From *Underwater Wonderland: A voyage of discovery through the sea*

(*Verden under vann: En oppdagelsesreise i havet*)

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**Introduction**

During the school holidays of my childhood I spent many hours a day playing on the jetty beside our cabin on Ullerøy, back home in Sarpsborg. While all our parents were at work, Grandma and Grandpa looked after my brother, our cousins and me, and we spent our days exploring the natural world around us. We built tree houses, jumped on the trampoline and whittled toy boats out of bark.

But above all else, we loved to lie on the jetty and peer down at the life that swirled around in the sea beneath us. Here, we could gape at shrimp, perfect our crab-catching skills and ponder why some types of seaweed were green, while others were brown. Grandpa was a chemical engineer and natural sciences enthusiast, and his field microscope was one of our most treasured possessions. We used it frequently, along with a copy of *The Big Handbook of Nature*, which we consulted so often that its spine had to be re-glued around once a year. Every day, we had a thousand new questions. There, down on the home-made floating jetty, flourished an endless fascination for the strange and the unknown.

Because below the water’s surface is a vast and colourful universe – although few people probably think about just how enormous it is. It’s often said that the sea covers around 71 per cent of the earth’s surface, but this is only half the truth. Were you to flatten out all the earth’s mountains and valleys into one continuous mass, it would have an average height of around 840 metres. Were you to do the same with the sea, however, the average depth would be around 3,700 metres – that is, almost 4 kilometres.

And when we consider that it’s much easier to move up and down in water than it is through an equivalent volume of air, you quickly discover that almost 99 per cent of the areas on earth that are inhabitable by animals are in the sea. It was here that life arose, and it is likely here that life will draw its final breath, at some point in a hopefully distant future.

All in all, we have identified approximately 1.2 million animals here on earth, but some researchers believe that there may be as many as a billion different creatures out there, and hundreds of new species are being discovered every single day – many of them underwater. So far, we have roughly surveyed only 10 per cent of the sea, and explored only less than 5 per cent of it in detail.

I like to think that you protect what you love, but it’s hard to love something if you don’t know it exists. And when it comes to the sea, there’s much we don’t know, simply because the different species and underwater discoveries haven’t been part of our basic education. My aim with this book is therefore to take you on a journey into my world. Down into the kelp forests and to the precipitous flanks of hydrothermal vents; down into the crushing, pitch-dark depths and into the beating heart of the earth. I’ll take you to some of my favourite places to meet some of my favourite organisms, and hopefully you’ll find a new favourite or two of your own.

I hope you’ll set aside this book before you finish reading it – because you simply *have* to go down to the shoreline to look for a bristle worm or nudibranch, or because you have to Google the ping pong tree sponge to see it with your own eyes. Regardless, I hope that you’ll be left with a feeling of both wonder and bewilderment, and a desire to know more.

**Chapter 4**

**Go home, Evolution – you’re drunk**

It’s said that beauty is in the eye of the beholder, and though my profession obligates me to love all creatures equally, I’ll admit that I still catch myself biting my lip every now and then. Roughly speaking, evolution is random mutation over time, and as a general rule will favour practicality over aesthetics – or at least, over what we humans regard as aesthetically pleasing.

In other words, in vast areas of the sea, animal life couldn’t give a toss about the human race’s unattainable beauty standards, quite simply because it’s often far too impractical. Long eyelashes, perky bottoms and breast implants aren’t particularly useful down there in the dark at depths of 4,000 metres. Because who needs to look pretty when nobody can see you? I certainly don’t.

The result is often creatures that can seem like the very definition of ugliness itself. This chapter will therefore be about all the animals you don’t print out poster-sized images of to hang on the wall – unless you have some weird interests, that is. It’s dedicated to the species who were last in line when good looks were being handed out.

Let’s get right to the point and start on the other side of the globe, where the fittingly named goblin shark (*Mitsukurina owstoni*) stands out as being an extremely poor contender for any country’s Next Top Model.

