

THE AMAZING FROGFISH
WHAT A BIG MOUTH YOU HAVE!

It's a rock! It's a sponge!
No, it's a fish! Dive with us and discover the life secrets of the coral reef's unsurpassed masters of camouflage

— A portrait of an *Antennarius pictus* reveals the cavernous mouth and the stunning camouflage of this sit-and-wait predator - note how the spots mimic to perfection the oscula of a harmless sponge. Barely visible above the mouth is the illicium, its fishing rod-like apparatus.

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*F*rogfish are weird, wonderful, lovable – and incredibly difficult to spot. Coming in all sizes and colors, these amazingly camouflaged predators are not rare at all, but divers might spend a lifetime exploring the reef without seeing one – even if it stands right out there in front of them. Ranging in size from a few inches to football-size, frogfish actually prefer exposed spots, usually perching contentedly for several weeks in a row on well-chosen, specific sponges: but their livery mimicks the sponge color and texture so incredibly well that it is often difficult recognizing them for what they are, even for experienced critter hunters. Their lumpy body greatly aids these clever hunters in disappearing in the surrounding landscape, and the endless variations in color patterns are exceptionally useful in disrupting the general shape of the animal, Grabbing corals and sponges with their modified pectoral fins, actually working as prehensile little webbed “feet”, frogfish are sit-and-wait ambush predators, relying on exceptional camouflage to escape their enemies and to confuse prey. They feed on fish and crustaceans as large as themselves (occasionally

