

ILLUSTRATION NOTEBOOK

# SCIENTISTS ARTISTS

Communicate the Ocean



**CAMPUS DO MAR**  
KNOWLEDGE IN DEPTH

CIM  
Centro de Investigación Mariña

Universidade de Vigo



2021 Decenio de las Naciones Unidas  
2030 de las Ciencias Oceánicas  
para el Desarrollo Sostenible

**Promote:**

Campus do Mar e  
Centro de Investigación Mariña da Universidade de Vigo

**Director:**

Daniel Rey García

**Coordinate:**

Noelia Estévez Calvar  
Alberte Román Losada  
Alba Hernández Otero

**Researchers:**

Universidade de Vigo: Tania Ballesteros Otero, Paulo Alcaraz,  
Alberto Gutiérrez, María Fernández Míguez, Ángel Pérez Diz,  
José González, Alexandre Martínez Schönemann,  
Marisela Des Villanueva, Maider Plaza-Morlote.  
Instituto Español de Oceanografía: Francisco Rodríguez Hernández.  
Universidade do Minho: Marisa Gomes.  
Universidade de Santiago de Compostela: Alicia L. Bruzos.

**Illustrators:**

Clara Cerviño, Pablo Rosendo, Fran Bueno, Rena Ortega, José Arcas,  
Xulia Pisón, Laura Tova, 13 Grados, Elga F. Lamas, Eva Agra,  
Rita Cortês, Sofía Venzel.

**Design:**

Viradela Comunicación Dixital

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Tania Sueiro Graña. Graphic Department. Universidade de Vigo  
Kais Jacob Mohamed Falcón  
Mariajo Ilustrajo  
Alicia López Bruzos

Vigo, June 2021

## PROLOGUE

The infinite blue of the oceans remains an unfathomable mystery to most of us. To approach these worlds, comprehend the species, the processes and the oceanic dynamics has been a staple in the history of humanity. In many occasions, scientists live with enthusiasm each discovery or progress in their research, but this effort and passion rarely reaches the public in a comprehensible way. How to convey this knowledge about the oceans to society is one of the great challenges launched by UNESCO through its initiative “Decade of Ocean” that looks to promote *ocean literacy*, in order to increase the knowledge about the oceans and their dynamics.

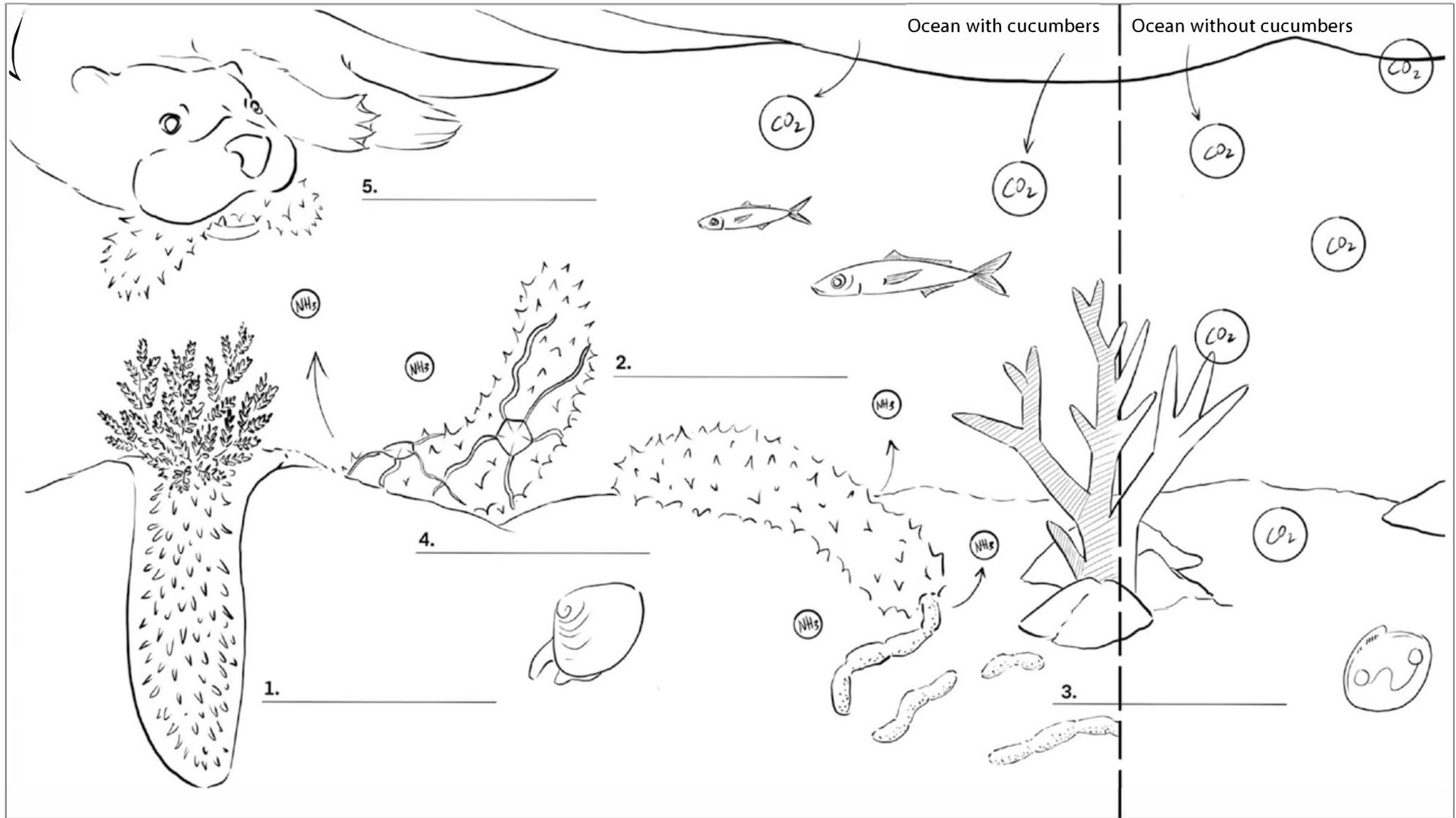
The initiative **Scientists meet Artists** was developed along these lines. It is the place where these very different disciplines meet and dialog. For a year, researchers from mainly the Campus do Mar network: Centro de Investigación Mariña da Universidade de Vigo, Instituto Español de Oceanografía, Universidade do Minho e Universidade de Santiago de Compostela, have been collaborating with illustrators. Each researcher contributed their scientific knowledge, and each illustrator portrayed these concepts and contents in their sheet. This way, each sheet is the result of the common work by distant disciplines, both in their own language, capable of having the oceans as a meeting place. We wanted to convey concepts or specific knowledge related to the marine world that are the focus of the research lines of the participating research groups. Our aim with this initiative was to answer common questions that we ask ourselves in numerous occasions. Thus, we show extraordinary phenomena that happen in our coasts, we approach the fascinating upwelling, that every summer makes life flourish in the Galician rias and is the fulcrum of our fishing richness, the wonders of *ardora*, a beautiful word to describe the natural process that microalgae produce in warm nights, we will learn about the world of mussels and our culinary

A vibrant yellow liquid splash is visible on the left side of the page, extending from the top to the bottom. The splash is dynamic, with various droplets and streaks of yellow against a white background.

tastes, and we will discover the fantastic stories that a sediment core keeps hidden. We didn't want to forget about the problems the oceans face, such as marine pollution, climate change, or the impact of microplastics in the life of the oceans and in ours.