Readers who have seen the Harry Potter films, and are familiar with the goblins who run the local bank, might have already begun to imagine what this shark looks like. Alternatively, you can think of the kaiju named ‘Knifehead’ from the movie *Pacific Rim*. The goblin shark can grow to more than three metres in length, and has an excessively long and prominent nose. In Japanese, it’s named the *tenguzame*, after the mythological Japanese *tengu*, which are often described as creatures with beaks and human-like features.

This might sound silly when we’re talking about a shark, until you realise that this one really *is* pink and floppy, with an enormous nose. A bit like a 180-year-old man with a huge schnozzle who always lies on his belly. And who has fins, sharp teeth, and skin like sandpaper. And a jaw that can be disconnected from his head. And gills. In other words, just your typical neighbourhood pensioner.

Sidebar: Sharks, rays and a group known as rabbit fish belong to what we call the cartilaginous fishes, because they have skeletons made of cartilage and branched off from the rest of their fishy friends 400 to 500 million years ago. Since then, they’ve done most things their own way, because you can do that, when you’re a shark.

Whereas the bony fishes have overlapping scales covering their bodies, the cartilaginous fishes have what we call placoid scales. Placoid scales are actually tiny, bent teethlike structures that stick out of the skin, with a shape somewhere between a whale tail and the spoiler on a Formula One race car. If you touch sharkskin, you’ll notice that you can only stroke it ‘with the nap’ – like a hedgehog, for example – because the scales point backwards. This shape has proved phenomenal at preventing marine growths, and for breaking up turbulence and drag, which enables the fish to swim more easily through the water. It’s also been shown to function as an excellent sandpaper, and was used for precisely this purpose before today’s modern sandpaper was invented.

Back when I was studying fish anatomy and discovered this, I immediately jumped into action as only an inspired 22-year-old with no business experience can, telling anyone who would listen about how it *must* be possible to use sharkskin-like substances as a replacement for antifouling paints on boats. My paranoia therefore peaked when, three months later, I read that the American military were about to embark on experiments to see whether placoid scale imitations on ships might be something worth pursuing. If I wasn’t already sure that everything in the universe was about me, I certainly was after that.

Anyway, the point is that biomimicry – that is, taking inspiration from nature to solve society’s problems – is extremely cool, and should be explored much more.

But back to the shark way of doing things, which is a little more relevant to the story of the goblin shark.

Sharks, rays and rabbit fish have retained an old-school jaw and head design, where the upper and lower jaws actually constitute a small, detachable system. The opposite of this is the type of jaw we humans have, with a skull and a movable lower jaw connected to it.

And here’s where things get weird, because sharks are able to disconnect their entire jaw from their skull and shoot it out like a little rocket. You can see this when the great white attacks its prey. It rolls its eyes back in its head (technically it closes its third eyelids, but that doesn’t sound quite as dramatic), and thrusts out its mouth. In much the same pose adopted by around 90 per cent of the bloggers on Instagram – but instead of just pouting its lips, the shark shoves out its entire upper and lower jaws. And this looks particularly crazy on the goblin shark, because it shoots out its jaws almost half a metre below its long and prominent nose.

Here, I was going to write something along the lines of ‘not something you’d want to meet in a dark alley’, but the truth is that I think I would have peed myself a little with excitement if I were to meet a goblin shark in its natural habitat.

But let’s stay down in the deep, because it’s here that some of the strangest creatures on the planet can be found. We probably regard these animals as being so very strange because we’re already used to all the absurd stuff that exists up here. Like humongous leopard-spotted camels with two-metre-long necks (the giraffe) and balls of bread dough with teeth and bad breath (the English Bulldog). But every time a research expedition takes us down into the deep, or brings the deep up to us, it’s a crazy new adventure. And one of the very strangest creatures of all is the jelly-head fish (fam. Opisthoproctidae).

