Mola mola

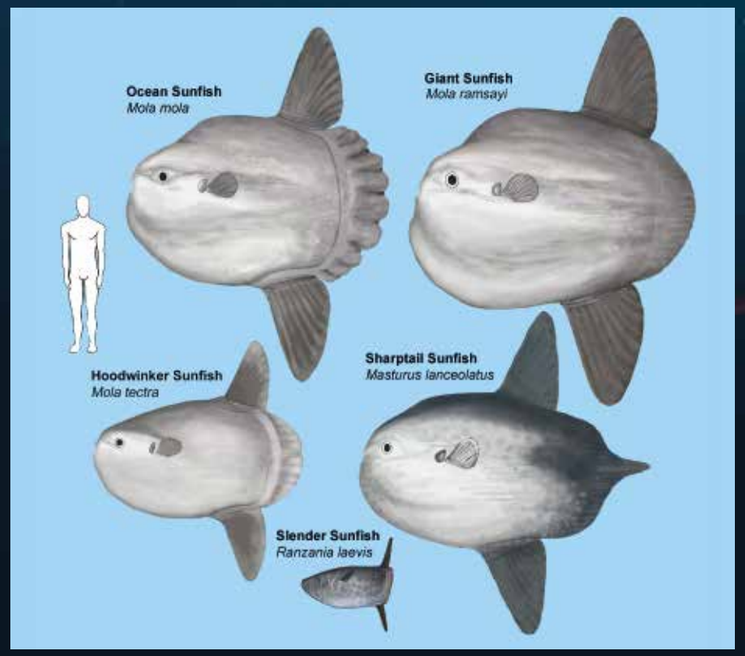
A big fish with an identity crisis

Marine biologist **Jamie Watts** is a fan of the spectacular giants, found in UK waters during the summer. Here he explains how our understanding of them is evolving

Right: A *Mola ramsayi* in the process of being cleaned by Mexican hogfish, Galapagos Islands

Far right: During his research, the author samples a salad of sharptail mola, *Masturus lanceolatus*

Finally, suddenly, out in the blue, there it was. I felt a surge of excitement, but instantly held it in check – I didn't want to spook the fish as I slowly eased away from the wall and into the fast-moving current. This was crazy diving, deep at 30 metres with down-wellings and ripping currents. But it was beautiful, and we'd finally found this utterly ridiculous, gorgeous animal.



That was in 2003, and I was tagging along with a gathering of very impressive folk in pursuit of the world's oddest fish: the sunfish. The late, great Peter Scoones was filming for the BBC, Tim Rock and Scott 'Gutsy' Tuason were shooting stills, and marine biologist Tierney Thys from Monterey was there to study the fish.

It had taken us a few days to start finding the Mola. When I saw my first, I found myself looking at the profile of cartoon canary Tweety Pie. Huge oval eyes and a fixed round pout gave the fish a look of perennial surprise or fear, and even the stubby beak was right. The 'face' was round, and seemed to make up half of the entire animal. It was the biggest fish I have ever seen – indeed the biggest species of bony fish on Earth. But it was only half a fish.

What a tail

Sunfishes are cousins to triggerfishes. But at some point over 40 million years ago, a mutation omitted the tail. Sunfish larvae have a stubby tail, but when they are less than half a centimetre-long, the rear third of the animal stops growing. The rest of the fish grows faster, and far larger, than any triggerfish, and the back of the dorsal and anal fins grow and wrap around the rear of the animal to form a rudder. It looks as if the rear end of the fish has been squeezed in a vice and then nipped off. No wonder it looks shocked.

Compared with other fishes, Mola's muscles are rather poorly developed, except for those powering the over-sized dorsal and anal fins – sunfishes 'fly' through the water. This mode of swimming gives them surprising efficiency – alongside a sunfish that decides to put on a burst of speed is a lesson in humility for any human.

They don't travel the thousands of miles as some large fishes, sharks and marine mammals do each year. But they are more accomplished travellers than they might appear, averaging 20 to 25 kilometres a day while searching and travelling, and about 5km a day around the feeding grounds. Their huge eyes hint at their lifestyle – they need to be able to see their semi-transparent prey in the dark depths where they hunt.