This handbook that you know hold is the result of this common work, of this dialogue. It contains 12 sheets of different styles and topics, to make discoveries in their details. We kept children in mind as the main audience for this first instance of the **Scientists meet Artists** initiative, and the sheets are available for them to colour. Each sheet is associated with didactic content accessible through QR codes. This way, adults can have resources to answer the always sharp questions of the little ones as they paint. Enjoy!

# Sea cucumber, a great unknown. What is its role in the oceans?



Sea cucumbers are very important animals in the ocean because: 1. those that live buried help to aerate the sea bottom, 2. the type of food (detritivorous) favours the recycling of nutrients, 3. they reduce the acidity of the ocean, counteracting one of the effects caused by climate change, 4. they are home to other animals, increasing the number of species (greater biodiversity) and, 5. they serve as food for other animals (trophic chain).

- 1. Aeration
- 2. Recycling of nutrients
- 3. Reduction of acidity
- 4. Biodiversity
- 5. Trophic chain



### Tania Ballesteros Otero

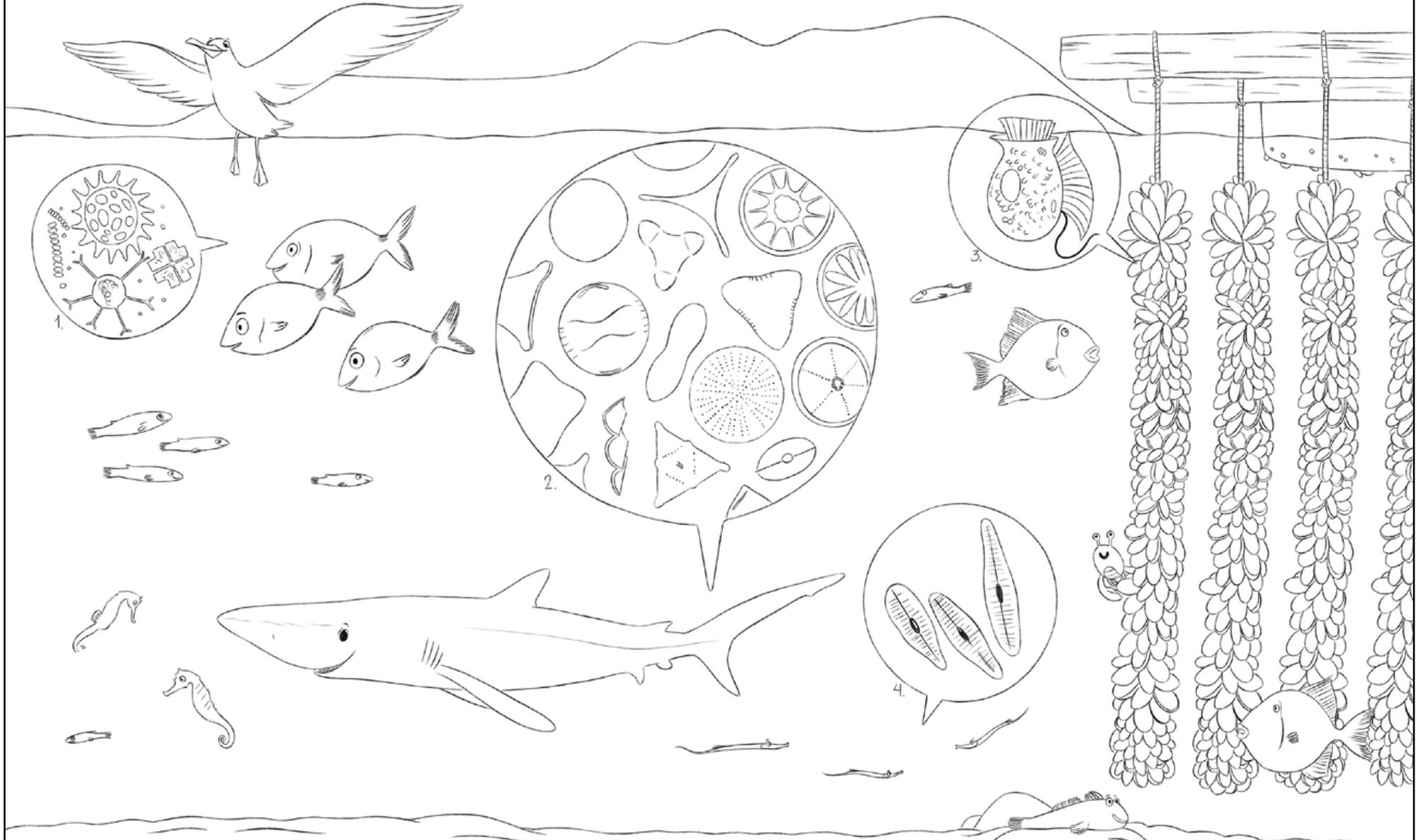
She is a biologist and has an Inter-university Master Degree in Marine Biology (Specialty in Marine Resources Exploitation). She has been working in different marine companies in the fields of aquaculture, project management, field-work and quality research. During the last five years, her professional activity has been focusing on the culture of marine organisms (microalgae, mollusks, echinoderms, and fish) and the study and management of marine resources. Nowadays, she is working as research staff in two projects funded by Xunta de Galicia: *Study of biology, population status and genetic diversity of holothurians (Holothuria forskali) in Ria of Vigo* and *Study of spatial variability of the reproductive cycle of razor-shells in Ria of Vigo and their application to fisheries management*.

### Clara Cerviño

She is biologist and scientific illustrator. After graduating in Biology from Universidade de Santiago de Compostela and studying two masters at Universitat de Barcelona, she arrived in Portugal. There, she had the opportunity to participate in a Training Course in Scientific Illustration at Universidade de Aveiro, and combine thereby her two passions: Biology and Drawing. Since then, she works as a professional scientific illustrator. Furthermore, she is member of the advisory committee of Ilustraciencia and teacher in the academy of the same name.

# Phytoplankton, our amazing microscopic friend

Phytoplankton (1, 2, 3 and 4) are the small microorganisms that live floating in watery environments. They are the foundation of the aquatic food web and marine ecosystems. In addition, they are so crucial for the life of the whole planet because they photosynthesize. Phytoplankton are extremely diverse, varying from diatoms (2 and 4) to dinoflagellates (1 and 3) and different in shape, size and color (1, 2, 3 and 4). They are the food of many fishes (1, 2 and 4) and mollusks (3) in the ocean. Also, phytoplankton are responsible for the release of 50 % of the oxygen that we breathe on the planet. They consume CO<sub>2</sub> and are a good mechanism of absorption of CO<sub>2</sub>. In fact, phytoplankton absorb a quarter of CO<sub>2</sub> that humans generate every year.