This phenomenal creature’s official English name is the ‘spookfish’, or barreleye, because its eyes look like two barrels sticking straight up from its head. But here in Norway, we call it the jelly-head fish – for two reasons:

1. It has a head made of jelly
2. Nobody had given it a proper Norwegian name before my good friend Kaja Lønne Fjærtoft named the fish the jelly-head while on tour with Riksteatret’s theatrical production of *Havboka*.

Is that allowed, you might ask? Absolutely – there are no rules regarding so-called trivial names, and the name that sounds best to the masses is the one that sticks.

The moral of the story? Anything is possible, if only you’re persistent enough.

The jelly-head has proved troublesome for researchers, who have been scratching their heads ever since it was discovered in 1939. If you catch a lump of jelly in a trawl net at a depth of 800 metres and haul it up, there’ll hardly be much left of it when it reaches the surface, and the first specimens of this fish were no exception. The rough treatment the animal received as it was brought up through the water ruined the fine mass of its head. It was only fairly recently, when someone not only managed to catch a living specimen, but also to film one in its natural habitat, that we were able to learn more about how the jelly-head fish was put together.

But this isn’t the only thing out there that has taken the ‘shrimp aspic buffet’ approach in its evolutionary exploration. The good thing about the sea – other than *everything* – is that all or parts of your body can be built out of a gelatinous mass, because it will neither dry out nor collapse under its own weight. You can therefore grow pretty large in volume without using much energy, because as a general rule jelly is just water with a hint of cells thrown in.

So let’s take a closer look at some of the other semi-insubstantial individuals out there.

We’ve already met the sea squirts, of course, and I hope that everyone reading this book has thought of the ‘intestinal sea scrotum’ (or vase tunicate, as it’s actually called) at least once in the last twenty-four hours. So now it’s time to say hello to yet another of the sea squirts’ relatives: the salps.

Salps are also a tunicate, but they belong to a class that enjoy swimming around more than sitting still, and they look like what you’d get if a jellyfish and a sea squirt had a baby. In January 2014, a fisherman from New Zealand caught what he thought was a transparent fish without a head, and the image of his discovery went viral all across the world. And just as quickly as the image was shared came the explanation: the creature in his hand was a *Salpa maxima*. Or rather, an individual from a colony of *S. maxima*.

Because salps can attach themselves to one another in long rows that drift restlessly around with the currents, almost like a swimming parade or a conga line. They have the same inhalant and exhalant siphons as the tunicates that sit still, but instead use them to pump water through themselves, sort of like a tiny waterjet motor. And these colonies can reach e-n-o-r-m-o-u-s proportions. Some form chains, while others prefer to create large balls of jelly, or floating metre-long tubes known as pyrosomes. A spectacular sight when you encounter one in its element.

And oh, by the way – pyrosomes can glow in the dark.

They don’t sting or burn, even though they look like jellyfish. But they can hoover up most of the tiny plankton and particles in the water. This means – as I’m sure you’ve already started to realise – that the salps exist on one of the lowest levels of the food chain. They can eat flakes of the organic matter that swirls around in the water, and transform it into something that can be used by others – both ocean sunfish and turtles have been documented munching on these small clumps of jelly. How such large animals can derive nutrition from something that’s around 95 per cent water is unknown, but it’s probably similar to when we eat cucumber.

But let’s get back to the flaccid tunicates. Out there in the big wide world, there are some truly spectacular specimens, and the most glorious of them all has to be the ox heart tunicate (*Polycarpa aurata*). It looks even cooler than you’re probably imagining it to be from its name. Like all other tunicates, the ox heart has the usual potato sack shape, but its body is decorated with a network of what can best be described as blood vessels or veins. I had the pleasure of seeing them in their natural habitat while on a snorkel safari in the Gili Islands a few years back. I’m pretty sure I swallowed half my own bodyweight in seawater from sheer excitement, and I’m still disappointed that my friend, who was diving for the first time, was unable to see it because it grew too deep.

