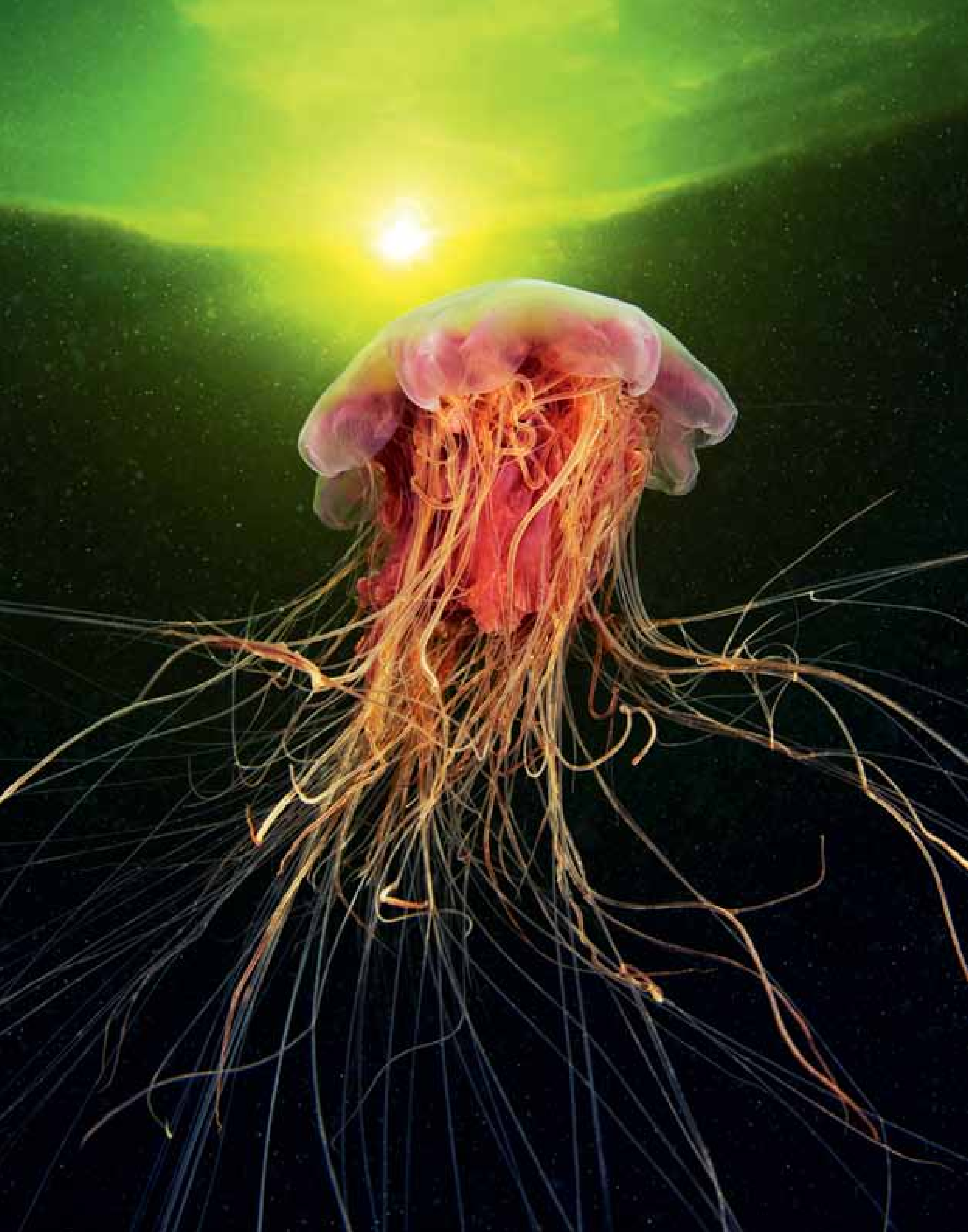