Most tropical seas do not provide enough food for the largest and fastest-growing bony fishes on Earth. They are seen in a few warm areas (notably Bali, Taiwan and the Galapagos), albeit in areas that have some rather chilly water washing around them.

Regular pitstops

Bali's Nusa Lembongan and Nusa Penida, from August to early October are two of the best places on Earth to find Mola; The Indonesian throughflow – where the Pacific leaks back into the Indian Ocean – washes around the islands strongly at those times of year, and the downstream side of the islands slurps up deep, cold water. These conditions, unusually for the near-surface tropics, really suit the sunfishes: you have rich reefs being washed from beneath by cold, rich waters, and visited by plankton blooms.

What they definitely come to these islands off Bali for is a spectacular cleaning service. Sunfishes have thick, leathery skin, which collects a magnificently disgusting array of parasites. All fishes need cleaning for their basic health, but sunfishes need it perhaps more than any other. The best-known site to see Mola is Crystal Bay off Nusa Penida, where dozens of bannerfish and even emperor angelfish change their normal habits at this time of

year and wait on the edge of the drop-off, as cold currents stream by, for the bizarre smorgasbord of juicy parasites aboard their hosts who swim up from the depths to be cleaned.

Most Mola photographs are taken in Bali, and show bannerfishes cleaning sub-adult giant sunfish off Nusa Penida and Nusa Lembongan, but Malcolm's photo of a young ocean sunfish being cleaned is half a world away at Fraggle Rock, off the Costa del Sol. Here wrasse, not butterfly and angelfish are the cleaners. Elsewhere the cleaners are different again, but everywhere you find Mola you see them basking and being cleaned. Off

MAIN PHOTO: SIMON ROGERSON

California the cleaner is the halfmoon fish, a sea chub. In the cool north Pacific, Mola lie by the dozen at the surface, offering their skin as dinner plates for albatrosses. Sunfish skin, gills and organs crawl and writhe with an assortment of worms, crustaceans and flukes.

Ever hungry

Getting cleaned, important as it is, is secondary for these ever-hungry giants.

Above: A young Mola being cleaned by wrasse off the Costa del Sol, Spain

Above right: Sunfish can grow to full maturity in aquaria, though smaller fish often beat them to food

Sunfishes' main food is gelatinous planktonic animals; jellyfishes, salps and others, and the greatest numbers are seen in rich temperate seas where this prey is most abundant. Like many giant marine creatures, Mola feed at the sweet spots where summer warming of surface seas allows them to push into areas with rich, cool seas with plenty of jellyfish.

Sunfishes go as far into cold water as their metabolism will allow, and build up reserves to spawn at some point in the summer. The famous basking behaviour seems to help warm them after deep dives into cold, richer water for their gelatinous prey. As the waters cool and the summer blooms die, sunfishes head offshore over deeper water and spend more time at depth. California, Japan, the richest areas of the north Atlantic, southern Australia, New Zealand, South Africa and Chile are sunfish strongholds.

An old study reported 300 million tiny eggs from a female barely large enough to qualify as mature. How many eggs giant adults produce we can only guess at, but it must certainly be in the billions – far more than any other vertebrate. At least a couple of sunfish species are rather abundant. Hundreds of thousands of *Mola mola* are caught as bycatch in swordfish fisheries, and so far the Mola have been able to take these kinds of losses. The vast quantity of eggs they can produce might explain this, but we know very little about their populations or the state of their stocks.

The larger species of sunfish mature at about 1.8 metres in length, at around 350 kilograms or so, probably at about age seven. Most of the sunfishes seen inshore around the UK, the United States and Taiwan in summer are adolescents or young adults, as are most of the Mola seen off Bali. In captivity some sunfishes have reached 3m long at age 20, but wild animals probably grow more slowly. Some of the big, wild Mola are thought to be a century old.

