The Particles ,
The Human Tale of A Dying Water

While man found in water the naturally pure matter, we are now facing the crisis of the «impurity» of the oceans. The ocean, the cradle of our life, is slowly being transformed into a tomb for man, who will not survive on a planet with dying water. This natural beauty, tarnished by humans, is gradually being transformed into an outlet for all kinds of waste. Assimilating so manysubstances, it absorbs all the colours, smells and flavours that man pours into it. As a victim of frigolism and the illusory recyclability of plastic, we dump eight million tonnes of it into the ocean every year.
At this rate, and without any real action on our part, the amount of plastic in the ocean is expected to triple by 2050.According to the UN, there would be more plastic waste in the sea than fish. Only 1% of plastic waste in the ocean is on the surface, while 99% is not found because it has either sunk to the bottom, washed up on the coast or, more importantly, has disintegrated. The plastics, which break up into smaller and smaller particles, then form microplastics smaller than five millimetres, which constitute the bulk of the plastic pollution in the ocean. Some of these particles are assimilated by phytoplankton, a single-celled organism otherwise known as cyanobacteria and micro-algae. Representing less than 1% of the Earth's photosynthetic mass, these tiny aquatic plants are responsible for 30%/40% of carbon dioxide absorption and more than 50% of oxygen production, a phenomenal and frightening result given their vulnerability to micro-plastics. Once inside the organism of these planktonic species, the latter reflect the sun's rays and prevent photosynthesis, reducing its production by 45%. Moreover, the permeability of phytoplankton to microplastics represents a direct health hazard for humans and animal life. It is one of the major routes of contamination by trophic transfer between the different links in the food chain. Due to their very small size, these particles slip through the net and unfortunately cannot be recovered. We are facing a frenzy of activity of underwater life being suffocated by plastic, a new «vegetation» of nightmares.

The Particles will then enter the immobile layer of the waters, to lift the shroud over the invisible beings, and to plunge the spectator into an abyss of reflection. With the creative image, I offer a new form to the destroyed world of tomorrow by reinventing its structure: plastic materials become the new representative form of plankton. Plastic waste, recovered from beaches and bins, allows me to reproduce these underwater species using a scientific and documentary posture, frontally on a cyanotype background. Inspired by Anna Atkins' *British Algae* herbarium, or Ernst Haeckel's sublime plates on *The Artistic Forms of Nature*, these productions are a dialectical tension between the sublime and the derisory of a nature damaged by the hand of man. A search for analogies between the material used and the form is developed: the emiliania huxleyi becomes a cluster of shower sieves, the guinardia striata a simple hair elastic, the licmophora a set of drink stirrers...
Marked by Joan Fontcuberta's approach and his Herbarium, the pieces presented at the Telmah gallery take up the idea of scientific plates by updating the photographic technique: cyanotypes on glass allow the orotone technique to be used. I apply fluorescent paint on a second glass plate placed on the emulsion side to recall the fluorescent protein of certain organisms. We fall into a psychedelic delirium: the tentacles catch fire, the jellyfish light up...

The image is then given as a ghost, the ghost of these endangered species, as a speculation that would be realised through appearance. A process that allows me to form images that go beyond reality, while at the same time implying to the viewer a certain imprint on reality in this anticipation story that underlines man's capacity for destruction. This sort of apocalyptic prophecy shows a sublimated seascape, deliberately too soft, tooartificial, «nowhere does fresh nature breathe» (G. Bachelard). By examining with an attentive eye, the viewer discovers little by little a repulsive whole and realises the deception he is facing. Concern must surprise him sooner or later, the eye follows this becoming of darkness, it questions the water as it questions its conscience and thus reads in this reconstruction of the water the destiny of man, his future funeral oration. The plastic that suffocates life in unfathomable depths to bury all human misfortune becomes the homeland of human death and transforms our planet into a universe submerged in sad, dark water that transmits strange, mournful whispers. Like the water that is splashed on one's face, The Particles wishes to awaken this energy of seeing, transforming the gaze into a clear and easy action leading to a real awareness. I thus entrust to imagination and artistic creation the ambition to excite the desire for transformation of society.