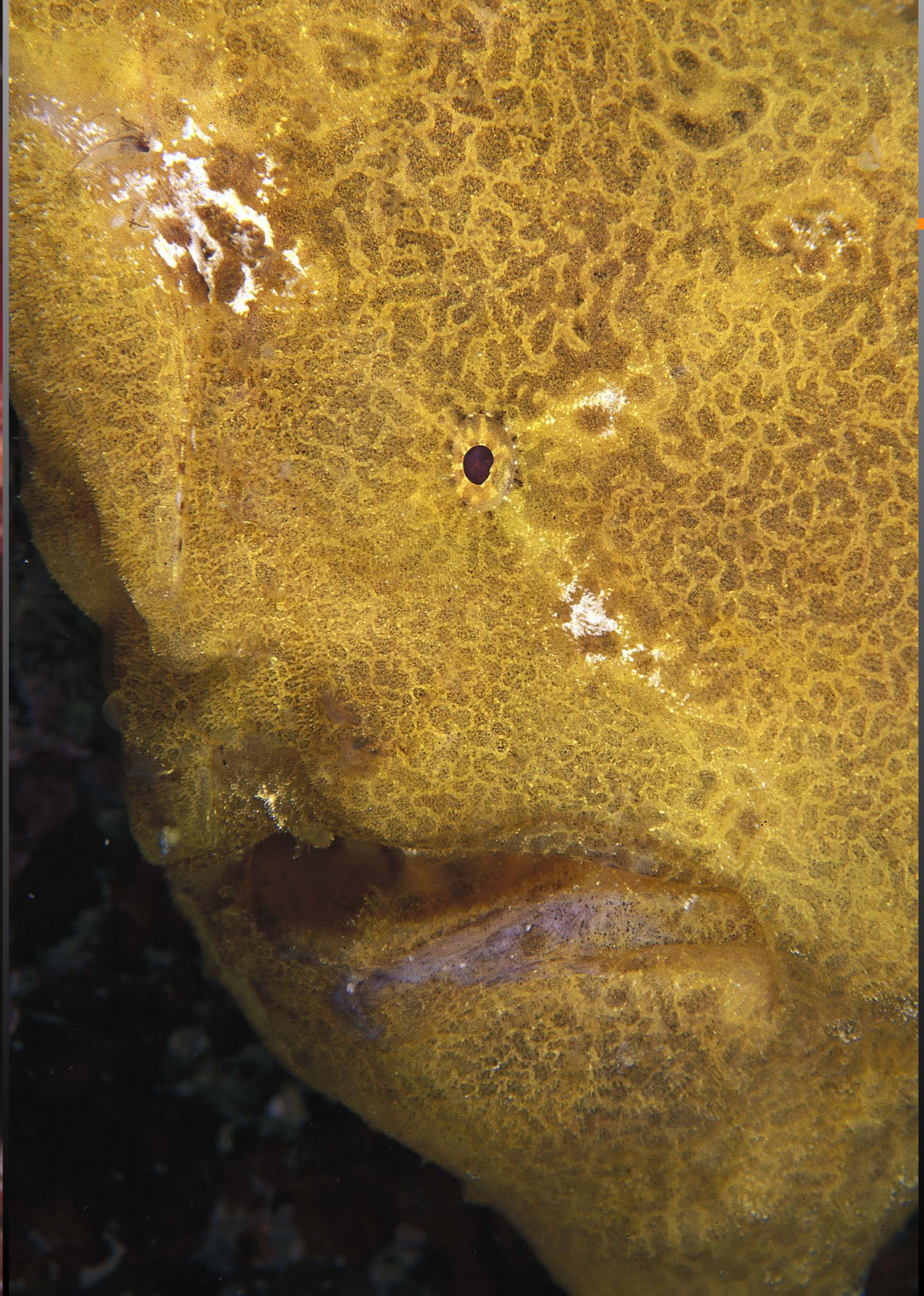
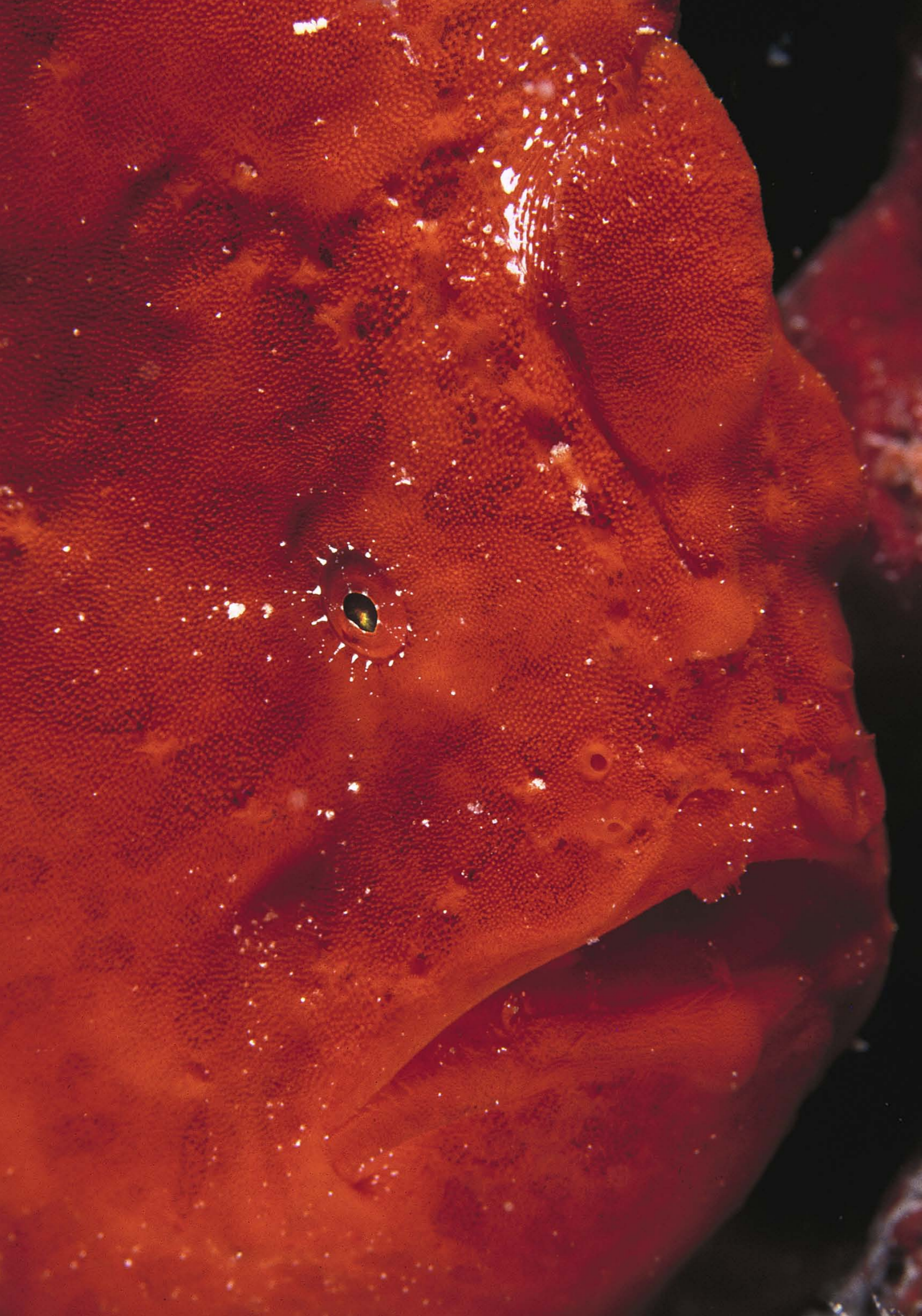
continued on page 88 >



Barely 2 inches / 4 cm long, a baby Painted frogfish *Antennarius pictus* sits on a sponge, well camouflaged and waiting for a tiny fish or shrimp to investigate. Confident in their exquisite camouflage, most frogfish usually sit in the open, but are nevertheless exceedingly difficult to spot in the complex coral reef environment .



A small sample of the infinite variety shown by frogfish species and liveries. From top left, clockwise: a bright yellow "hairy" morph of *Antennarius striatus*, a sponge-mimicking bright red *Antennarius pictus*, a typical *Antennarius maculatus* and a somber yellow-green *Antennarius pictus*, in this case uncommonly encountered on a sandy bottom.



