

BY JAY MACLEAN

the HIDDEN

majority

A FAMILY SNAPSHOT: GOBIES MAKE UP THE LARGEST FAMILY OF MARINE FISHES IN THE WORLD, PROBABLY IN EXCESS OF 2,000 DIFFERENT KINDS. IN THE WESTERN PACIFIC- EASTERN INDIAN OCEAN OR INDO-PACIFIC AREA THERE ARE ABOUT 500 MARINE GOBY TYPES. THE NEXT LARGEST GROUP OF FISHES IN THE AREA ARE THE WRASSES, THEN DAMSELFISHES, BASSLETS AND GROUPERS, AND THEN BLENNIES. ABOUT 10 % OF GOBIES LIVE IN FRESHWATER, WHILE A FEW SPECIES SPEND THEIR YOUTH IN FRESHWATER AND GO DOWN TO THE SEA TO SPAWN.

Gobies are basically small fish, usually less than 10 centimetres long, with the largest being only about 50 centimetres. Their main distinguishing characteristic is that their pelvic fins (the pair of fins half-way along and underneath a fish's body) are partly or totally joined to form a disc, which when well developed is sticky and allows them to hang on to a host animal or rock or mangrove even in strong currents.

Many of them are popular aquarium fish and some live at least seven years in captivity. Some have been introduced into other countries' waters. One tropical goby in Hawaii is known to have been introduced there from its native waters in the Philippines and Taiwan.

Most of the reef species are only two to five centimetres long. In fact, gobies include the world's smallest fishes, as well as the smallest animals with

backbones (vertebrates). Filipinos take pride in two tiny gobies. One is the dwarf pygmy goby *Pandaka pygmaea*, which grows to a maximum total length of only 1.5 centimetres and was initially known in only a few freshwater systems in the Philippines. We have almost extinguished it from the country through reclamation, pollution and introductions of exotic fish. It's now known to occur in lakes in Indonesia and recently has been collected in the sea near Culion Island [Palawan, Philippines] and from Singapore. The other is the freshwater sinarapan *Mistichthys luzonensis*, only found in a few lakes and one river system in the Philippines; it grows to 2.5 centimetres and, like the dwarf pygmy goby, is in danger of extinction.

However, the really small gobies are found in the sea. Among those that live on corals are species that are only one centimetre or even less in total length. These are truly the smallest animals in our (vertebrate) phylum. By way of comparison, it would take a 200 million of them to make up the weight of a large adult blue whale!

CONFUSING CHILDHOODS All (female) gobies lay sticky eggs that do not float (as do the eggs of most kinds of fish, which shed their eggs and sperm into the sea). The eggs are laid in crevices, on the ceilings of small caves or in burrows, or even on other animals, especially corals. The eggs number in the dozens to a few hundred, depending on the kind of goby (but not thousands of eggs as in fish that release floating eggs into the sea). Generally, the male becomes the egg guarder until the eggs hatch. In the tropics, this takes 10 to 17 days at temperatures ranging from 27° to 30° C.