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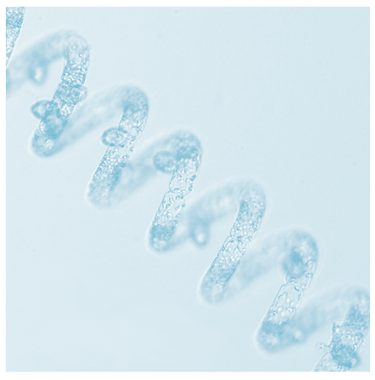
When a new element is introduced (in this case plastic), life reorganises itself; it does not reject. It integrates, assimilates and transforms. Except that 5,000 billion particles of an unprecedented constitution, such as nature has never known in the past, is too much to integrate. This is what the project attempts to expose, these invisible threats to the marine eco-system and indeed to humans.

PHYTOPLANKTON

The plant plankton, or phytoplankton, are all microscopic algae formed from a single cell (microalgae). Although they are unicellular, microalgae have a wide variety of sizes, colours and shapes that can be very elaborate. Like all plants, microalgae are organisms that produce their substance from carbon dioxide (CO_2) and mineral compounds (nitrogen, phosphates, potassium, iron, silica, etc.) dissolved in water. To do this, they use the energy of light, which they capture thanks to the chlorophyll contained in their cells. The chemical reactions involved in the production of organic matter release oxygen (O_2). Through photosynthesis, phytoplankton produce a large quantity of oxygen necessary for life in the water, but also, thanks to gas exchanges at the surface of the oceans, they supply two thirds of the oxygen in the air of our planet, the last third coming from plants on the continents.

Diatoms

Some diatom species cannot tolerate any pollution, while others are very tolerant and proliferate in degraded environments. Diatoms are used by a growing number of countries to monitor the quality of river or sea water because they are a very reliable indicator of aquatic pollution. In the event of pollution, the proportion of species in the plankton community changes. The more sensitive species disappear, while the more tolerant ones gain ground.



Guinardia striata

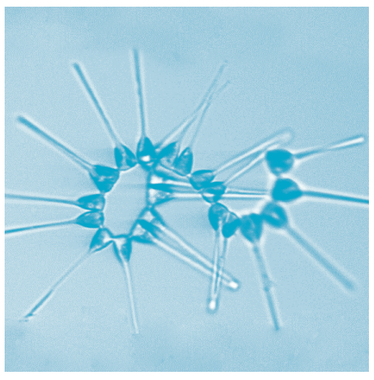
Ø 9 µm
Is a microscopic brown algae belonging to the class Diatoms, family Rhizosoleniaceae. The cells are cylindrical and often form curved or spiral chains. This genus is found in temperate coastal oceanic waters.

Mesoplastic 5 mm < 5cm
Represented by a hair band

Thalassionema nitzschioides

10 < 230 µm
Is a type of phytoplankton belonging to the group of pinnate diatoms. Their cells are straight and linear and they connect to form zigzag chains. The cells are rectangular in shape, with rounded ends, and the cells are connected at the ends to each other. They are found worldwide, except in the polar regions, along shallow coastal ocean waters.

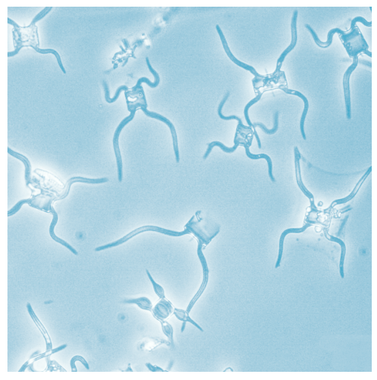
Macro plastic 5cm < 50 cm.
Represented by a set of ballpont pens..
Belongs to the category of single-use plastics. Modern ballpoint pens are made primarily of plastic and metal. A ball made of powdered tungstencarbide is placed in a brass tip connected to an ink cartridge. The body of the pen is made of polystyrene. The natural resource used to produce theses materials is mainly oil.