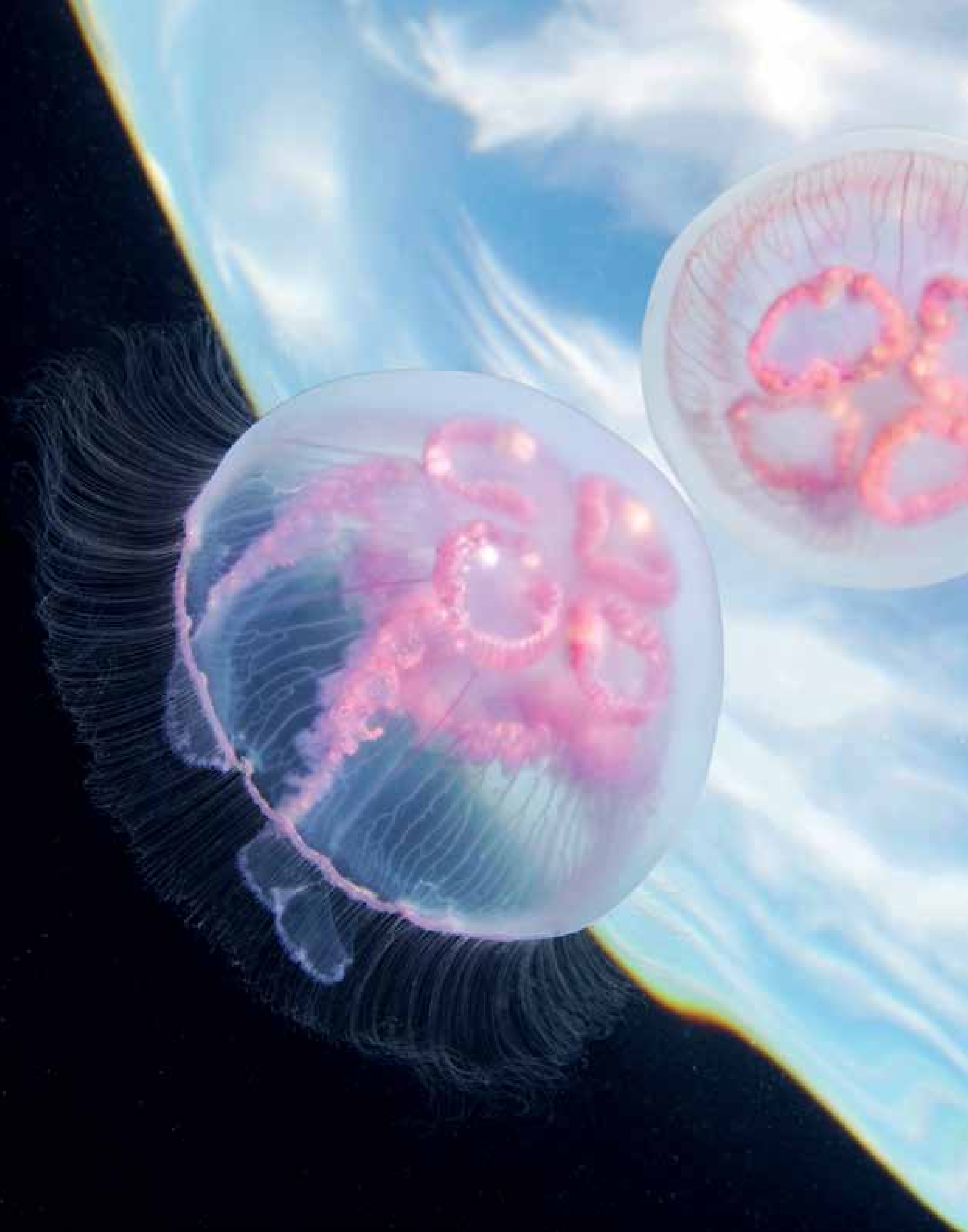


