OceanoScientific Expeditions 2023-2030

Wednesday 17 January 2024

Putting Science at the service of Humanity

As announced in the weekly Newsletter of Wednesday 10 January, on the occasion of the presentation of the new Board of Directors, this week we are talking about the scientific objectives of the OceanoScientific association for a seven-year cycle, from 2024 to 2030 inclusive. In the Newsletter of Wednesday 24 January, we will reveal the purpose of the OceanoScientific actions and eponymous expeditions. From the creation of the OceanoScientific Program on the 14 November 2016 to the *OceanoScientific Mediterranean Contaminants Expedition 2020*, the priority objective has been to collect physico-chemical oceanographic data, notably during the solo circumnavigation of the globe to carry out the *OceanoScientific Expedition 2016-2017*, which was the first campaign to collect scientific data at the Air-Sea interface under sail without CO2 emission below the 40th South, in the Antarctic Circumpolar Current, below the three great continental capes: Good Hope, Leeuwin and Cape Horn. Yvan Griboval, President of the philanthropic association of general interest OceanoScientific, Director of the expeditions and skipper of the oceanographic platform *LOVE THE OCEAN*, adapted from a Lagoon 570 catamaran, presents these objectives below in the form of an interview, approved by the members of the Board of Directors.

The *OceanoScientific Coral Reefs Expeditions 2023-2030* will focus on studying the sponges that populate France's reef heritage. All of this will be carried out by a sailboat that will be self-sufficient in energy, without CO2 emission. The aim will be to collect tiny samples, without killing or harming the marine organisms studied, for initial DNA sequencing on board the catamaran *LOVE THE OCEAN*, using the molecular genetics cabin designed by our Vice-President, Christian Siatka. Photo Thierry Pérez, CNRS Research Director at the Station Marine d'Endoume - IMBE (Marseille - France).

Question - Why are you now interested in marine reef organisms?

Yvan Griboval - *"First of all, it is important to point out that we haven't given up collecting physico-chemical data. In fact, a fourth version of the OceanoScientific System (OSC System) has been developed and we intend to install it as soon as possible on board the catamaran Lagoon 570 LOVE THE OCEAN. However, this is no longer the main focus of our OceanoScientific Expeditions.*

With this in mind, we are currently in the process of equipping our Lagoon 570 with the OCEANO VOX system developed by Antoine Cousot in close collaboration with Thierry Reynaud, an Ifremer researcher who played an effective role in developing the OSC System and supervising the OceanoScientific Around the World Expedition 2016-2017. Thanks to funding from the PURE OCEAN foundation as a result of a call for projects won in 2023, we will be testing two OCEANO VOX boxes over long ocean distances to enable Antoine to finalize this product. It is ultimately intended for pleasure sailing boats, as part of a vast operation led by Lucie Cocquempot, the bearer of this winning project: "Citizen into Science" in her capacity as Oceanographic Observation Coordinator at Ifremer, which has been encouraging participatory science for almost twenty years.

These physico-chemical data are of prime importance when it comes to assessing anthropic pressure on marine biodiversity and the impact of Man on Nature. Consequently, the fact that the Lagoon 570 LOVE THE OCEAN has such an innovative equipment is a real asset to be leveraged for the benefit of institutes and researchers who devote significant resources to these studies. However, raising funds for this purpose is complex...

Nevertheless, from 2018 to 2022, two reflections have been progressively linked. The first relates to feedback from the many conferences held to report on my solo circumnavigation as part of the OceanoScientific Around the World Expedition 2016-2017.

Whether I was talking to school students from upper classes of elementary school - our priority target in those years - or to adults, every time I mentioned the scientific mission carried out on behalf of our partners: Ifremer, Météo-France, IRD and CNRS, the same question came up: "What is the use of what you have collected?"

I admit to felt a certain unease when I read the waning interest in my adventure in the eyes of my interlocutors, whatever their age; when I explained that these scientific data collected far from land in hostile seas, by implication at the risk of my life, were destined to feed databases totally abstruse to the public. At best - and this was the initial commitment of the excellent researchers who supervised the OceanoScientific Expeditions in question - the result would have been a scientific publication aimed at the "few" scientists concerned by the subject. A "few", because you can't reasonably compare the audience of a scientific publication with that of a general news magazine.

When I explained that these oceanographic data, which are rare and of great scientific value, have no market value; that the researchers concerned don't pay a single euro to access and use it, or even to make a significant contribution to funding the campaigns used to collect it, my audience's already flagging interest turned frankly critical on the theme: "All that for this? ...".