## Paulo Alcaraz

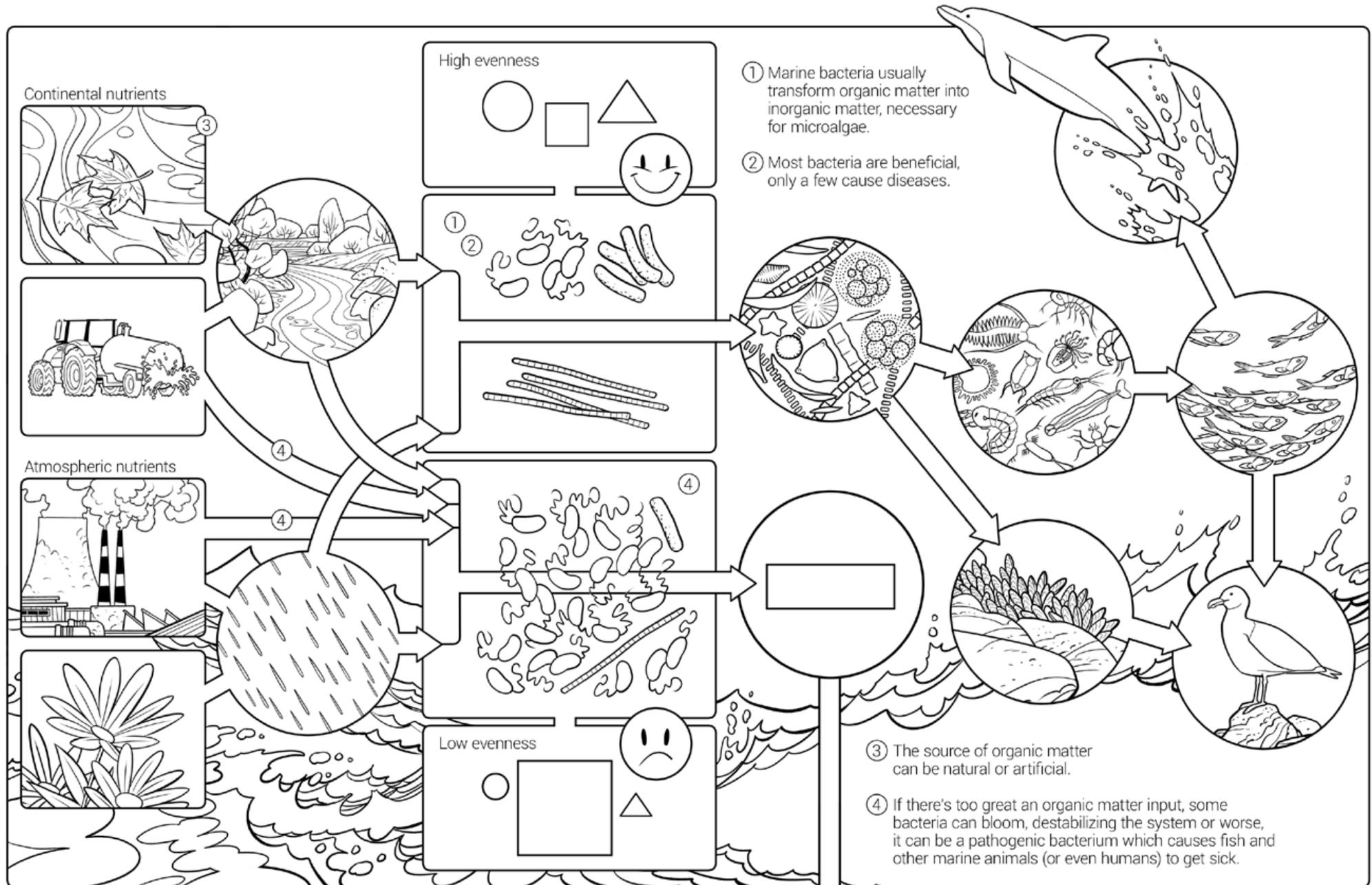
He is a graduate of Marine Science from the University of Vigo. He has long-standing experience in oceanography due to his collaboration with the Biological Oceanography Group of Vigo's University since 2015. He has participated in several oceanographic campaigns in international waters and presented papers at international conferences. Moreover, he has collaborated in scientific dissemination activities organised by FECYT and Xunta de Galicia. Nowadays he is a PhD student at DOMAR.

## Pablo Rosendo

He is a Galician illustrator who resides in Vigo, with 15 years of professional experience and an infinity of awards that guarantee his well-doing. Pablo can say that he has done everything.

He has worked for companies, publishing houses and entities, he has published children's books, and has illustrated more than 50 school textbooks. One of his publications is *Sendas de Ons* (Ons paths) by El Patito Editorial and *Cies e Roque: Operación Reconquista* (Cies and Roque: Reconquest Venture) by Lobito Bueno.

Nowadays, he has decided to place a storefront in order to work more closely to those public that window-shops at 30 Progreso Street in Vigo. He is responsible to recreate in drawings all of those moments and images that his customers want to immortalize.



- ① Marine bacteria usually transform organic matter into inorganic matter, necessary for microalgae.
- ② Most bacteria are beneficial, only a few cause diseases.

- ③ The source of organic matter can be natural or artificial.
- ④ If there's too great an organic matter input, some bacteria can bloom, destabilizing the system or worse, it can be a pathogenic bacterium which causes fish and other marine animals (or even humans) to get sick.