Another fabulous species is the bleeding rock tunicate (*Pyura chilensis*). The first written descriptions of this species date back to 1782, when a Chilean abbot visiting the Chiloé archipelago noted that the local population seemed to eat living rocks. It must have been such a treat to be an explorer back in the old days. Just think how absurd it would be to pick up what you think is a stone, only to discover that not only is it soft – it’s also full of organs.

The bleeding rock tunicate is still a popular delicacy today, despite the fact that it has the slightly soapy taste of iodine. Regardless, if you’d like to try it, you can always take a trip to Sweden. A report I found from 2006 states that over 32 per cent of all exports of this species are sent to Sweden. God only knows why, but after lurking around on Reddit for a while I found a thread that informed me this might be because many Chileans live in Sweden. Another pointed out that Pyura is the secret ingredient in the traditional Swedish Christmas soda ‘*Apotekernas julmust*’, but the source link was dead, so the trail went cold. If any readers happen to have any insider info on this, I’d most definitely like to know.

Another group of filtering creatures that stay stuck in one place, and which we’ll have to come back to, are the barnacles. The strangest of them all is the Rhizocephala, or as we call it in Norwegian, the ‘root barnacle’ (Rhizocephala: rhizo = root, cephalus = head), and it takes parasitism to a whole new level.

As the name suggests, the life of the root crab barnacle is based on – wait for it – roots. As upcoming young larvae, the males and females are relatively similar, but as is the case for many humans it’s the female barnacle that matures first, and who prepares to settle down with a house and kids and station wagon. When the time is right, she finds an appropriate host – in this case, another crustacean – then sneaks in through a weakness in the otherwise thick armour of the host organism. And when I say, ‘sneaks in’, what I really mean is ‘opens herself up using a kind of zipper and squeezes her bodily fluids into the host’. In other words, the Rhizocephala was probably in the bathroom when the expression ‘the simplest solution is often best’ was first announced, and seems to have confused ‘simplest’ with ‘silliest.

Safe inside the host – let’s say any ordinary shore crab – the barnacle starts to produce a complex network of roots, *vermigon*, which spread out into all the nooks and crannies where the barnacle can extract nutrients: mainly, in the crab’s digestive system.

As soon as this internal route network of parasitic threads is mature, the roots make their way to the genital opening and form a balloon where the crab’s spawn would usually emerge. The balloon is the same shape as a cluster of eggs, and emits pheromones and other alluring chemicals as a signal to passing larvae of the opposite sex to come on over. The more or less (un)fortunate male that happens to get there first now gives up everything else in his life to merge with this female blob of sexiness. He denounces any former desire to be his own person, and spends the rest of his life as a sperm-donating sack attached to the girl of his dreams.

Now, I could probably ascribe to these animals some human attributes. I could fantasise about the male falling head over heels in love, and make the entire thing into a poetic, romantic scene. But I’m not going to. We’re talking about barnacles, after all. Parasitic barnacles that expend all their energy infecting another organism’s gastrointestinal tract. It’s not exactly Romeo and Juliet.

But even if the interaction between the male and female can’t be compared with a romantic comedy, the female’s influence on the host certainly could provide the inspiration for a film. *The Walking Dead* and zombie movies would probably be the right genre to look to. Because the female also winds her threads up into the host’s brain, instructing it that all nutrients shall now be sent down to her – which the chosen crab believes to be its own spawn. This false motherly instinct is so strong that even infected male crabs go around feeling excited about their upcoming motherhood. It’s quite sweet, actually – but at the same time, a little sad?

The lucky infected males are not only sterilised in the process (at least temporarily), but they also develop female characteristics, such as a wider flap, in order to better take care of their new lodgers. In addition, the host will actively engage in waving fresh, oxygenated water over the barnacle, and clean and tend to it as if it were a baby, until it happily watches the larvae swim off to infect new crabs elsewhere (cue *Circle of Life*).