This observation made us think hard.

Indeed, one of the aims of the OceanoScientific Expeditions is to use the maritime adventure of its innovative scientific sailing missions in little-known and little-visited maritime zones, to raise the awareness of the widest possible public, so that everyone takes an interest in the Ocean, with the aim of respecting it, preserving it for future generations, and loving the Ocean. Hence the name of our catamaran: LOVE THE OCEAN. Without easy public support, the objective is not achieved.

It was during the first confinement, trapped by the situation in our house in Cabourg (Normandy - France) with a strict ban on treading the damp sand of the immense Normandy beach that the sea uncovers so far away at low tide (what an ordeal!), that

I became aware that the common denominator of Humanity was in fact the fear of illness, the fear of dying, even of growing old.

However, not being myself a scuba-diver and therefore not frequenting the wonders of tropical waters, it was thanks to the research and storytelling talents of Denis Allemand, Scientific Director of the Centre Scientifique de Monaco, that I learned that the marine organisms that populate coral reefs potentially conceal molecules of interest for human health and well-being: dermatology, cosmetology, nutrition. A door opened up on my self-taught journey...

While my first intention, inspired by Denis Allemand's communicative passion, was to take a natural interest in coral, I gradually abandoned the idea of making it the Alpha and Omega of the OceanoScientific Expeditions for a number of reasons, the most decisive of which was a conversation with Gilles Boeuf on Tuesday 8 February 2022 in Brest on the way to Oceanopolis during the One Ocean Summit. It can be summed up in these few words: "Yvan, if you go to the coral reefs, take an interest in sponges as a priority, they are extraordinary animals about which we know little except that they can provide solutions for the benefit of humans through biomimicry..."

All it took was another meeting, this one on Wednesday 17 August 2022, with Professor Thierry Pérez, an internationally renowned sponge scientist based in the Endoume district of Marseille (France) at the Institut Méditerranéen de Biodiversité et d'Écologie marine et continentale (IMBE), to be definitively won over by the sponge virus, those fantastic animals that pioneered the Planet approximately 650 million years ago.

In addition, I was struck at the same time by the resentment of my audiences of all ages, as well as prospective company directors, at the realization that these oceanographic data, reputed to be unique and of great value, in fact had no market value whatsoever. And no matter what you do, no matter what you say, it is difficult if not impossible in our consumerist society to justify fighting for the preservation of something that is, in fact, "worthless" in their eyes...

Thanks to the hypothesis, justified by thirteen Nobel Prizes in Medicine - that is no mean feat! - that marine organisms potentially conceal molecules of interest for human health and well-being, it seemed possible to me to add value to these animals forgotten on their reef rocks, and therefore to mobilize for their preservation, starting by working to know them better."

Question - But the more you demonstrate that what is freely available in the sea has value, the more you will increase the plundering and destruction of coral reef biodiversity, the opposite of the message you want to convey?

Yvan Griboval - *"Indeed, it is a subject that kept me busy many nights. Rather sleepless and anxious ones! An equation that seemed impossible to solve. All the information I*

gleaned here and there showed that the search for molecules of interest from marine organisms required the use of hundreds of kilos, tons of live animals, due to the biological techniques used for this deadly research.

As an autodidact who believes that what is impossible is in fact what has not yet been achieved, I imagined that by resorting to genetics, by working on the DNA of marine organisms, there was probably a way of identifying these famous high value-added molecules ... without killing or harming the slightest animal. On land, I fight every day never to kill spiders or flies, so I'm not going to kill colonies of animals at sea, some of which, like sponges, are reputed to be the first multicellular animals to have taken up residence on our planet...

But when I raised this idea with our research contacts, I was politely advised to "look after my sailing boat and let the specialists do the Science". At least, that is how I perceived it...

Yet, when a self-taught person instinctively feels that there is a path where everyone else sees only the densest jungle, it is sometimes useful to remain attentive to what he or she is going to achieve. Willpower, combined with a healthy dose of stubbornness and enthusiasm, can sometimes open up unsuspected opportunities...

As the world of French oceanography scoffed at my idea of using genetic data from marine organisms, I turned in September 2021 to a geneticist who knew nothing about reef organisms other than the superb images in magazines extolling these enchanting seabeds. So I addressed Professeur Christian Siatka, co-founder and Chairman of the Scientific Board of the École de l'ADN and, among other prestigious positions, member of the Unité Propre de Recherche CHROME (UPR CHROME), ...who last October became Vice-President of the OceanoScientific association and Scientific Director of the OceanoScientific Coral Reefs Expeditions 2023-2030.

