc. (Harmelin *et al.* 1985). He demonstrated the importance of having a holistic approach of an organism, applying what is known today as integrative taxonomy. He also had the opportunity, from 1960, to explore the deep sea thanks to the 1<sup>st</sup> submersible built by Cousteau (Laborel *et al.* 1961; Vacelet 1969). Using that new device, he observed some analogies between cave and deep-sea communities. In 1990, this hypothesis was reinforced by the discovery near Marseille of the 3PP cave, a habitat trapping cold water all year round, and where were found a hexactinellid and a tiny cladorhizid sponge, two groups only known from deep-sea ecosystems. Rather unexpectedly, this cladorhizid sponge was found to be carnivorous, which led to a better observation of similar deep-sea organisms (Vacelet & Boury-Esnault 1995; Vacelet 2006). Working at the Station Marine d'Endoume since 1957, Jean Vacelet is an example of stability, working in the same laboratory on the same topic for more than 60 years. But his network of

collaborators spreads throughout the entire world, as he has collaborated with almost all sponge researchers worldwide and participated in so many expeditions, conferences and workshops, where he often met Klaus Rützler.

Klaus Rützler was born in 1936 in the alpine Tyrol province of Austria, a land-locked country. As a young boy he dreamt with “Das gläserne Unterseeboot” from Nora Widemann, and also with “Vingt mille lieues sous les mers” from Jules Verne. In the early 1950s, he made his first dives in the cold lakes of Austria, building his own diving tanks following the books of Hans Haas and Jacques-Yves Cousteau. His first dives in the sea were in the Adriatic and then in Elba and Corsica islands. He joined the University of Vienna in 1955, where he met Rupert Riedl, who at that time studied the distribution of animals inside and outside intertidal caves from the Gulf of Sorrento (Italy) and who had a great influence on Mediterranean marine ecological research. Klaus Rützler became in charge of the Porifera. After his first publication on marine caves (Russ & Rützler 1959), he kept learning sponge taxonomy with the Italian specialist Michele Sarà, and began his Ph.D. thesis on the sponge biodiversity of the Adriatic Sea (Rützler 1965, 1966). Before the end of his Ph.D., he undertook “the 1<sup>st</sup> Austrian Indo-Pacific Expedition” with his friend Ernst Kirsteuer. Lacking the necessary funding, they could not go to Seychelles, but they reached the tiny island of Tany Kely, off Nosy-Bé (North of Madagascar). They spent 10 months there (1959-1960) living like “Robinson Crusoe”, but Robinson Crusoe with a microscope! They managed to build a small laboratory with the help of the French Oceanographic Station of Nosy-Bé and worked on sponges and nemerteans, photographed underwater plants and animals and produced a one-hour documentary film that was shown on Austrian TV. Klaus Rützler acquired there a fantastic experience of field work. Coming back to Vienna, he defended his Ph.D. in 1963 and, soon after, he had the opportunity of a post-doc in Ernst Mayr’s Laboratory at Harvard’s Museum of Comparative Zoology, to reorganize the marine invertebrate collections and participate in a 3-months cruise on the “Te Vega”, during the “International Indian Ocean Expedition”.

After a few trips back and forth to Europe, he obtained a permanent job in 1965 as a sponge expert at the Smithsonian National Museum of Natural History in Washington, in the newly created Department of Invertebrate Zoology. Working in a natural history museum, not a marine science institute, he nevertheless immediately investigated the opportunities to conduct field research in the Caribbean. After several field trips in the Caribbean area, Klaus Rützler discovered his ideal place to found a Marine Field Station: Carrie Bow Cay, in Belize. From February 1972 until today, against all odds, fire, hurricanes, and lack of funding, this research station has been a place of fruitful collaboration and still provides efficient facilities for all those who study coral reefs in the field rather than in theory (Rützler 2001). In November 1985, he organized the 3<sup>rd</sup> International Conference of Sponge Biology in Woods Hole, MA, USA, which allowed the spongiologist community to increase collaborative works and which left unforgettable memories (Rützler 1990).

From Tany Kely to Carrie Bow Cay, Klaus Rützler, fascinated by coral reefs and mangroves (Rützler 1988), devoted all his energy and talents to coordinate long-term programs on these ecosystems (Macintyre *et al.* 1982; Rützler & Macintyre 1982; Rützler 2009) and on Porifera (Rützler 2012).

During the 2<sup>nd</sup> part of the 20<sup>th</sup> century, there was not only progress in SCUBA diving but also in Transmission and Scanning Electron Microscopy. Both Jean Vacelet and Klaus Rützler have integrated these new techniques in their research. In the late 1980’s, a five-year collaborative research between Brussels, Marseille and Washington DC led to the publication of an Atlas of Sponge Morphology published by the Smithsonian Institution (De Vos *et al.* 1991).

The necessity of collaborative works among sponge taxonomists emerged in the 1980s, when Shirley Stone, curator of the sponge collection at the NHM in London, organized the first workshop on NE Atlantic species on Sherkin Island. The aim of that workshop was to discuss the systematics of sponges in order to reach a consensus of opinion. The 1<sup>st</sup> step was to obtain a clear definition of the terminology used to describe species. From 1986 to 1992, seven workshops (Marseille, Genève, Dinard, Genova, Bruxelles, Blanes, Harbor Branch) were organized, to which Klaus Rützler and Jean Vacelet contributed actively. The most important result of these meetings was a Sponge Thesaurus of sponge morphology, illustrated by Molly Ryan and published thanks again to the Smithsonian Institution (Boury-Esnault & Rützler 1997). In the following years, both Jean Vacelet and Klaus Rützler largely contributed to the *Systema Porifera* (2002) and to the World Porifera Database. While Jean Vacelet was interested in sponges with a hypercalcified skeleton (Vacelet 1985), Klaus Rützler was interested in sponges able to excavate calcareous substrata, important actors of the coral reef ecosystem (Rützler 1975)! Both were also working on sponge and coral diseases, and the role of microsymbionts in Porifera.

Driven by their passion for diving and taking pictures *in situ*, Klaus Rützler and Jean Vacelet have been witnesses of a tremendous evolution in marine science and technology during the last 60 years, and yet, they have continuously adapted and kept up to date with new concepts and new technologies. Their long list of publications is a reflection of their capacity to integrate the continuous progress of Science. This volume, dedicated to both of them, is a proof that there are still new sponge findings to be made in caves, coral reefs and the deep sea. Besides, all contributors of this volume are witnesses of their friendship and support of the spongiologist community.

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