What a beautiful world we live in.

And if you’re now feeling a little affronted that such abominations exist right there at your nearest beach, then hold on tight, because things are about to get worse. In our series ‘really weird things in your neighbourhood’, it’s time to take a look at our friend the common monkfish (*Lophius piscatorius*).

This fish consists of around 70 per cent head – the rest is all just tail and decoration. And in the unlikely event you’ve never seen a common monkfish before, you can get an idea of what it looks like by taking a bowl of pancake mix, stirring in a few spoonfuls of chocolate sauce, frying this concoction until it’s around a third of the way done, and then throwing the resulting half-cooked monster pancake as hard as you can at the wall. And, irresponsible educator that I am, I recommend that everyone tries this at home (the author, however, takes no responsibility for any injuries to persons or damage to property).

Then all you need to do is add a bunch of sharp teeth and a couple of eyes, et voilà. The common monkfish.

The monkfish has detached the first three spines of its dorsal fin and turned them into a fishing rod with a bit of skin on the end. To the untrained eye of a young saithe, for example, the bit of skin can be mistaken for a little worm. In addition to being fifty shades of brown, the common monkfish is covered in small, kelp-like growths to help it blend into its surroundings, and it waves its fishing rod until an unlucky little saithe comes past, hoping for a tasty morsel.

And the common monkfish is a greedy creature. When I worked as an aquarist at the Bergen Aquarium, we had one – I called it Berit – and it ate everything it came across, as long as it thought the prey was alive. It’s actually quite a feat to be so fussy *and* gluttonous at the same time, but Berit managed it with ease. And since it isn’t legally permitted to use live animals as feed in Norway, we had to get a little creative whenever feeding time rolled around. Usually this meant putting a dead herring on a specially designed piece of equipment (read: a broom handle with zip ties), and waving it around in front of the fish.

One day, when my good friend and former colleague Frits arrived at work, Berit had apparently finally lost it. She had swallowed a salmon almost the same size as herself, resulting in the terrified victim swimming around for ten minutes while wearing a kind of monkfish poncho with teeth – until the poncho finally swallowed the animal whole.

And before you ask why we didn’t intervene – there was nothing we could do without taking the life of both the monkfish and its prey. The salmon was already more than halfway down Berit’s throat when they were discovered, and at that point it was sadly doomed. Not only does the monkfish have masses of teeth lining its jaws, but these are also numerous down its gullet, and help to work large prey towards the stomach. These, like the teeth of many other predatory fish, are constructed such that they can be tilted inwards, but lock in place if anything travelling the opposite way pushes against them, just like fishing barbs. Had we attempted to pull the salmon out of a mouth like that, we would probably have pulled out half of Berit’s teeth, too, so the situation simply had to run its course.

My first encounter with a live monkfish outside the aquarium’s walls was at ten or twelve metres deep off the coast of the island of Sotra some time in the early 2000s. A friend and I were on a diving trip, and, opportunistic gatherers that we are, had taken along both nets and knives to collect flounder, kelp and scallops. Anyone who has gone diving with me, or even just seen me anywhere near water, knows that I become a kid again as soon as I catch sight of anything that glimmers, flickers, flaps or generally looks alive beneath the surface. In other words, I was deeply engrossed in staring at a snail when an unbelievable racket reached my ears (although this is perhaps somewhat exaggerated – there’s a limit to what you can hear through a five-millimetre-thick neoprene hood).

I had time to do no more than turn my head before a hot-tempered monkfish was flung into my face by my friend, who was disappearing towards the surface at top speed. In his eagerness to catch our evening meal, he managed to press a few buttons he shouldn’t have pressed, and filled his vest with way too much air. The result was that his body suddenly became a huge balloon, which pulled him up to the surface while I remained sitting on the seafloor with a raging fish in my lap.