When Christian explained to me that a hair, a fingernail clippings or a little saliva can be used to accurately collect DNA of a human being, and that it would therefore only take a few millimeters of sponges to collect their genetic data, from which it would then be possible to study for their molecular characteristics, enabling the search for the "famous" molecules of interest, I realized that a path was indeed opening up in front of me. More like a freeway than a country lane!"

Question - From now on, what are exactly the scientific objectives of the OceanoScientific association?

Yvan Griboval - *"We have two objectives in one. In one because in both cases, it is a question of genetics, of processing, of exploiting the DNA of marine organisms without ever removing them from their environment, without harming them and even less killing them.*

While the maturation of the coral reefs project was gradual and rather long to define precisely, the decision to collect eDNA samples was much quicker.*

As always in the life of a self-taught person, it is the mysteries of Life: the Encounters, that guide us towards certain paths rather than others. In this case, a long exchange on Friday 16 September 2022 in La Ciotat on the sidelines of the Lumexplore Festival with Pierre Boissery, Expert in coastal waters and the Mediterranean coast of the Rhone Mediterranean Corsica water Agency, was decisive. We got closer to each other on the theme: "The Mediterranean is not a dustbin, let's make it known so that this sea with its rich biodiversity is respected as it deserves, rather than being vilified as one of the most polluted maritime spaces in the world, a sea where everything is screwed up, where it would be pointless to fight to preserve its biodiversity...".

Pierre Boissery quickly put me in touch with Professeur David Mouillot, a researcher at the Marbec Joint Research Unit (UMR Marbec) based at the University of Montpellier. It was a professional love at first sight on Wednesday 26 October 2022 in his laboratory, with this pioneer in the use of eDNA to precisely identify species living in coastal marine areas.*

This is how the OceanoScientific association got fully enrolled as a science logistician in the BioDivMed Mission, carrying out its first OceanoScientific eDNA Mediterranean Expedition last July, before committing to a further four-year cycle on this theme in 2024-2027 to create "Biodiversity Sentinels", from Menton to La Grande Motte in our case.*

The BioDivMed Mission 2023 consisted in carrying out a synchronized and standardized inventory of living organisms on the French Mediterranean coast and in the Pelagos sanctuary, using eDNA, under the joint impetus of the Rhone Mediterranean Corsica water Agency, the University of Montpellier and an ANR-funded joint laboratory between the Marbec Joint Research Unit (UMR Marbec) and the company SpyGen.*

This unprecedented and exemplary partnership in the service of marine biodiversity also involved Andromède Océanologie, the Vigilife alliance and two philanthropic associations in Nice: Greg Lecoeur's We are Méditerranée and OceanoScientific.

This exceptional operation was the first fine-scale, synchronous mapping of marine biodiversity from the French Mediterranean coastal zone, including lagoons, river mouths and harbors, to the Pelagos Sanctuary between Corsica and the mainland, in order to better understand the occurrences of fish, crustacean and marine mammal species.

Never before such a synchronized and standardized inventory of marine biodiversity has been carried out in France. OceanoScientific took a record of 104 thirty-minute samples at 52 Stations (see map below) along the 465 nautical mile (862 km) route of

the OceanoScientific eDNA Mediterranean Expedition 2023, dedicated to this unprecedented collection of eDNA* along the French Mediterranean coast."*

Delivery of environmental DNA (eDNA) samples in the port of La Grande Motte in July 2023 as part of the OceanoScientific eDNA Mediterranean Expedition 2023. From left to right: **David Mouillot** (Scientific Director / UMR Marbec - University of Montpellier), **Yvan Griboval** (OceanoScientific Expedition Director & Skipper), Léa Griboval (Speed & Depth Manager), **Pierre Friant** (Second -in-Command & Vanguard-Suzuki Pilot), **Léni Guillotin** (Marine Biologist / Scientific Manager), **Justine Camus** (OceanoScientific Expedition Coordinator / GPS trajectory Manager). Photo OceanoScientific

Question - Listening to you, it is easy to see why the *OceanoScientific Coral Reefs Expeditions* are of interest to Humankind. When it comes to collecting eDNA samples, the interest for human beings seems less obvious. Tell us about it...