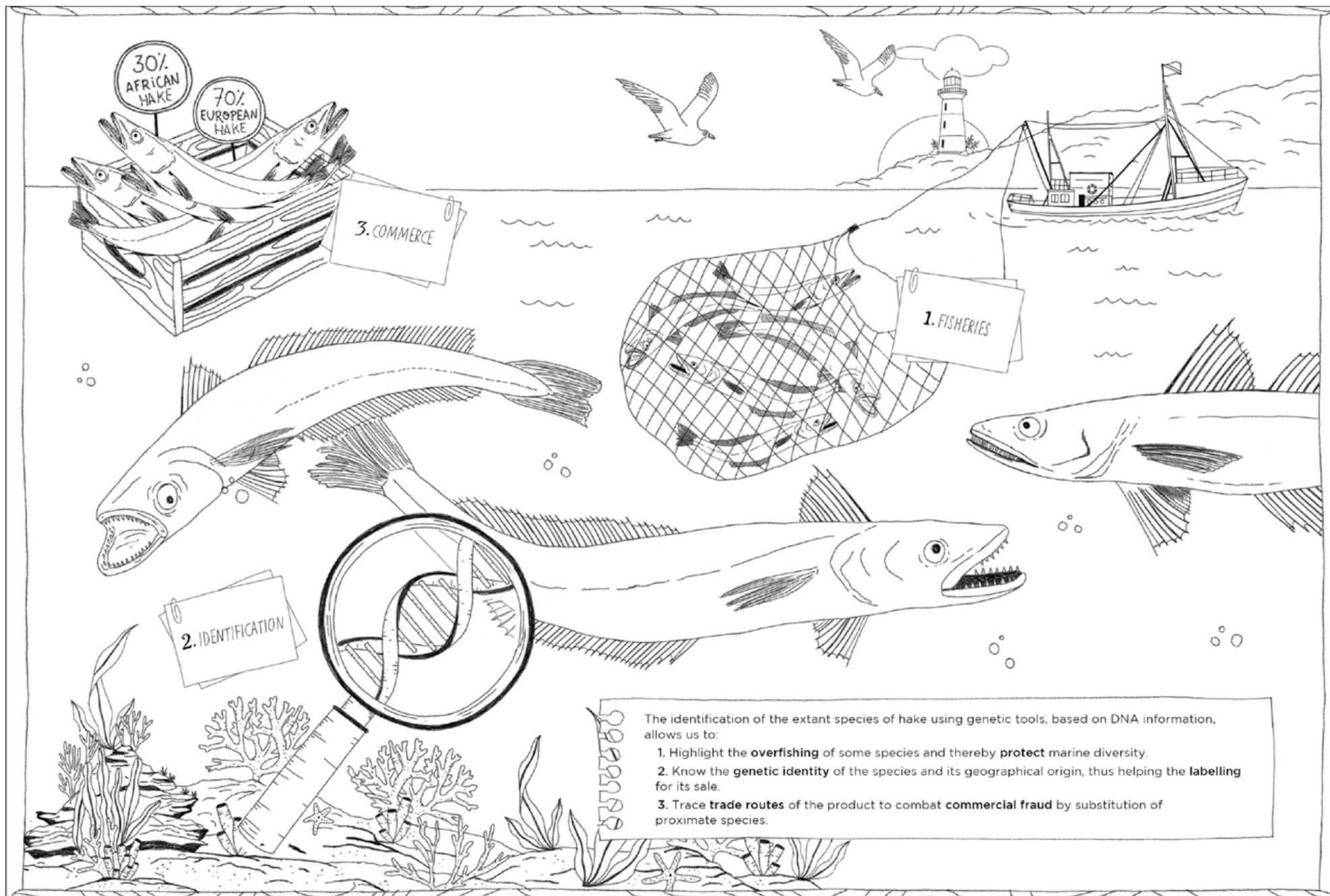
## Alberto Gutiérrez

I have a degree in Biology and a master in Biotechnology, both by Universidade de Santiago de Compostela. Nowadays, I am a predoctoral researcher at DoMar program. During my degree, I spent an exchange year at North Dakota State University (EEUU). During my PhD studies, I spent a five-month stay at Ocean University of China and a three-month stay at Universidade de Cabo Verde. I speak English, Portuguese and I am studying B2 of Mandarin Chinese at Official Languages School.

## Fran Bueno

He began by illustrating numerous school textbooks, children's books with writers as Agustín Paz or Marilar Aleixandre. He participated in mythic comic fanzines *Golfiño* and *Galimatías*, and he has published comics in France and United States. He was teaching in comic school *O Garaxe Hermético* for nine years, and nowadays, he collaborates in the magazine *A viñeta de Schrödinger*. He is working on a book written by Diego Ameixeiras, and he gets international commissions represented by Astound Agency.

# What does genetics contribute to hake's traceability?

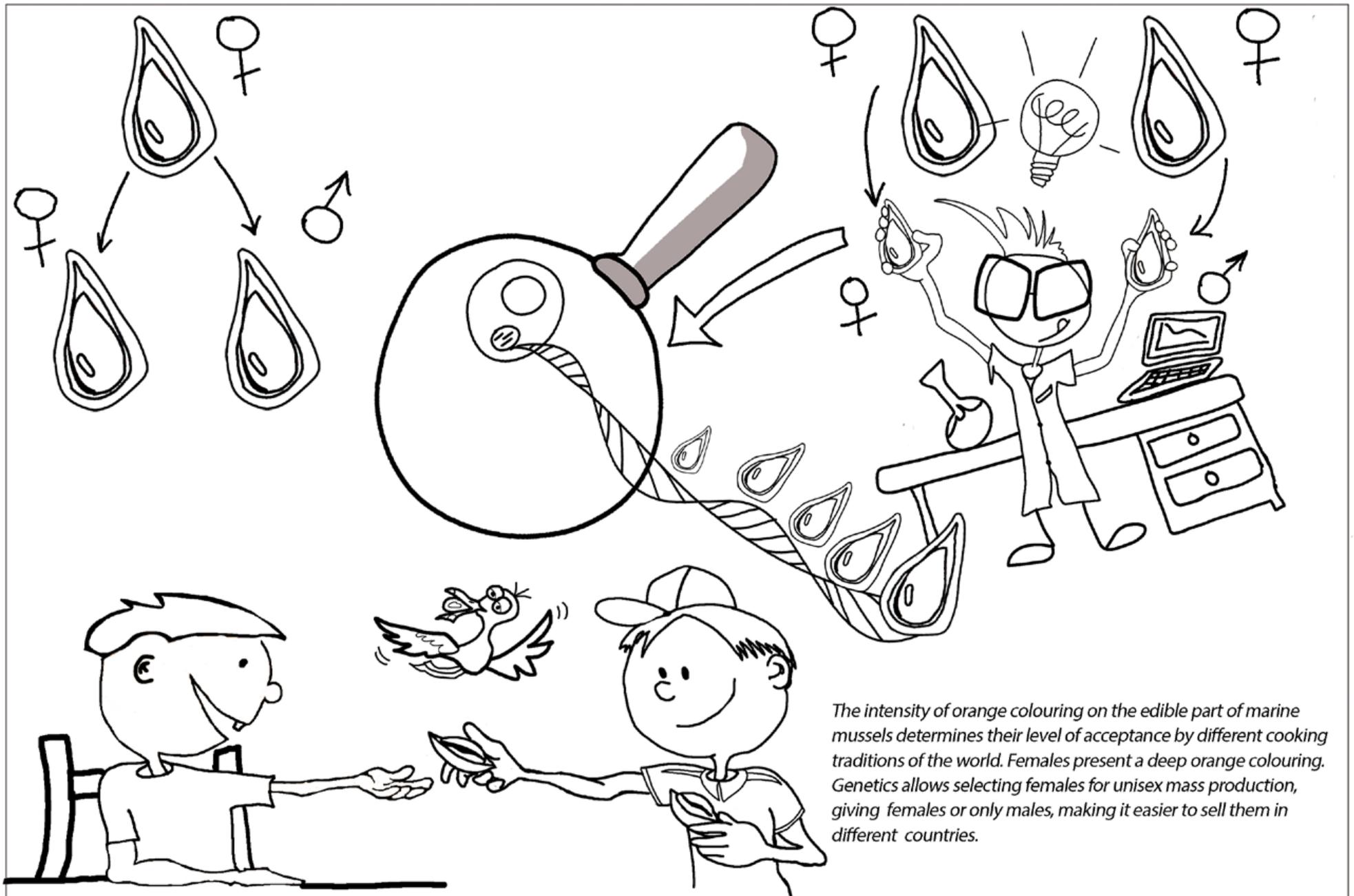


### María Fernández Míguez

Degree in Biology at USC, where she began her research in the taxonomy of marine gastropods. Her master degree in Aquaculture provided her the opportunity to collaborate with Universidade de Vigo on the study of the phylogeny of the *Merluccius* genus for their commercial traceability. She is currently part of ReXenMar Group (CIM-Uvigo), where she works on the final stage of her doctoral research on the application of molecular tools in Aquaculture and the improvement of fishing. She complements this work with teaching at the University of Vigo and scientific outreach.

### Rena Ortega

She is an Illustrator, a worldwide explorer and an activist of passion, colour, beauty and the natural world. Her illustrations intend to raise awareness about the beauty of this world and promote nature conservation by inspiring the lives of the people through projects related to the publishing world, travels and scientific outreach focused on flora and fauna.



*The intensity of orange colouring on the edible part of marine mussels determines their level of acceptance by different cooking traditions of the world. Females present a deep orange colouring. Genetics allows selecting females for unisex mass production, giving females or only males, making it easier to sell them in different countries.*



## Ángel Pérez Diz

Associate Professor in the area of Genetics at Universidade de Vigo interested in different aspects of Evolutionary and Reproductive Biology, e.g. know functional consequences of genetic changes, the molecular mechanisms underlying adaptation and speciation, basics on reproduction and reproductive isolating mechanisms in marine organisms using genomic analysis, transcriptomes and proteomics.