So there I was, twelve metres down and alone with a lump made up of 70 per cent mouth and angry teeth. Which had been stabbed in the head by my friend’s knife, and which was now snapping around me,[[1]](#footnote-1) in a loving embrace of life and death. It doesn’t get any more zen than that.

Monkfish belong to an odd group known as the *Lophiiformes*: a large number of more or less… *unique* fish that use one or more of their spines as fishing rods, and which are therefore referred to as anglerfish in English. In Norwegian we call them *marulker* – probably because the direct Norwegian equivalent of anglerfish – ‘*fiskerfisk*’ or ‘fisher fish’ – sounds a little silly, even if it is definitively more descriptive (ref. the ambush fishing method practised by Berit). Anglerfish is a collective term for around 200 species that live at different depths, and which all hunt more or less in this way.

Anglerfish are what you would get if you let a five-year-old obsessed with dinosaurs, dragons and candy design a fish. In addition to the common monkfish, we find charming representatives like the batfishes and frogfishes (family Ogcocephalidae and suborder Antennarioidei, respectively).

Frogfishes are peculiar things. I have a feeling this expression is going to be somewhat overused throughout this chapter, but so be it. Firstly, the frogfish saunters about on the seabed on two flesh-filled, flaccid pectoral fins. And when I say saunter, I mean that it quite literally saunters. These fish also have a huge mouth, which is often hidden behind completely ridiculous growths, stripes and occasionally other organisms. Because some frogfish choose to camouflage themselves by using algae and hydroids – that is, small jellyfish-anemone hybrids, much like the decorative crabs we met in the kelp forest.

My current favourites in this group are the psychedelic frogfish (*Histiophryne psychedelica*) and the hairy frogfish (*Antennarius striatus*). The first looks like one of those colourful lollipops you can buy at the funfair. The other can best be compared to the result of the little ‘scientific experiment’ I accidently ran when I left a pot of pasta carbonara in the fridge while I went on a scientific cruise around Svalbard for a month.

I could probably have written an entire book about the anglerfish, because the more I read about them, the more weird species pop up. Including the handfish (Brachionichthyidae), which I’ve now officially named the mohawk fish, because it looks like what you’d get if you stuck a mohawk hairstyle and seagull feet on a dried leg of mutton.

The Latin name Brachionichthyidae actually means ‘arm fish’ (bracchium = arm, ichtys = fish), and it isn’t hard to imagine how the ancient fishes took their first steps and began to crawl around on land when you look at how these fish do it. But before the fish and evolution experts get on my back about this: yes, I know we’re not descended from handfish/anglerfish. We most likely come from around the same place as the lungfish, but that’s a story you can read about in another book.

Perhaps the most well-known relatives of our monkfish friends are the deep-sea anglerfishes (suborder Ceratioidei), who live exactly where the name indicates: in the deep. Like their relatives at the surface, these fish are also keen anglers, but since you can’t see very much down in the depths where it’s completely dark, they’ve exchanged their flap of skin for a small bulbous light. Light is an excellent way of attracting attention, and when a little nosy parker gets close enough, the deep-sea anglerfish wolfs down it’s unlucky prey faster than you can say ‘lightly fried fish fillet’.

But the deep-sea anglerfish are not alone in having excessively big teeth, light bulbs and other growths in places you never could have imagined. The members of the family with the appropriate name ‘viper fish’ (*Chauliodus* sp.) and the two known species of fangtooth (*Anoplogaster brachycera* and *A. cornuta*) all flaunt a set of teeth that would give even the most experienced dentist a nervous breakdown. The two species of fangtooth, which for some reason or other have a Latin name that means ‘unprotected stomach’, actually possess the biggest teeth in the animal kingdom relative to their body size. I sent photos of this spectacle to my good friend and dentist Malin to hear what she thought, and learned many new swear words that day.