Yvan Griboval - *"Indeed, the OceanoScientific Coral Reefs Expeditions will enable genetic data to be used for Health (Human - Animal), Well-being (Dermatology - Cosmetology - Nutrition) and Environmental Services (Agriculture - Aquaculture - Depollution).*

If today, eDNA is a proven tool for identifying species present in volumes of water up to 30 meters deep, which remains a major scientific innovation and has shown that species thought to be extinct still populate the French shores of the Mediterranean Sea, in the near future, Professor David Mouillot, with the help of the SpyGen teams, will be able to identify not only the presence of species on a given site, but also their density.*

This information will become a fantastic asset for inshore fishermen - those involved in "small-scale fishing" - who will be able to put their fishing sites in fallow. In other words, they will be able to reduce fishing pressure for a while on their favorite sites, which are sometimes relentlessly prospected from grandfather to grandson, and let the fish stocks recover, by fishing elsewhere, on the advice of scientists, where the resources are more abundant. It is a win-win situation. For Nature first. Then for the fishermen, both in terms of sales (by accessing a larger resource) and in terms of the guarantee of a sustainable resource. This will enable young people to succeed them without fear of a tomorrow without fish.

In this way, we will promote in the medium to short term the implementation of a sustainable fishing for a sustainable food.

In conclusion, our work will always serve Fundamental Science - since our status as "Oceanography Logisticians" will strengthen French researchers' access to quality scientific data. But our priority now is to encourage what I call "Science of Use", whose aim is to "be of use to Humanity as quickly as possible".

Thus, when young people ask me "Sir, what is the point of what you are doing?", I will no longer see disappointment in their eyes, but on the contrary a definite interest, and even the realization that the Blue Economy's professions of the Future are being created, and that new career paths are opening up for them. This will be the subject of our next Newsletter on Wednesday 24 October..."

* environmental DNA

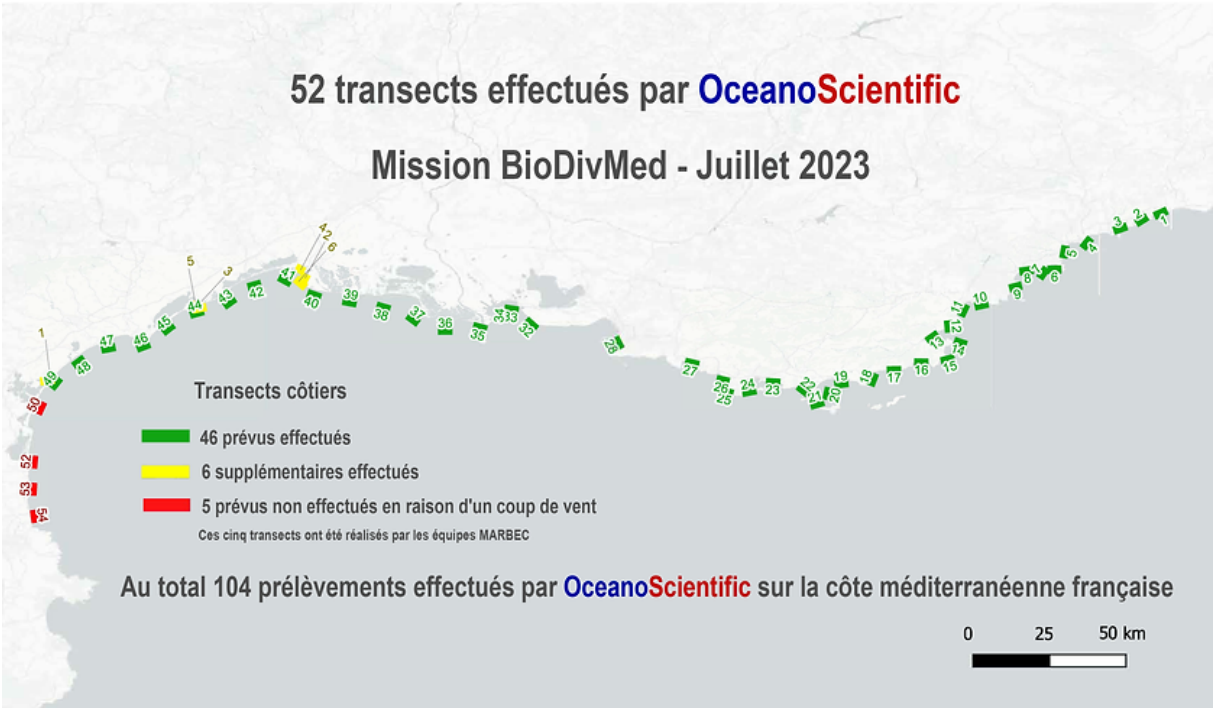

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Photo OceanoScientific