Researcher at work

Some people just seem to go through life vibrating at a higher level than the rest of us. I have dived with hundreds of buddies over the years, but Marianne Nyegaard stands apart. Her sheer enthusiasm and energy, combined with a nerdy level of knowledge and interest in all things marine-lifey and a dynamic diving style, are infectious. Marianne is a Mola scientist, and has spent the last few years tagging, tracking, DNA sampling and identifying sunfishes.

I joined her on some research dives over two of her seasons. It's a beautiful environment but she picks some high-energy dive sites and goes deep in currents in search of her study animals. It's fun, but not for the faint-hearted. At a couple of well-known sites crowds of divers visiting for the sunfish season make it impossible for the sunfishes to settle enough to be tagged or a skin sample taken.

She's pretty focused, and very clear – I stay back and close to the wall until she's got her tag onto a fish and her skin samples for DNA. Then, with the fish settled I can get my photos and video. She's finding out where these fishes go

PHOTO: MALCOLM NOBBS

PHOTO:JAMIE WATTS

(not as far as we might think, apparently), that the ones in Bali are not *Mola mola*, and she's just described a species that's been hiding in plain sight for more than a century.

Scientific confusion

Sunfish species identification has become confused over the years, with diagnostic features used to identify species apparently misjudged. Most sunfish look similar until they get to more than 2.5m long, when they broaden out and some species grow crest-like and brow-like ridges. The Ocean Sunfish, *Mola mola*, the most common and widespread species, is found almost worldwide. This is the species commonly seen and photographed (mainly youngsters) off the UK's west coast, and off California each summer. It probably reaches almost 3m long and the largest individuals exceed 1.5 tonnes. When they mature, the edge of the clavus – the stump at the back of the animal that has replaced the tail – becomes fan-like and develops lobes.

The real giants among the sunfishes are another species, found off western Japan, southern Australia and New Zealand in their respective summers. These bigger Mola seem to be a species that was originally described as the southern sunfish, *Mola ramsayi*, but it turns out they are not particularly 'southern', so calling them 'giant sunfish' seems more appropriate. These are the fish seen off Bali as young adults, when they still look very much like *Mola mola*. The 'tail' in the giant sunfish doesn't become a lobed fan in large adults, the giants become rather bulbous and massive in the fore body, and taper more into the tail.

So how big does this giant species get? A 3.1m-long fish caught off Sydney weighed 2,235kg, a shorter fish off Japan recently was nearly three tonnes. Several giants off Japan have been measured longer than this, so the 3.5 tonnes estimated for another fish off Australia seems reasonable, especially as large adults become more heavily-built with age. Females grow bigger than the males, any animal more than 2.5m long is almost certainly a lady.

Naming a species

Marianne and her colleagues began to suspect, then investigate that another species had been missed, and that confusion of identification features had kept this species hidden. After some detective work, plenty of DNA sampling from around the world and examination of new and old specimens and records going back over a century, Marianne and team recently published their findings; a new species, looking much like the younger members of the other Mola species, but with a slightly different tail-rudder, and apparently never bulging or lobe-ing out, has been living off Australia, New Zealand and South Africa, right under our noses. It had hoodwinked scientists, so naturally it became the hoodwinker sunfish, *Mola tectra*.

As well as the three Mola species, two more sunfish exist. The sharptail sunfish is found in slightly warmer seas, a local fishery and even something of a sunfish culture exists off Hualien province on the east of Taiwan. Because they are abundant off Hualien, fishermen set themselves a challenge to come up with more appetizing and saleable food products. The best apparently is a kind of dried sunfish crisp, something along the lines of a prawn cracker. I tried sunfish salad made from the gelatinous connective tissue under the skin. The salad and dressing were delicious, but the sunfish component pretty foul. The sharptail grows longer than other sunfishes thanks to the tail, but its sleeker build means it rarely if ever reaches a tonne.

The last species of sunfish is the small and somewhat sleeker, suitcase-sized slender sunfish. They seem to be abundant throughout warm seas and they have been known to mass-strand in some places, but they don't seem to hang around in areas divers frequent… as far as we know.