The truth is that we don’t know all that much about the species that live in the deep. Few have been observed in the wild, and even fewer, if any, have given us the opportunity to observe their daily behaviour. The reason for this is that they live in places that are hard for us humans to get to.

If you’re curious about how a great tit lives, for example, you can go outside with a pair of binoculars and a decent helping of patience. If you want to know how a deep-sea fish behaves, you first have to get hold of a solid submarine or a subsea robot (an ROV) that can film for you, without collapsing under the enormous pressure. Then you have to search for a small fish, often no bigger than a football, in the dark, in an utterly gigantic swimming pool (the sea). Then you need to be lucky enough for the fish not to be scared away by the bright headlamps and all the noise you’ve brought with you, before you can finally begin to document your findings. And if you manage all this, you’ve most probably blown the entire budget of a small Norwegian municipality already, because this type of research is ridiculously expensive and therefore sets its own frequency limits.

So once again, the patient reader has to make do with a drawing of what creatures can end up looking like when they’re permitted to evolve over a couple of hundred million years without access to competent dentists.

Another hooligan with a huge mouth is my absolute favourite fish of all time: the pelican eel. I first met the pelican eel (*Eurypharynx pelecanoides*) when I was nine or ten years old, in the library back home in Sarpsborg. It was love at first sight when I came across a picture of this lovely abomination, and since then it’s held a special place in my heart. Even after I learned that it’s relatively modest in size, and not 20 metres long, as my child’s mind had fantasised.

Because when I first read about the monsters of the deep, I imagined enormous giants down in the sea’s infinite depths, with huge teeth and a mouth that could swallow a bus whole. Unfortunately, the truth is some light years from this. The fangtooth reaches no more than 18 centimetres in length, and the viperfish a maximum length of 60 centimetres. On a good day, the pelican eel can reach a length of 75 centimetres – which as far as I know is not enough to swallow a bus.

Still, it’s pretty impressive, this little swimming mouth-sack that looks like a kind of Pacman-sperm cell hybrid. The pelican eel has an even larger mouth-to-body ratio than the common monkfish, and its jaws comprise as much as 95 per cent of its entire body. And just like the pelican for which it is named, it can expand its gullet and swallow prey up to three times its own size.

But how is that possible, you may be wondering?

*Stretchiness* is the answer. Because just like an elastic swimming cap, the eel can expand not only its gullet, but also its stomach. And that’s rather practical in the deep, because down here a long time can pass between meals, so it makes sense to be able to gobble down whatever comes along when it comes along.

Nor is the pelican eel alone in this adaptation. In the deep, there are several species that make use of the stretch method, and both the fangtooth and viperfish employ the same strategy to ensure they get enough food. In fact, there’s a species that has been named for its gluttonous personality – the black swallower (*Chiasmodon niger*) – which is only 25 centimetres from its snout to the tip of its tail, but can stuff itself with fish until it’s up to twice as long and *ten times* more massive than its original size.

Ironically enough, it’s precisely this greediness that has made it possible for us to observe the black swallowers, too. Because every now and then they eat such large prey that their body is incapable of breaking it down before the process of decomposition kicks in, which leads to the glutton involuntarily filling with air, dying, and rising to the surface. Sort of like my diving buddy’s vest when we were hunting for monkfish. Up at the surface, the black swallower bobs around, ready to be picked up should a random researcher, holidaymaker or other especially interested person happen upon it.

Black bodies and body parts are another interesting adaptation to life in the deep that the fish have figured out. Because in the deep, there are many self-illuminating animals, and if you eat things that glow in the dark, it’s pretty revealing if they continue to shine on inside your belly. Then you’re no more than a swimming lantern yourself, unable to switch off the electricity.

The solution to this problem comes in the form of the animal kingdom’s version of sooty windows. Most deep-sea fish have coated the inside of their stomach with black *epithelium*, in an attempt to dampen the lighting. If you end up with a deep-sea fish on your hook, maybe you can open its stomach and take a look yourself?