Asterionellopsis glacialis

± 70 µm
Is a microscopic brown algae belonging to the class Diatoms pinnata and the order Fragilariales. They are elongated and have an enlargement at the lower end. The cells are united in star-shaped or spiral colonies by this enlarged end. Their area of distribution is very wide as A. glacialis can be found in all temperate waters of the world. Blooms are regularly observed in the Bay of Arcachon, in Brittany (Channel coast) and more generally on the French coast, very frequently in winter and early spring.

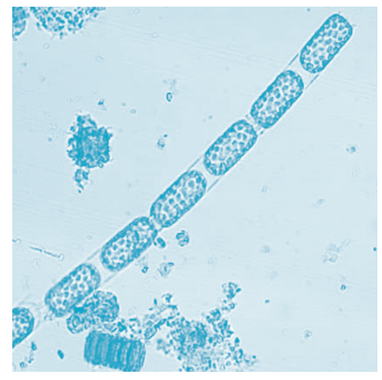
Macro plastic 5 cm < 50 cm.
Represented by Q-tips
One of the most common consumer items in the 50% of plastics that have a single use.



Chaetoceros atlantis

± 100 µm
Is a genus of diatoms in the family Chaetocerotaceae. Each cell has 4 silica setae (2 setae per valve) of varying length and thickness. Studies suggest that Chaetoceros colonies are an important source of food in the water column and a major carbon sink in the benthic environment (benthic zone). Studies suggest that Chaetoceros colonies are an important food source in the water column and a major carbon sink in the benthic (seabed) environment. In North Water, located in northern Baffin Bay (Arctic Ocean Boundary Sea), Chaetoceros has been reported to contribute about 91% of the total phytoplankton cells, making it an important primary producer in this area. As a result, it contributes to the production of oxygen in the northern water.

Mesoplastic 5 mm < 5 cm
Represented by sections of net.
These sections can come from the fragmentation or abrasion of objects from a larger set. This is one of the types of plastic I have found most often when collecting on beaches.



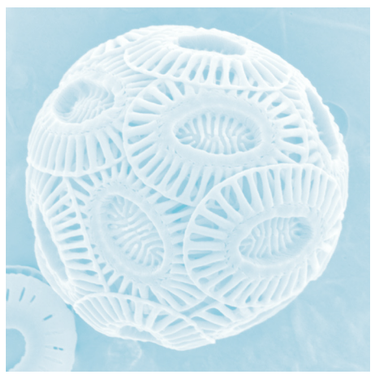
Stephanopyxis palmeriana

Ø of a cell : 38 µm
Average cell height: 33/66 µm
Is a family of algae in the phylum Bacillariophyta (Diatoms), class Coscinodiscophyceae and order Stephanopyxales.

Mesoplastic 5 mm < 5 cm.
Represented by filters/cigarette butts
Made from cellulose acetate (a plastic made by chemically modifying cellulose), the filter is the most problematic part of the cigarette butt. As the number one plastic waste product in the environment, cigarette butts can take decades to break down in nature. More than 4.3 trillion of them are left on the streets each year around the world, accounting for up to 40% of the waste collected during clean-up campaigns. Once discarded on land, cigarette butts are likely to end up in rivers, seas and oceans.