## José Arcas

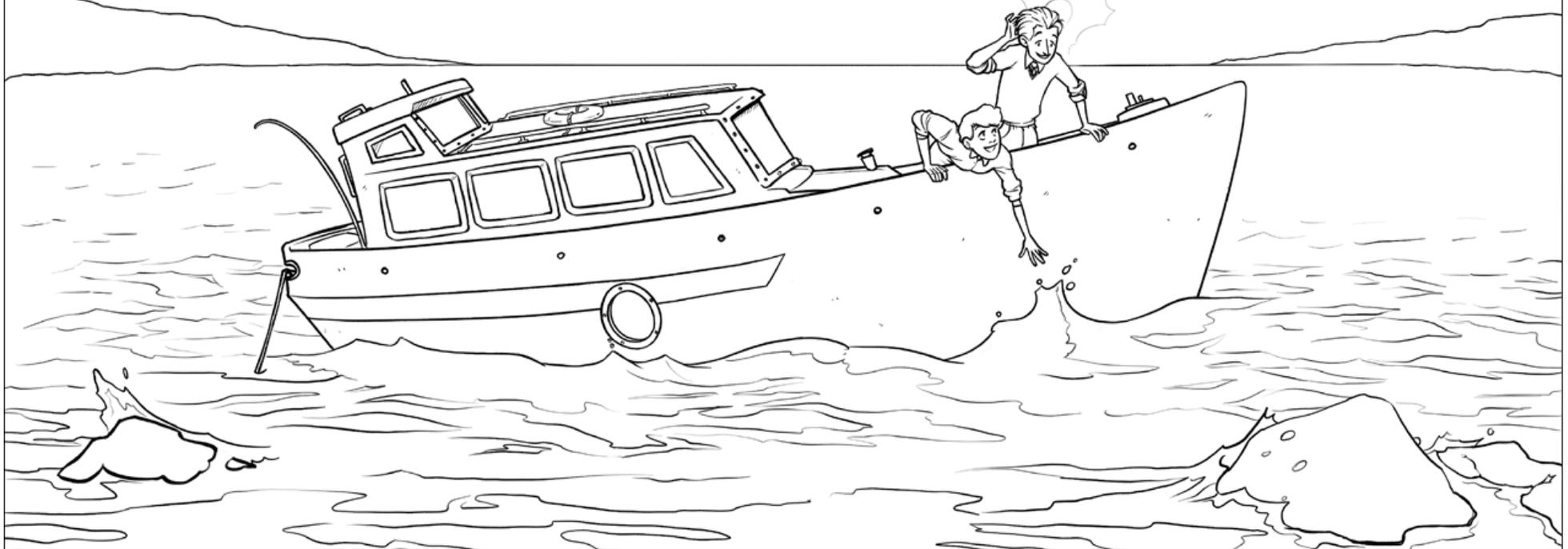
Doctor in Biology and nature self-taught artist. Although I am interested in nature as a whole, I focus my work as an artist on birds and in watercolour. However, I'm fascinated as well by other animal groups such as mammals and other painting techniques such as oil paint.

Within the large world of birds, I have a special predilection for coastal birds, because my academic background was focused on life at those ecosystems. I've drawn also abroad in places that always attracted me a lot such as Kenia, Wadden Sea, Italy and Portugal.

Ramón and Ángeles enjoy the spectacle  
of phosphorescent waters.

In the warmer months microalgae produce red tides  
but at night some of them, like *Noctiluca*...

...glow in the sea.



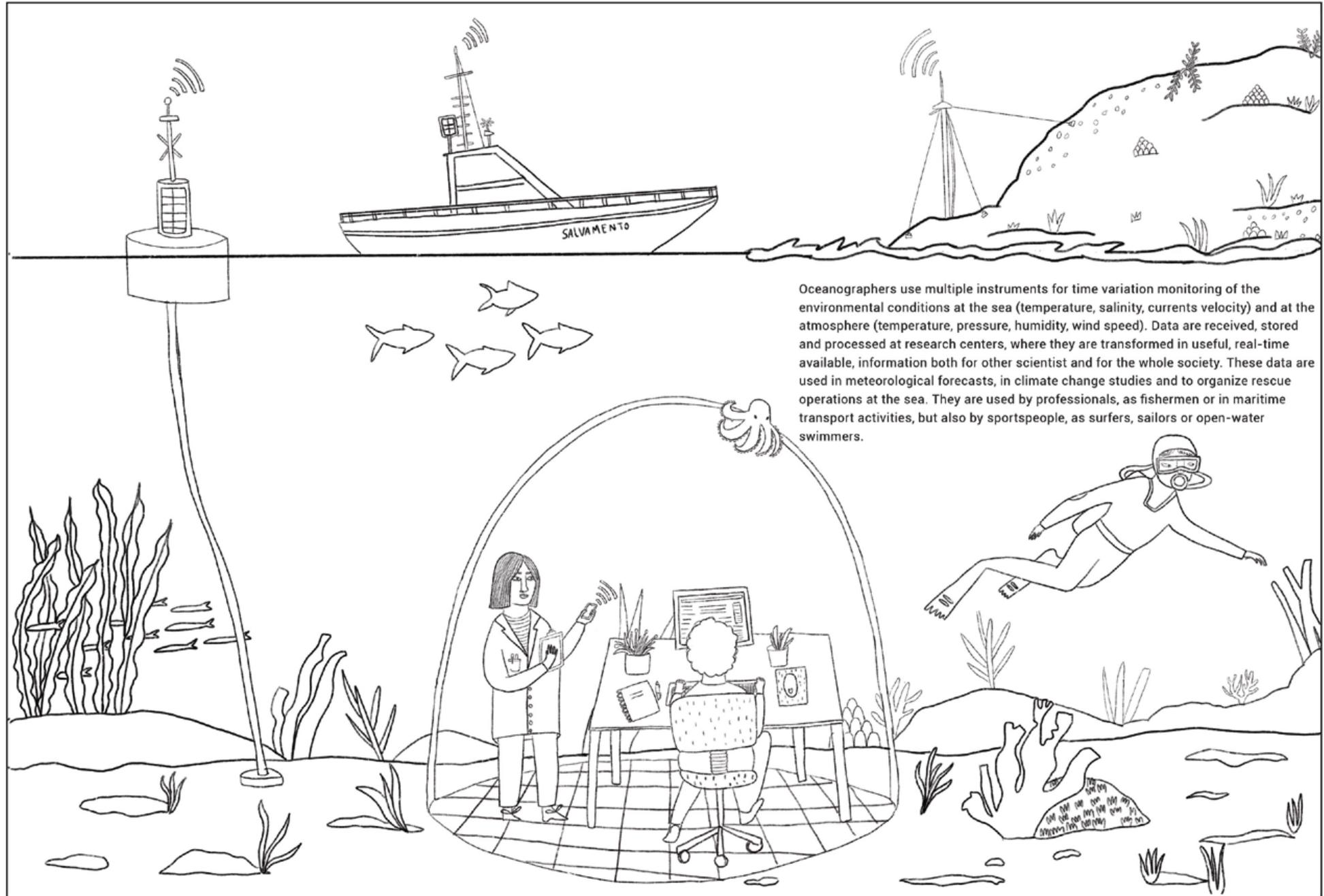
## Francisco Rodríguez Hernández

He is a researcher at the Vigo Oceanographic Centre (IEO) since 2008. He belongs to the group of Toxic Phytoplankton and Red Tides, wherein are ongoing studies on species of harmful microalgae, mainly dinoflagellates, responsible in the rias for closures on shellfish extraction.

## Xulia Pisón

She is a Comic book artist. She began her career in 2015 with self-edited fanzines *McCactus*,  $(\infty-1)$  and *Legado* (Legacy) (with a script by K. Belloch). Since then, she has participated in various comics collective publications such as *Licor Café* (Demo Editorial), *Altar Mutante* (Altar Mutant). She carries out works as a posters illustrator and editorial, *Unha Mente que Voa* (A flying mind) by Xurxo Mariño, Editorial Xerais.