Goby 011 Crab-eye goby

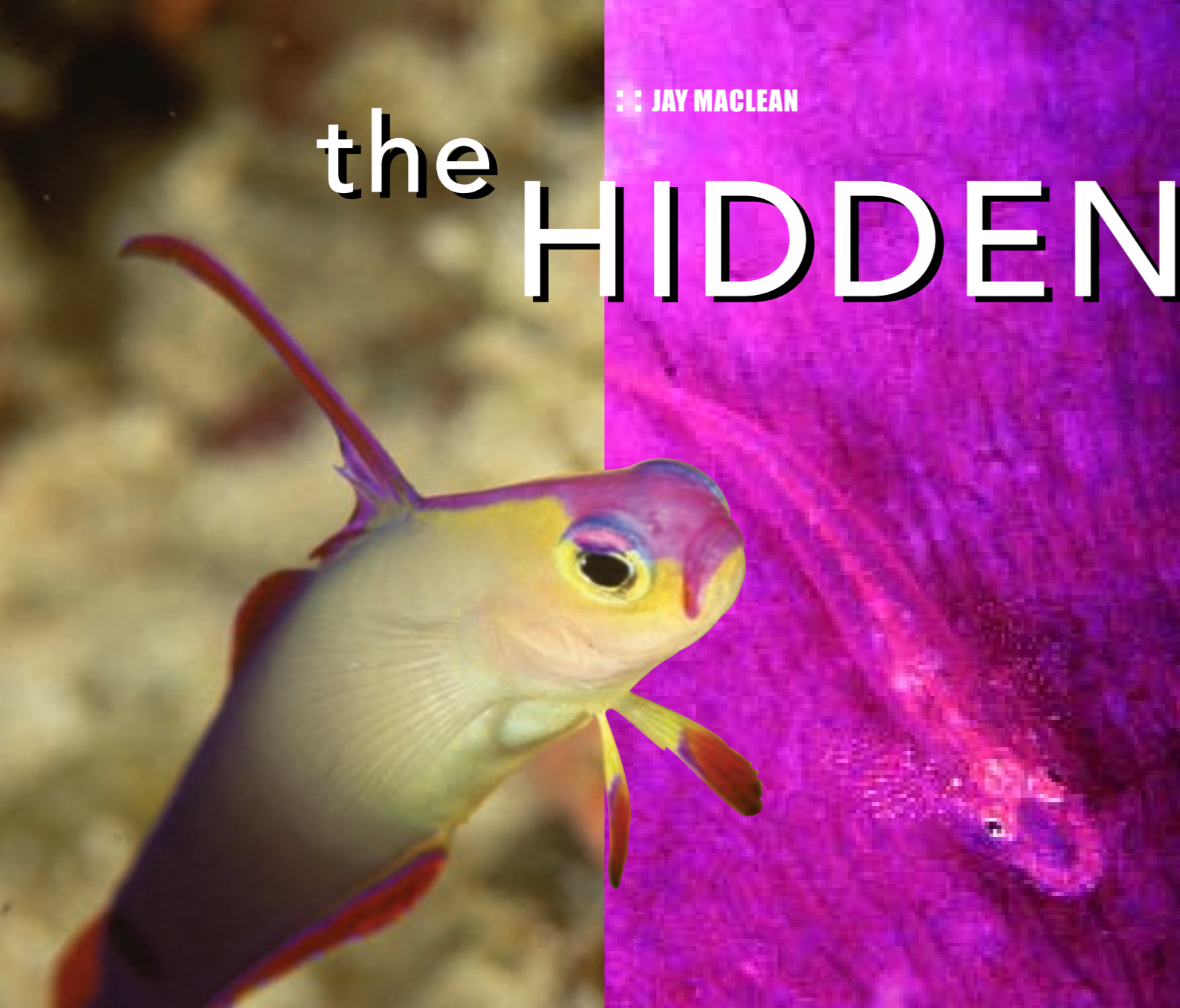
Left, top to bottom:

Decorated dartfish *Nemateleotris decora* is found up to 8 centimetres in length, either solitary or in pairs. Usually located in sand and rubble patches at the base of reefs in 28 to 68 metres.

The common ghostgoby *Pleurosicya mossambica* has highly variable markings and colour from brown to red, greenish and translucent. May be found perching on algae, seagrasses, tunicates, seapens, soft and hard corals in 2 to 30 metres.

Above:

Orange-dashed goby *Valenciennea puellaris* is recorded to 15.5 centimetres and is widely distributed - Red Sea and Madagascar to Indonesia and Samoa. Usually seen in pairs on sand bottoms in 8 to 25 metres.





Above: Variations of the blotched goby *Coryphopterus infraculatus*, which is known from Indonesia to the Great Barrier Reef, and north to Guam and Taiwan.

Opposite page:

Fire dartfish *Nemateleotris magnifica* hover above burrows on patches of sand and rubble on outer reef slopes in 6 to 60 metres.

Signal or crab-eye goby *Signigobius biocellatus* is found in Indonesia, Philippines, Palau, Great Barrier Reef, and Vanuatu.

In cooler seas, hatching takes longer. Some kinds of gobies make nests while others do not guard their eggs at all.

In at least one kind of tropical goby, the female makes a nest, lays her eggs and seals the male inside to look after them! Now and again, the female opens the nest, both parents clean it out, and the male is sealed up again. The process goes on until the young hatch. This is fairly extreme parental care, surpassed only by cardinal fish, in which the male carries the eggs around in its mouth until they hatch. These different ways of reproducing are trade offs – many eggs and little or no care versus fewer eggs and more care – in trying to make sure that some young will survive to continue the next generation.

After hatching, larval gobies generally have to fend for themselves among the plankton until they change into the adult form and settle on the bottom, which usually takes 30-40 days.