Coccoliths

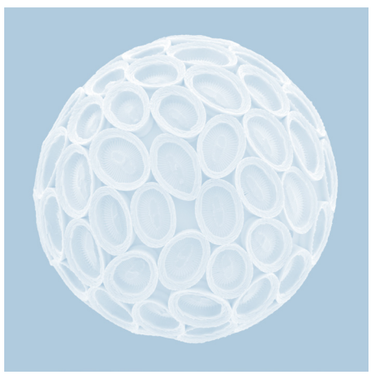
Coccoliths (coccolithophorids) are exclusively marine single-celled algae that live mainly in cold regions such as Canada and the North Atlantic. These variously shaped microalgae measure between 5 and 50 microns. They are visible under the microscope and have several hundred of species listed. Coccoliths are characterised by their external skeleton. Just as diatoms take silica from the water to build their shells, coccoliths take calcium carbonate from the water to build their calcareous shell. If the diatoms formed the Murat quarries, the Coccoliths, on the other hand, built the cliffs of Étretat, among others... They have the role of capturing the carbon dioxide dissolved in the water to produce their plant matter and to release oxygen. Throughout their life in surface waters, coccoliths trap carbon in their cells. Then they sink as corpses and organic debris to the bottom of the sea, where they are “consumed” by bacteria. In this way, coccoliths feed the carbon sink, carrying some of the carbon dioxide from the atmosphere to the bottom of the ocean. They have been doing this since the dawn of time. Today, by capturing part of the CO_2 that is the main cause of global warming, coccoliths are helping to regulate the climate and limit the greenhouse effect caused by human activities.



Emiliania huxleyi

Ø 5 µm
Is a species of algae of the class Coccolithophyceae (syn. Prymnesiophyceae), of the order Coccolithophores, which is numerically the most abundant and widespread on the planet. It is a pelagic, exclusively marine organism found in almost all seas, except in the equatorial zone. E. Huxleyi protects its single cell under a layer of coccoliths; tiny plates of plate-shaped calcite (discoids). It was this species that inspired James Lovelock’s Gaia hypothesis, according to which living organisms, and algae in particular, exert a feedback control on the global climate.

Macro plastic 5 cm < 50 cm.
Represented by a cluster of shower sieves



Corronosphaera mediterranea

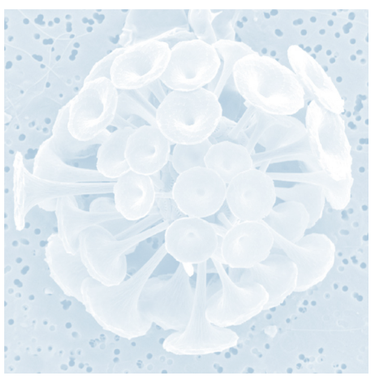
Length 13-24 µm; width 13-16µm
Is a species of algae in the class Coccolithophyceae (syn. Prymnesiophyceae), order Coccolithophores. These planktonic micro-algae are the moss deposited on the coast by the tides during algal blooms. The spherical central body is surrounded by protective calcium scales, called the coccosphere. This species is sensitive to changes in water salinity. Coronosphaera mediterranea, as well as individuals of this species, are essential for the regulation of carbon levels in the atmosphere.

Mesoplastic 5 mm < 5 cm
Represented by caps for sauce bottles

Braarudosphaera bigelowii

Ø 5 µm
Is a species of unicellular coastal algae in the class Coccolithophora and the family Braarudosphaera. They are the only known living taxon that produces calcareous scales called pentalites. Their presence on earth is known since the beginning of the Cretaceous period. Their resilience during the K/Pg mass extinction event, which resulted in a 76% decline in species, is of interest to scientists who are studying their phylogeny and ecology.

Macro plastic 5 cm < 50 cm.
Represented by disposable plates
Plastic plates and bowls are an important part of modern 21st century households. They are usually made of two main chemicals: polystyrene and melamine, which are a threat to consumers and to biodiversity. The carcinogenic and sometimes lethal particles dissolve on contact with food, and their fragmentation in soil and water exposes living things to their danger. Plastic particles break up, without ever disappearing, until they become microplastics or nanoplastics.