Recently, she published *Microalgas. O Mundo oculto* (Microalgae. The hidden world) and *Microalgas. O mar de Ardora* (Microalgae. Ardora's sea), two adventure and scientific dissemination comics published in collaboration with Universidade da Coruña



Oceanographers use multiple instruments for time variation monitoring of the environmental conditions at the sea (temperature, salinity, currents velocity) and at the atmosphere (temperature, pressure, humidity, wind speed). Data are received, stored and processed at research centers, where they are transformed in useful, real-time available, information both for other scientist and for the whole society. These data are used in meteorological forecasts, in climate change studies and to organize rescue operations at the sea. They are used by professionals, as fishermen or in maritime transport activities, but also by sportspeople, as surfers, sailors or open-water swimmers.



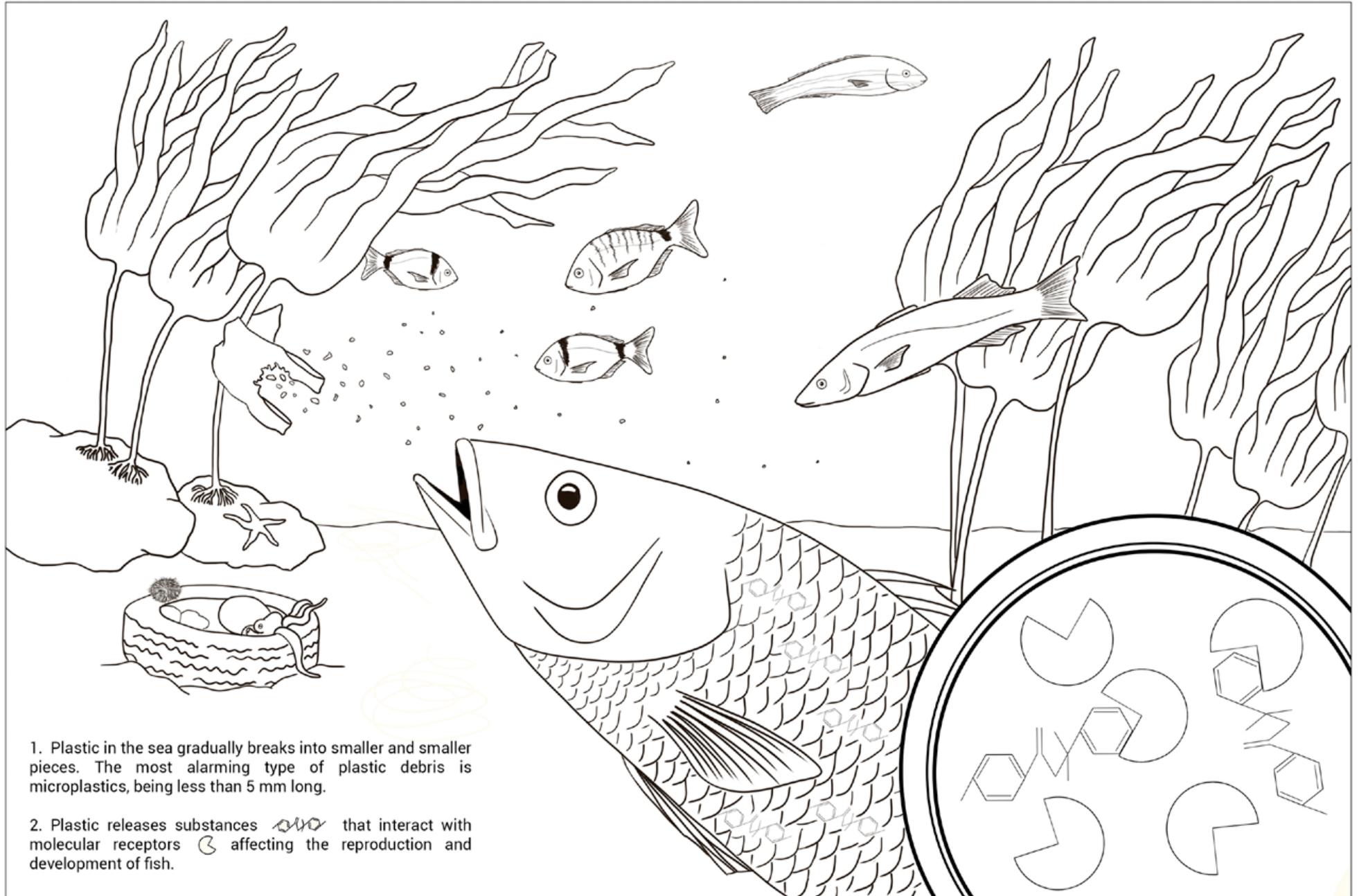
## José González

He has a Degree in Ocean Sciences and a doctorate in Oceanography. During the past 20 years, his area has been multidisciplinary, combining experience in Marine Ecology, especially in mesocosms studies and Physical Oceanography, specifically in the domain of Operational Oceanography and Environmental Monitoring. Since 2016, he is responsible for the Oceanography Unit at Toralla Marine Science Station that belongs to the Marine Research Centre of Universidade de Vigo

## Laura Tova

Trained in Illustration at EASD Pablo Picasso of A Coruña, she starts to work in Illustration at the end of 2014, specifically in product design and after that, she gets involved in the world of Advertising and Editorial Illustration, publishing for Galician editorials like Xerais and OQO Editora. She has realized illustrations for Carballo's Council such as the promotional Christmas campaign *Semechadescóntovos*, for Santiago Turismo or Lalin's Council. Furthermore, she organises workshops for seniors and older people in which she seeks to convey her particular way of interpreting through emotions and senses.

In 2018, she exhibited her project *Voantes* (Flyings), where Sculpture and Illustration converged, with an extensive philosophical concept on a naive and minimalist style. She also participated in muralism projects like *Derrubando muros con pintura* (Tearing down walls with paintings) and *Mulleres en Acción* (Women in action) promoted by Deputación de Pontevedra.