To conclude this chapter about evolution’s most bizarre results, I think we should slip back to the world of the cephalopods. More specifically, the blanket octopus (*Tremoctopus* sp.), which makes Doctor Strange’s cape look like a dirty dishcloth. The blanket octopus swims around trailing a huge veil that looks like something you might put on to impress your partner when on your honeymoon.

I’m pretty sure you’d receive a 10 out of 10 from the fashion police were you to wear this blanket on the red carpet – were it not for the awful smell, that is. The octopus’s veil is removable, and can be dropped if she feels threatened. And yes, I’m writing *she* deliberately here, because it’s only the ladies that look like this. The blanket octopus has the craziest form of sexual dimorphism that we know of in the animal kingdom. Sexual dimorphism describes the condition where males and females have very different characteristics. You can think of the different colour patterns of the male and female mallard, for example; the way a bull elk has antlers, whereas the females don’t, etc.

In the case of the blanket octopus, what we’re talking about is sexual *size* dimorphism. The females can be up to two metres long, while the males remain a puny 2.4 centimetres.

And just to emphasise how extremely chic this octopus is – it’s immune to the venom of the Portuguese man o’ war (*Physalia physalis*), which many people will have become acquainted with through quality TV series like *Baywatch*[[2]](#footnote-2), where it’s portrayed as a kind of bloodthirsty, floating brain. When the blanket octopus meets the floating warship – which many regard to be one of the most poisonous animals on earth – she rips off its long tentacles and uses them to defend herself. Because she’s a badass.

I’m going to round off with a quick tour through the world of transparent creatures, because there’s plenty to see here, too. Among others, we have a number of shrimp that can manipulate their cells in the same way that octopus do to become transparent, but the coolest of them all is the crocodile icefish.

The crocodile icefish (fam. Channichthyidae) are actually 16 different species that live in the ice-cold waters around Antarctica. Because the water here is so very cold, there are few fish that are able to tolerate living here permanently. This is because vertebrate blood quickly becomes highly viscous at such low temperatures. But the crocodile icefish has solved this problem by getting rid of the components that make the blood thick – namely, the blood cells.

At first, this might seem like an extremely bad idea. Our blood cells contain the protein haemoglobin, which acts like a little boat for transporting oxygen from the lungs and out into the body. Without the boat, how are you going to transport this vital component to the right destination?

Well, it turns out that as long as you’re small enough (in this case no bigger than 50 centimetres in length), you can simply absorb the oxygen you need from the cold water around you. Such low temperatures also result in a metabolism with the speed of your average snail, so the need for oxygen isn’t particularly great, either. The end product is cell-less, transparent blood, which also makes the crocodile icefish the only medallist we know of in the competition to see which vertebrates can get rid of their red blood cells and still survive.

There are also a couple of other organisms out there that are transparent, such as the glass squid (family Cranchiidae). The glass squid is perfect if you want to learn a bit about squid anatomy without having to take the creature’s life because its entire body is completely pigment free, meaning that you can study its innards right where they are. This is probably a strategy to avoid being seen (which I’m sure won’t come as a shock to you), and completes the squid’s otherwise peculiar appearance. It looks like a bewildered fish wearing a wizard’s hat.

When I googled the animal to find some inspiration for this section, I ended up spending a quarter of an hour giggling at videos of glass squid on YouTube, so you know what to do once you’ve finished this book. Or right now, if you like – I’m not your supervisor. And while you’re googling transparent animals, I’d like to take the opportunity to invite you on a deep dive into the mysterious lives of the cephalopods.

[End of chapter]

1. Luckily, I quickly pulled myself together and put the poor animal out of its misery – it made a delicious meal later that evening. [↑](#footnote-ref-1)
2. Season seven, episode 12 for those who can’t remember off the top of their head. [↑](#footnote-ref-2)