Deciding who is going to be male is an issue that typical gobies share with wrasses, parrotfish, groupers, cods, basslets and some damselfish, among others. In all these families of fish, the individual is typically born female. As they grow, some, depending on need (!), turn into males. Take away the dominant male and a female will change sex to fill the void. (The opposite, beginning as males and becoming female on demand, is found, for example, in flatheads, scorpionfish, seabreams, hussars, snappers and some anemonefish.)

Some gobies are hermaphrodites, with both male and female organs. Among them are true and 'sequential' hermaphrodites, depending on whether the reproductive organs mature at the same time or one sex at a time. Finally, in some there are distinct males and females that do not change sex at all. Don't worry; to gobies it all makes sense.

EATING AND BEING EATEN The main foods of gobies in general are bottom-living shrimp and shrimp-like animals, worms, shellfish (both gastropods and bivalves), detritus, small fish, hard corals, crabs, bottom-growing algae and planktonic crustaceans.

In an eat-or-be-eaten world, gobies are not well endowed with combat features. Their small size makes them vulnerable to just about all other kinds of fish. They're eaten by sleepers, flatfish, groupers, lizardfish, rays and even seabirds. However, because gobies are usually found alone or in pairs and dive into burrows when threatened, they are probably not a major food item of these animals.

Some, such as the Indo-Pacific poison goby and coral-dwelling gobies in general, exude a toxin through their skin when approached by a predator. Other brave kinds of gobies have been seen to dance in front of lizardfish to show that they are aware of this predator's presence. Lizardfish rely on stealth; once seen, they usually move on to find an unsuspecting target.

One, a blue and white goby in the Caribbean, is a cleaner fish. Amazingly, when fish collected on Pacific Ocean reefs were placed in the same tank as this goby, they recognized it as a cleaner and availed of its services instead of eating it, even though it is quite different from the blue and black wrasse that we and they are used to seeing in Pacific Ocean reefs.

Many gobies bury under the sand at night to avoid being eaten. A few actually spend much of their time out of the water. But for most gobies, a pair of sharp eyes and speedy access to a nearby burrow are the weapons of choice.

WHERE DO THEY LIVE? Gobies are found on or near the seabed in all temperate and tropical seas in shallow coastal waters, on bare ground, coral reefs, lagoons, rock pools and freshwater lakes and rivers. In oceanic islands they are often the main freshwater fish. In tropical seas they may live on rocks, on or in fine sand, among seagrass, mangrove swamps, silty mud, coral rubble, hard corals, whip corals, and sponges. Most are fairly specific about their habitat, although the many-host goby is said to live on hard or soft corals, sea squirts, sponges, shellfish, sea cucumbers or algae.

Some gobies, the mudskippers, live mainly on mud flats, mangrove roots or rocks. Most of their time is spent out of water, which is their way of avoiding underwater predators. However, they then face crabs bigger than themselves and attract the attention of passing birds and other animals that browse tidal flats. These gobies are air breathers, a feature shared with some blennies. But only the gobies choose to live out of water for extended periods.

UNIQUE ASSOCIATIONS Despite all these interesting aspects of their lives, the one feature that people usually associate with gobies is that they share burrows with shrimps. Only a minority of gobies does this, however. The shrimps are all of a type known as snapping or pistol shrimps, so-called for the sharp noise they make with



their larger claw. Scientists think the shrimps can stun fish with the noise. They don't seem to use this weapon on gobies, although, since the shrimps must surely have occasion to fire their 'pistol' within

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earshot of the gobies, it is likely gobies are somehow immune to the noise, as are anemonefish to the stings of their hosts.

Gobies, alone or in pairs, are often seen half in-half out of a hole in the sand or rubble on coral reefs, apparently minding their own business while a snapping shrimp is busy doing maintenance work on the hole – its burrow. The gobies are actually lookouts and the shrimps, it turns out, have poor eyesight. When danger approaches, such as predators, tax

collectors and the like, the gobies warn the shrimp with a flick of their tail and all disappear down the burrow. Some kinds of gobies make and maintain their own burrows. I wonder if they allow snapping shrimps to join them?

The shrimp-goby association, a form of symbiosis – both animals benefit from sharing – is not the only kind of association among the gobies. Some of those that live on corals nip off polyps to make a space on which they lay their eggs, which is a parasitic association.

I don't think any other family of fish has such a range of lifestyles. But this is not surprising among this hidden majority, the largest of all the families of fishes.

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