### Alexandre M. Schönemann

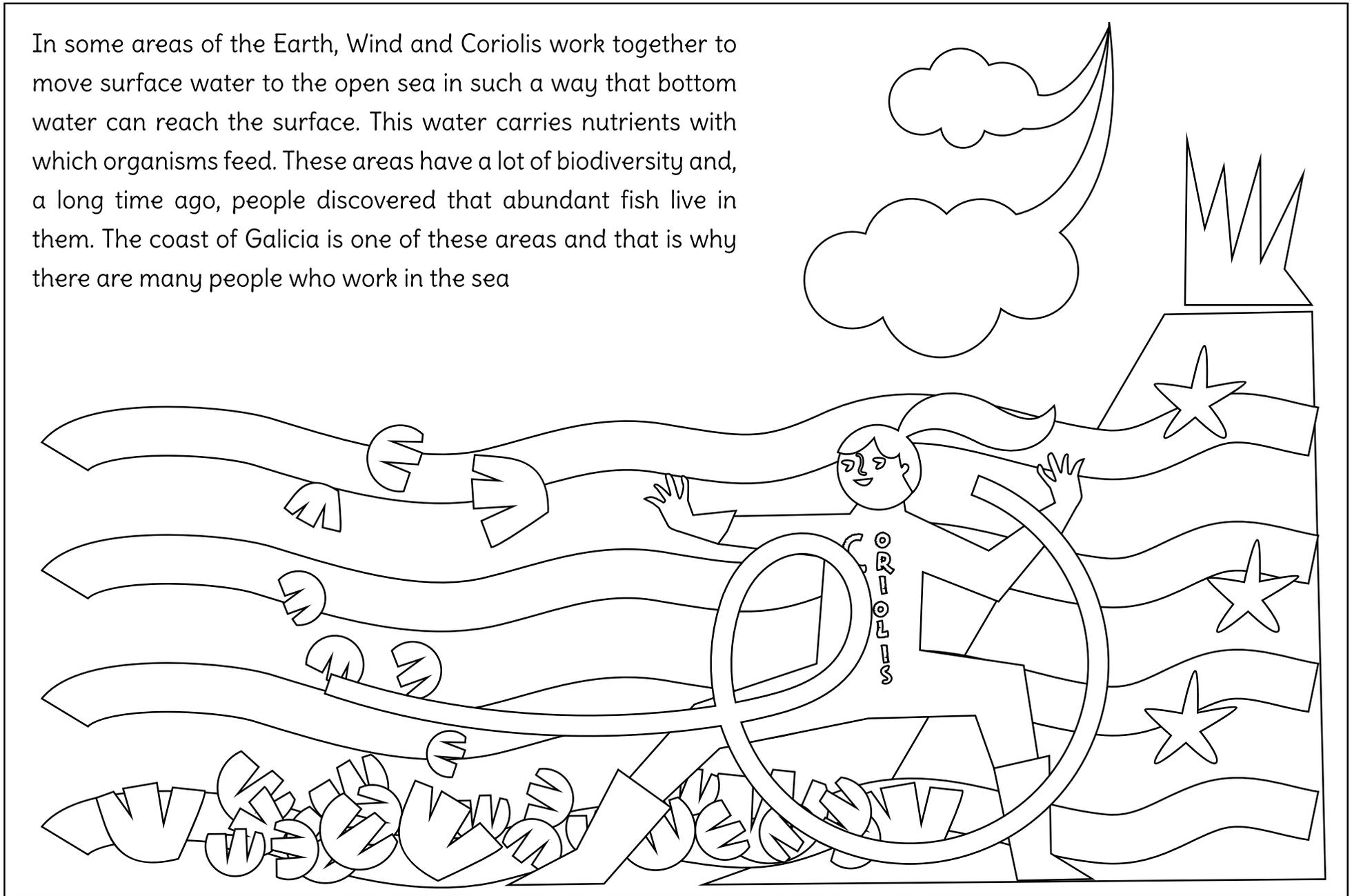
He is a Predoctoral Investigator at Universidade de Vigo. He studied Marine Sciences and a master on Oceanography at Universidad de Cádiz. He has worked on different subjects related to Ecology, from the study of the meadows of marine phanerogams to research the life cycle of several jellyfish species.

Now he is developing his doctoral thesis on the adverse effects of plastic additives in sea fishes, using molecular tools as proteomics.

### 13 GRADOS

We are a non-profit Galician cooperative. We aim to translate marine knowledge and what happens below the ocean waters to accessible visual contents through drawings, audiovisuals, books or activities that connect people to the sea from a perspective of conservationism and sustainability.

In some areas of the Earth, Wind and Coriolis work together to move surface water to the open sea in such a way that bottom water can reach the surface. This water carries nutrients with which organisms feed. These areas have a lot of biodiversity and, a long time ago, people discovered that abundant fish live in them. The coast of Galicia is one of these areas and that is why there are many people who work in the sea



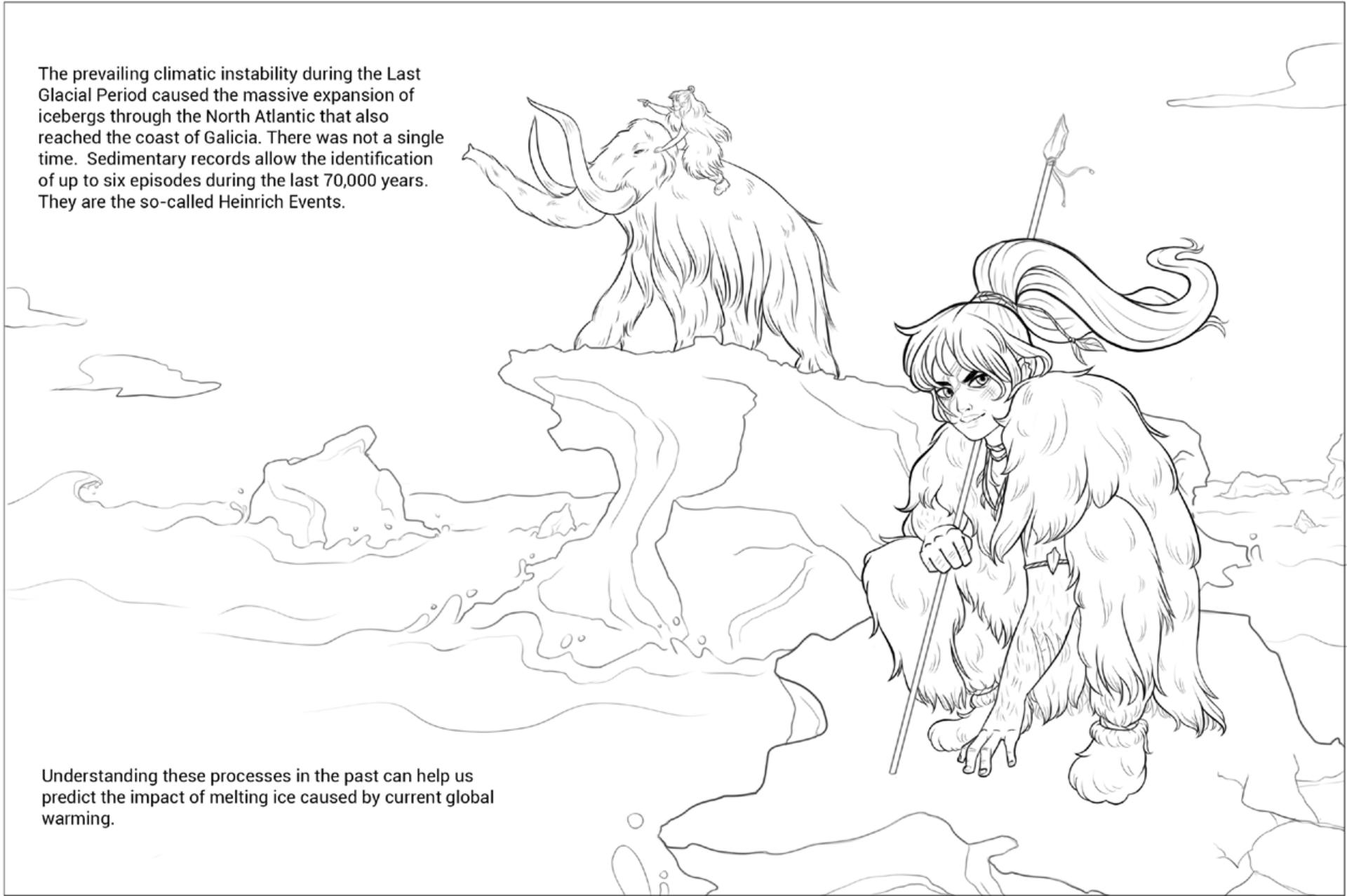
### **Marisela Des Villanueva**

She is an Environmental Sciences graduate with a Master in Oceanography. She got a PhD in DOMAR program from Universidade de Vigo. She is specialized in numerical modelling of hydrodynamics at coastal and estuarine zones. Her main line of research is the analysis of the impacts of climate change on the Atlantic coast of the Iberian Peninsula, such as changes in the upwelling, water temperatures or stratification, and repercussions of these impacts for the fauna and flora.