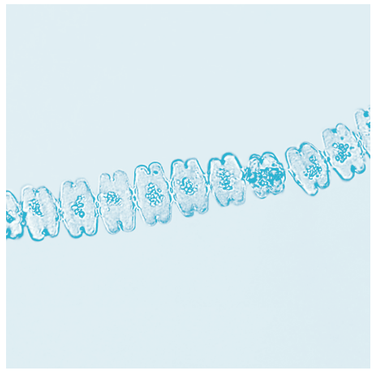
Discophaera tubifera

Lith size: 3->8µm; Coccosphere size: 12->20µm; Liths per sphere: 35->70µm
Is a species of algae in the class Coccolithophyceae (syn. Prymnesiophyceae), order Coccolithophores. Common in oligotrophic surface waters. A characteristic species of subtropical gyres. Characterised by a monomorphic coccosphere with trumpet-shaped projections. Like all individuals in this family, its place as the first link in the food chain and its role in carbon recycling make it essential for the protection of biodiversity but also in climate regulation.

Macro plastique 5 cm < 50 cm.
Represented by a set of balloon stems.
Made of polypropylene. Balloons are extremely dangerous for seabirds and are responsible for almost half of the mortality of these animals through ingestion of plastic waste. They are also a danger to children because they are inflated by putting them in the mouth. They contain nitrosamines, a substance considered a probable carcinogen, which is ingested. More generally, plastic toys are dangerous. When handled, some nanoparticles can enter the child’s body. Phthalates, volatile plastic particles that are dangerous for their development, are still present in 20% of toys according to a study published in 2018 by ECHA (the European Chemicals Agency) despite their ban in 1999.

Chlorophyceae

Chlorophyceae are green microalgae that live in isolation or in colonies in marine and fresh waters of temperate and warm zones. They are unicellular or multicellular, ovoid in shape, measuring from 1 to 10 microns and may, like chrysophyceae, have two flagella which allow them to stay on the surface.



Desmidium pseudostreptonema

Cell 20 x 50 µm
Is a genus of green algae belonging to the Desmidiaceae, one of the genera of filamentous desmidates characterised by rather firm intercellular connections. The cells connect to adjacent cells at the flat, apical side of the cells. The cells may be longer or shorter than they are wide. A medial constriction of the cells may appear either distinct or weak. The cell walls of the desmidium are smooth with multiple pores juxtaposed or scattered. The cells are typically oval in shape or have an angle of three to five

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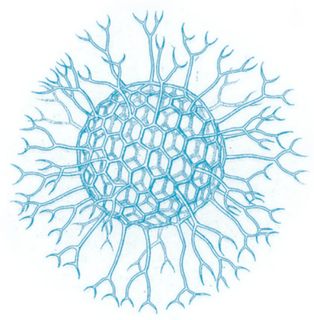
Mesoplastic 5 mm < 5 cm
Represented by a clamping collar
One of the objects found while collecting waste on the beaches.

ZOOPLANCTON

Zooplankton are small or microscopic unicellular or multicellular animals from many zoological groups. Animal plankton includes: permanent zooplankton (holoplankton) which are born, grow and die plankton; temporary zooplankton (meroplankton) consisting of eggs and larvae which live from a few hours to several weeks in the plankton and leave it by metamorphosing into juveniles and then into adults. Permanent zooplankton are planktonic animal organisms that remain planktonic throughout their lives. Permanent zooplankton exist thanks to the phytoplankton that make up their diet, and are on the second step of the aquatic food pyramid, forming the bridge between the plant world and the marine animal world. Its role is decisive and its diversity determines the great variety of temporary zooplankton which then become fish, lobsters, shrimps, etc., which make up the human diet. Although phytoplankton does not concern humans directly, its depletion can lead, through the intermediary of permanent zooplankton, to a drop in the variety of fish and seafood on the menu. To preserve the abundance of food offered by the ocean, man must protect the permanent zooplankton and therefore ensure the multiplicity of phytoplankton. To do this, we must be vigilant about water quality and the prevention of various forms of pollution that damage the seas and threaten the entire marine food chain.