Aurelia or moon jellyfish
Aurelia aurita

Phylum: Cnidaria
Class: Scyphozoa
Order: Semaeostomeae
Family: Ulmaridae
Aurelia aurita
(Linnaeus, 1758)

The *Aurelia aurita,* or the moon jellyfish, is a cosmopolitan species found in nearly every sea of the World Ocean. You can encounter it in the warm waters of the Red Sea and under the Arctic ice cap in sub-zero water temperatures. The *Aurelia* is easy to recognize thanks to its four bright horseshoe-shaped gonads which shine through its hood – they are the jellyfish's calling card. While the standard disc size of an adult jellyfish is 30-40 cm, *Aurelia* can grow into giant plates of more than 1 m in diameter. *Aurelia* float gracefully through the water column, usually at shallow depths, by slowly contracting their hoods and pushing water towards their tentacles. They feed on small zooplankton: crustaceans, invertebrates and fish larvae, which they catch using their long tentacles lined with stinging cells. The jellyfish then moves its harpooned and immobilized victim towards its four oral lobes, which, in turn, push it towards the mouth which is located in their center. After the prey is digested, nutrients spread throughout the body of the jellyfish through the radial intestine channels. Whatever waste remains undigested is ejected from the creature's body through the mouth.

Moon jellyfish have beautiful thin tentacles that look like strings of pearls and are completely harmless to humans. Their stinging cells do not really burn, as they can only penetrate human skin in especially delicate areas. However, even the harmless *Aurelia* can cause serious problems for human beings – this happens when the jellyfish population goes through a catastrophic increase. When this happens, the population of jellyfish becomes so large that they can occupy a volume of several cubic kilometers. The space that such a mass of jellyfish occupies can actually be bigger than the surface area of some European countries! The sheer number of jellyfish is not the main problem though. The most harmful property of these swarms is the fact that they eat everything organic in the huge masses of water surrounding them, leaving other marine animals without food. Other sea-dwellers are then forced to migrate or to die of starvation. Even fish leave these areas, leaving marine mammals, birds and humans withough a valuable food source. Since zooplankton disappears, microscopic algae blooming and reproduce lavishly, blocking the sunlight from reefs and benthic algae, which then inevitably die off. Restoring a local ecosystem and food chain can take several years or even decades.



Aurelia limbata
Aurelia limbata

Phylum: Cnidaria
Class: Scyphozoa
Order: Semaeostomeae
Family: Ulmaridae
Aurelia limbata
(Brandt, 1835)

Another *Aurelia* – the *A. limbata* inhabits the northern part of the Pacific Ocean. Though its lifestyle is similar to that of the common *Aurelia* (i.e. *A. aurita*), which can be found in almost all seas and oceans of the world, the *A. limbata* looks very different. It can be recognized thanks to its dense fleshy hood with a dark brown ring around the rim. These *Aurelia* inhabit the whole water column, from the very surface to depths of up to 1,000 meters. They live in warm 30°C waters, and in sub-zero temperatures. Sometimes they assemble into huge sprawls of hundreds of thousands and millions of individuals, creating overwhelming competition for fish by consuming all of the organic matter in the surrounding water. When there are too many jellyfish in the water column, they stay virtually immobile in order not to harm each other. They simply float in the water, spreading their tentacles and wide oral lobes. They feed on zooplankton: crustaceans, fish eggs and fry, and other small jellyfish and various larvae. *Aurelia* themselves are prey for the giant *Cyanea*. The *Aurelia* that are not eaten by *Cyanea* ly live for a few months. During this short time, they can grow into large individuals of up to half a meter in diameter. These jellyfish are surprisingly fast swimmers, much faster than many other jellyfish: sometimes even a scuba diver wearing paddles can find it difficult to catch an *Aurelia*. In fact, *Aurelia* use a special trick when they swim, which makes them different from other jellyfish. When it expands its hood, the *Aurelia* creates special little whirlpools around it, which makes it easier to move when it pushes again. By observing this distinctive movement, which is the result of millions of years of evolution, scientists can gather knowledge and use it to develop fundamentally new submarine engines and tiny medical robots that will be able to navigate through human blood vessels.