### **Elga Fernandez Lamas**

I'm a designer-illustrator from Ferrol (Galicia). For years, I was devoted to Performing Arts, but one thing led to another, and today I do what I consider the most beautiful work in the world: I'm an illustrator! I cry proud, and from this claim emerges my style: powerful colours, concepts that strengthen the protest from the feminine, from the industrial, from the fight.

The prevailing climatic instability during the Last Glacial Period caused the massive expansion of icebergs through the North Atlantic that also reached the coast of Galicia. There was not a single time. Sedimentary records allow the identification of up to six episodes during the last 70,000 years. They are the so-called Heinrich Events.



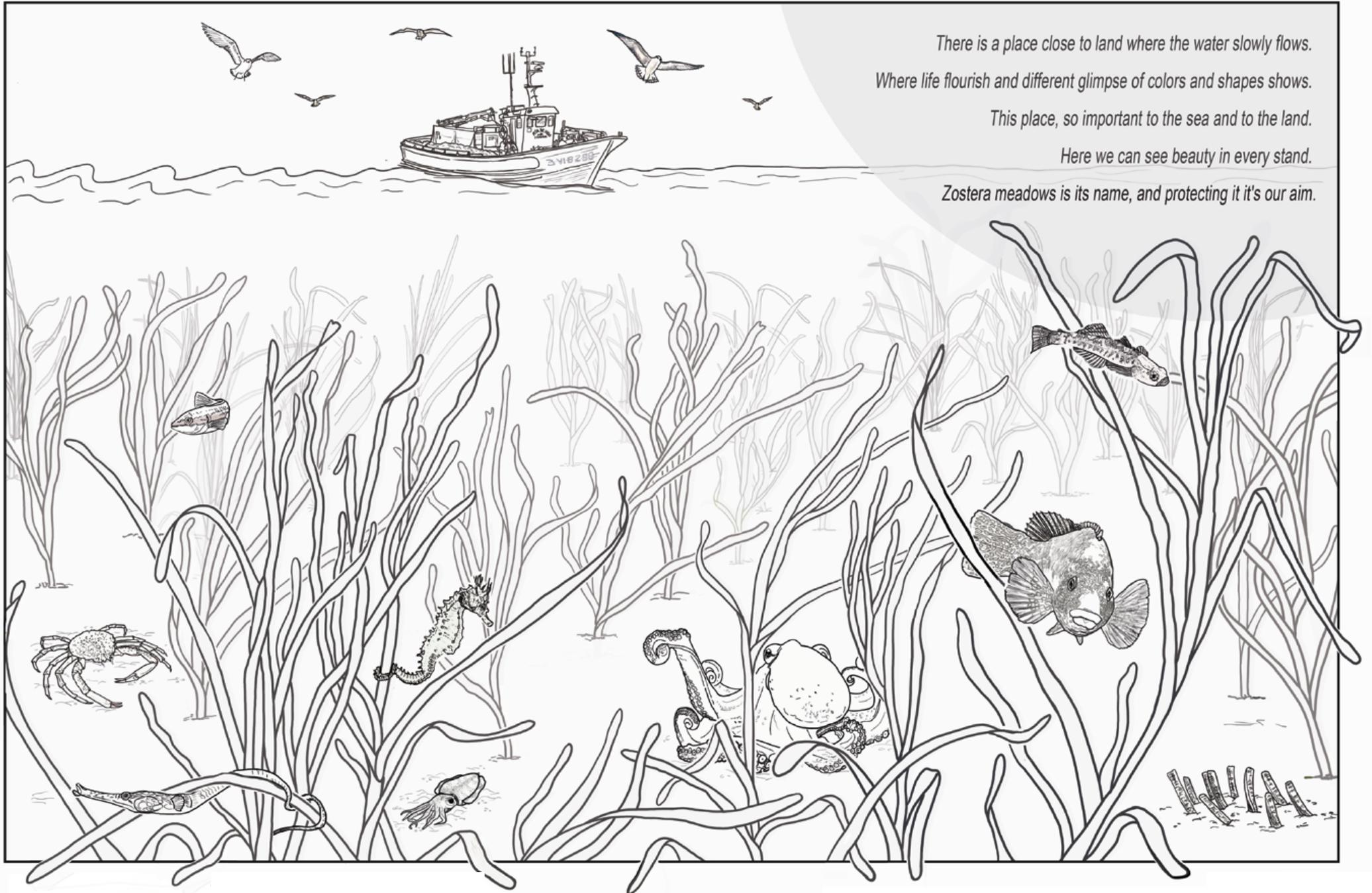
Understanding these processes in the past can help us predict the impact of melting ice caused by current global warming.

### **Maidier Plaza-Morlote**

She is a Postdoctoral researcher at Universidade de Vigo. Her research focuses on the quantitative analysis of interactions between the ocean and the climate in the past (Paleoceanography/ Paleoclimatology). By studying deep sea sediment cores and using geochemical tools, micro-paleontological and statistics, she tries to understand palaeoclimatic changes in the Earth system and their potential response to future tensions.

### **Eva Agra, 7H Cooperativa Cultural**

She studied Photography at EASD Mestre Mateo and Illustration at EASD Antonio Faílde. Since 2015, she works at 7H Cooperativa Cultural, a non-profit organisation devoted to the management and creation of cultural projects that is committed to community participation as a tool for equality and social integration. Among her illustrator works it stands out the collection of books *Mulleres Bravas da Nosa Historia* (Brave Women of our History), by Urco Editora.



*There is a place close to land where the water slowly flows.  
Where life flourish and different glimpse of colors and shapes shows.  
This place, so important to the sea and to the land.  
Here we can see beauty in every stand.  
Zostera meadows is its name, and protecting it's our aim.*



### Marisa Gomes

She is a predoctoral researcher of the Doctoral Program DOMAR, in the Universidade do Minho and Universidade de Vigo. The aim of her project is to understand the role of habitats and fishing effort in the distribution of benthic and demersal marine animals. *Zostera* meadows, in the Ria of Vigo, are one of the habitats she is currently studying.

### Rita Cortês

She started her training in design in the field of archaeology. She graduated in History and concluded a master in *História dos Descobrimentos Portugueses*. She took up the Design through the courses of Scientific Design with the professor Pedro Salgado at Museu de História Natural e da Ciência de Lisboa. She is currently working as a freelance illustrator.

All living beings are made up of cells and, sometimes, some cells become cancerous because they divide uncontrollably and can travel to other parts of the body. Cockles live buried in the sand and when they have cancer, those cancer cells can spread from one cockle to another. Studying the genetics of these contagious cancer cells help us to better understand cancer.



### **Alicia L. Bruzos**

She was born in Lugo. She studied Biology at Universidade de Santiago de Compostela (Spain) and Bioinformatics at Universitat Autònoma de Barcelona (Spain). Nowadays, she is a lecturer in Genetics at the USC Biology School and a researcher specialized in cancer genomics at CiMUS (Center for Research in Molecular Medicine and Chronic Diseases) of USC.

### **Sofía Venzel**

I am a author and illustrator based in Vigo (Galicia, Spain). My work has been selected in numerous international competitions, including the illustration competition of the Bologna Children's Book fair (2018), and has been exhibited in Russia, Spain, Portugal, South Korea, Arab Emirates, Italy, Japan, China and UK. In 2019 Thule Ediciones (Barcelona) published my first picture book *A/ Sur* (To the South).

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