Protozoans

The first animal life form, the protozoan (Protozoa, from the Greek proto, ‘first’, and zoe, ‘animal’) is a microscopic organism consisting of a single cell usually covered by a shell that sometimes takes the shape of a sphere or a snail shell. Varying in size from a few microns to a few hundred microns, with the largest approaching a millimetre, protozoa may be equipped with vibratory cilia or flagella. Protozoa are heterotrophic and feed by ingesting nutrient particles available in their environment. Their diet consists of suspended organic matter, bacteria, microalgae or even other protozoa. They reproduce by cell division, and a single individual can replenish an entire population.



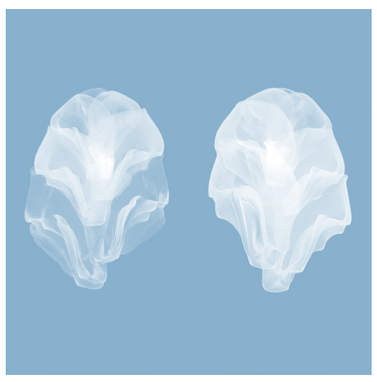
Thalassolampe margarodes

50 < 300 µm.
Is a marine, planktonic, floating, unicellular actinopod protozoan. Its siliceous skeleton is made of very fine spines, the spicules, which can be isolated or joined. In the latter case, they form a remarkably elaborate spherical shell bristling with spines.

Macro plastic 5 cm < 50 cm.
Represented by stretch mesh sleeves.
Requires phthalates to be flexible. May contain cadmium. Pollutes air and water with dioxins - the best known POPs (persistent organic pollutant) - during manufacture (excessively toxic) or disposal.
Responsible for liver cancer in factories. Dioxins return to the air, settle on the ground and accumulate in meat and dairy products, until consumption, when they return to human tissue.

Hydrozoans

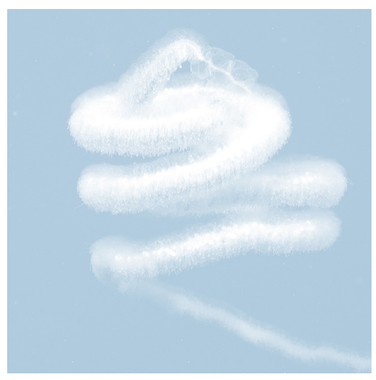
Cnidarians whose life cycle is alternated, but inconstantly, by two different phases: the polyp and the medusa. Presence of a velum in the jellyfish (called craspedote), ectodermal gonads, loss of septa, loss of endodermal cnidocytes. Colonial or solitary. Climate change, current disturbances, indirect pollution, overfishing have led scientists to predict that the “jellyfish era” will soon begin. jellyfish’. In 400 ocean regions considered biologically dead, due to various forms of pollution, there is not much left to live for... except jellyfish! The Red Sea and the Baltic Sea, in their most polluted parts, already look like jellyfish soup. Some predict that, if the current trend continues, in twenty years’ time the ocean may become a world of jellyfish.



Hippodius hippopus

Measures 3 to 5 cm
Is a siphonophore of the hydra family and characterised by a highly specialised stinging cell. It measures on average between 3 and 5 cm in length. The central body, called the mesoglea, is soft and gelatinous and is surrounded by two embryonic sheets (ectoderm and endoderm) : they are diploblastic. An orifice surrounded by tentacles serves as its mouth. Transparent most of the time, its fins become opaque at the slightest danger or stimulus.