Chrysaora

Chrysaora sp.

Phylum: Cnidaria
Class: Scyphozoa
Order: Semaeostomeae
Family: Pelagiidae
Chrysaora sp.

The *Chrysaora* jellyfish, or the sea nettle, has earned its name for a rather unpleasant characteristic: its long colorful tentacles are covered with very strong stinging cells (cnidocytes) that can leave memorable burn scars. There are many different types of Chrysaora and its various species live in almost every sea and every depth of the World Ocean. These jellyfish swim actively through the water column. During the day, they drift vertically, often in large groups, covering up to a kilometer in depth in a single day. Adult jellyfish range in size from 8-12 cm up to several meters. They hunt different prey depending on their size, from tiny crustaceans and larvae to large fish and other jellyfish. Some cold-water *Chrysaora* have not been described yet, and their lives remain a mystery.

Cyanea
Cyanea capillata

Phylum: Cnidaria
Class: Scyphozoa
Order: Semaeostomeae
Family: Cyaneidae
Cyanea capillata
(Linnaeus, 1758)

The *Cyanea capillata* is a truly legendary creature and the protagonist of an Arthur Conan Doyle story. The *C. capillata* is the ocean's largest jellyfish. Its hood can surpass two meters in diameter and the tentacles of these giants stretch out to more than 36 meters! They can shrink to form short think "sausages" or stretch out to their their full length and become incredibly thin and practically transparent. When the *Cyanea* hunts, it spreads its tentacles all around. It needs to contract its hood just to keep floating in the same spot. There it hangs, quietly suspended in the water column while its tentacles trap prey in a wide area surrounding it. Where the tentacles of one *Cyanea* end the tentacles of another begin, so several meters of the water column (sometimes dozens of meters) can be permeated by the trapping nets of dozens and even hundreds of *Cyanea*. Their tentacles are covered with batteries of burning stinging cells (cnidocytes) that shoot poisonous filaments into any victim that touches them. Their venom can kill small creatures and cause significant harm to larger ones. Surprisingly, the main food source of these giant jellyfish is other jellyfish. Jelly-like organisms make up around 70% of the *Cyanea* diet, and the remaining 30% is composed of small planktonic crustaceans, fish fry and various larvae. When there is an abundance of jellyfish in the plankton, they are trapped in the huge *Cyanea* nets and become entangled. Then the *Cyanea* contracts its tentacles, pulling the prey towards its oral lobes, which look like soft stretchy fabric. The *Cyanea* then gradually covers its victim with its lobes, until it is pletely enveloped. Digestion also takes places within the oral cavity. *Cyanea* are even capable of swallowing jellyfish that are slightly larger than them.

When it is time to breed, the *Cyanea* must produce a large mass of gametes in the folded gonads hanging freely under its hood. If a jellyfish wasn't able to consume sufficient nutrients to create "building blocks" for future generations, it gets them from its own body by digesting the tentacles and decreasing significantly in size. At the end of their breeding season, *Cyanea* look like floating alien flowers, since they lose their giant mane of tentacles.

Phacellophora
Phacellophora camtschatica

Phylum: Cnidaria
Class: Scyphozoa
Order: Semaeostomeae
Family: Ulmaridae
Phacellophora camtschatica
(Brandt, 1835)

The *Phacellophora* is a very distinctive scyphomedusa which inhabits the cold seas of the Far East. This species has strong ties with the Kamchatka Peninsula which actually gave it its name. As it develops, this jellyfish undergoes a truly miraculous transformation: the once beautiful and graceful ghost-like creature becomes a huge puffy fried egg jellyfish. It gets its name from the bright yellow colour of its stomach which shines through its transparent hood. The color of the "yolk" largely depends on what the *Phacellophora* had for lunch. And it eats everything that sticks to its sprawling tentacles – mostly other jellyfish, comb jellies, salps and other jelly-like creatures. Although their stinging cells have a very weak toxin, they're great at sticking to things. If a *Phacellophora* tentacle suddenly sticks to you, you can simply peel it off and return it to the jelly, since it won't even burn you. Small crustaceans often settle on these jellyfish and steal food from their tentacles and right from their mouths! Certain fish can even swim peacefully and live their whole lives among their sprawling tentacles.