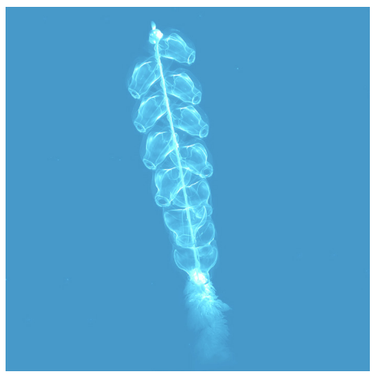
Macro plastic 5 cm < 50 cm
Represented by a plastic bag
Of the 175 million pieces of waste found (study conducted in the early 1990s), 77% are plastic and 91% of them are bags. The plastic bag is one of the best examples that illustrates our society that produces without thinking about waste treatment. The single use of such an object is disconnected from the pollution generated by its production and by its decomposition in a living environment. 80% of plastic bags are neither sorted nor recycled, many of them end up directly in nature and in the seas, either because they are thrown away or because they have flown away. It takes between 100 and 400 years for them to degrade. In addition to the health hazards caused by their decomposition in the soil and the sea, their impact on biodiversity is observable on a human life scale: they suffocate and strangle many marine species, such as turtles, dolphins and tuna, which ingest them because they mistake them for prey, particularly gelatinous plankton such as jellyfish or siphonophores...



Apolemia lanosa

can reach 40m
Is a hydrozoan of the siphonophore family. Considered the longest animals in the world, they can reach up to 40 metres. Their transparency is due to a high water content. They are very sensitive to contact and the touch of a coral or a fishing net can be fatal. Belonging to the cnidarian family and therefore closely related to jellyfish, they are colonial animals, made up of several units composed of several individuals from the same genome. These units are called “zoids”. They are connected to each other by the stolon. The gastrozoids, long stinging tentacles that spread out like a net, are used to catch prey (fish and shrimp). The nectophores take care of the movement. The female reproductive zoids can be recognised by the presence of white eggs. These emit a molecule that attracts sperm of the same species, which allows the budding of other units. They live in very deep water.

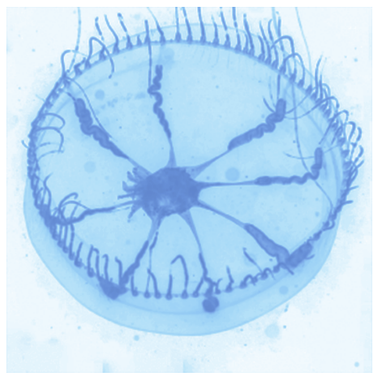
Macro plastic 5 cm < 50 cm
Represented by a Christmas garland.
Christmas lights and plastic garlands are among the decorations used for a fortnight of the year. They are cheaply made, which leads to rapid deterioration: they tear and lose their paints, which are often highly toxic. In addition, marketing campaigns create a false need to renew one’s stock from one year to the next, reducing this decorative object to a single use.



Marrus orthocanna

Can be several metres long and its tentacles can extend 50 cm on each side.
Is a species of pelagic siphonophores in the family Agalmatidae (Hydrozoa). It lives in the cold, deep waters of the Arctic. Like other siphonophores, it is a colony composed of a number of specialised zoids connected by a long stem. The upper part is the pneumatophore, which is orange in colour and filled with buoyant gas. Behind it is the nectosome, a part composed of a number of translucent red nectophores, without radial ducts. They are bell-shaped and specialise in locomotion.

Macro plastic 5 cm < 50 cm
Represented by a colony of soda bottles and a bottle brush.
PET compound: Polyethylene terephthalate.



Melicertissa clavigera

Ø bell 6 mm
Is a hydroid polyp of the family Laodiceidae (class Hydrozoa). It was first described scientifically by Haeckel in 1879.

Macro plastic 5 cm < 50 cm
Represented by a cut-out bottle bottom
PET compound: Polyethylene terephthalate.

The plastic bottle, and what goes with it, is a form of plastic that could easily be replaced by returnable glass and reusable water bottles. Made of HDPE & PET: High Density Polyethylene & Polyethylene Terephthalate. Releases antimony trioxide, a heavy metal. Bottled water contains 30 to 100 times more antimony than unbottled water. PET contains acetaldehyde, which migrates from the polymers into the liquid; found in mineral water and lemonade. The longer the storage time, the more migration occurs.