Phacellophora tend to be quite weak and can barely resist the currents, but their bodies still command respect, since their hoods can reach more than a meter in diameter and extend to nearly 6 meters in a thich mop of tentacles. Sometimes masses of *Phacellophora* appear in a particular region, eating anything and everything they encounter. More often though, *Phacellophora* drift alone, clearly visible from the surface thanks to their bright yolky colour. These jellyfish have a great appetite and they eat well, but they themselves are an important food source for dozens of animals: fish, birds and various small crustacean parasites happily feed on these mesoglea fried eggs. The *Phacellophora* is therefore an important animal with a firm place in the food chain, especially considering how widespread it is. Surprisingly, this seemingly local jellyfish with its geographical name can be seen far beyond the coast of Kamchatka, in places like Chile or the North Atlantic, for example. This is clearly shows how ocean currents flow and how far they can carry plankton inhabitants.

Ctenophores

Ctenophores, or comb jellies, are a large group of planktonic animals classified in a separate phylum. With rare exceptions, all of them belong to the jelly plankton. All ctenophores have one thing in common – eight rows of swimming combs which line the sides of their bodies. These combs are formed by lash-like cilia sticking together. They beat in beautiful synchronization to create a wave along the ctenophore's body and push it forward through the water like little ores. Ctenophores are the largest animals that use cilia to move. Some ctenophores, such as the comb jelly called the Venus girdle *(Cestum veneris)*, reach a length of 3 meters, but their average size rarely exceeds 8-10 cm.

All ctenophores are predators and feed on zooplankton of all shapes and sizes. They can eat planktonic larvae and small crustaceans, as well as small jellyfish and even other comb jellies. In general, different species of ctenophores eat in completely different ways; some have a huge mouth with ciliated teeth, some have sticky tentacles, and some have ladle-like oral lobes that they use to pull in prey. Masses of ctenophores appear in cold seas in early spring and play a crucial part in the food chain and the ecosystem as a whole. In past years, they have eaten almost the whole *Cyanea* and *Aurelia* populations, emptying the seas of jellyfish and their offspring for the next season. This, of course, seriously impacts the delicate balance of power in the plankton. In another case, *Mnemiopsis leidyi* comb jellies were carried in ship ballast water into the unfamiliar territories of the Black and Azov Seas. There, they wreaked havoc with their competitive nature and voracious appetite. They ate nearly all of the available plankton, leaving local animals without food. As a result, many marine dwellers simply starved to death. Since the main food source was depleated, fish also disappeared. This was a real disaster not only for the ecosystems of the Black and Azov Seas, but also for local residents, since their livelihood largely depends on abundant fishing. Other comb jellies – *Beroe ovata* – were specially introduced from North America in order to defeat the invasive *Mnemiopsis*. By eating the *Mnemiopsis,* they controlled their numbers, and the Black Sea ecosystem slowly began to recover. The damage these ctenophores caused is so severe that restoring the zooplankton populations to their original levels will take years.

Ctenophores are believed to be very ancient creatures. Their taxonomic position is still the subject of fervent debate among scientists. Since ctenophores' bodies are made of soft tissues, they leave practically no fossils behind. Scientists have found fossilized impressions that look like ctenophores, but despite an overall similarity, the anatomical structure of the potential ancestors is quite different to that of the modern ctenophore. Understanding their evolutionary place could give us the answers to many questions about the origins of multicellular organisms. Recent studies which used molecular analysis suggest that ctenophores were the first group to separate from a common ancestor. They did so even before sponges, which are morphologically more primitive.