Portraits of a bright red *Antennarius pictus* (far left) and a yellow *Antennarius commersoni* (left) reveal the sponge-mimicking texture of their bodies and the small, camouflaged eye. Revealed by the camera's underwater strobes' flash, their bright colors at depth appear in fact a brownish shade in natural light, helping these ambush predators to virtually become invisible in their habitat.

The entire frogfish existence is spent trying to look like something else entirely



— Mimicking a toxic, colorful nudibranch to avoid predation, a tiny, less than 1 inch / 2cm long baby Antennarius maculatus sits brazenly in the open. Its fishing apparatus - the rod-like illicium topped by a pom-pom-like esca - is being wiggled in front of its mouth in the hope of attracting some unsuspecting prey and is perfectly visible here.

even bigger) which they can swallow alive in one single gulp thanks to their incredibly wide, protrusible mouth and their elastic stomach. In fact, they could be described as just that – a huge mouth and a belly to match, with a little fish added around them. To attract unsuspecting prey, frogfish have also developed a fascinating luring apparatus which looks (and works) just like a fishing rod: positioned between their eyes, a thin ray (called the *illicium* in scientific parlance) ends with a bit of fleshy tissue (called the *esca*, ie the lure) exactly shaped like a wiggling worm, a tiny fish, a pom-pom like bunch of worms or a little shrimp, depending on the frogfish species. Wiggling periodically this tasty-looking morsel in front of their cavernous mouth and relying on their spectacular camouflage to avoid detection, frogfish – also called anglerfish, with good reason – do not go for long without eating good meals.

A Variety of Frogfish

These highly specialized reef denizens number about 12 genera and at least 41 species worldwide, most of which are rather common in tropical waters: however, since they are so incredibly variable in color and size, it usually is rather difficult to correctly identify most species underwater. In fact, the only really reliable clue to their identification is

continued on page 91 ➤



Three more stunning color variations: a yellow-green *Antennarius pictus* (top far left), a pink *Antennarius pictus* (left) and an unidentified bright yellow species (bottom far left). Correct identification of most frogfish is in most cases difficult or next to impossible underwater - the only sure means to differentiate among species is the shape of the esca, which can look like a worm, a tiny fish, a small shrimp, a bunch of worms or something else but presumably equally appetizing.



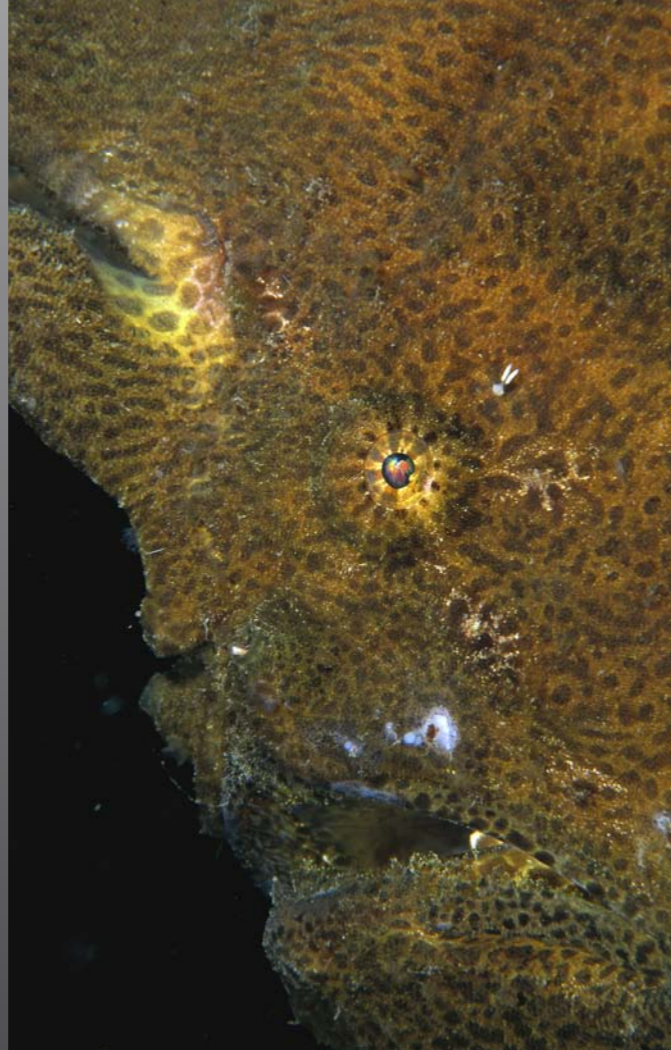
Left, the side views of two vastly different and quite atypical individuals of the Clown or Warty frogfish *Antennarius maculatus* show the difficulties encountered in identifying frogfish underwater - in this species' case the triangular blotches and the permanently erect first and second dorsal fins are diagnostic. Far left, a stunning portrait of an uncommon and exquisitely camouflaged species, possibly *Antennarius biocellatus*.

— A telling example of the frogfish - here *Antennarius pictus* - stupendous camouflage. These predators are capable - over a stretch of time - to assume the coloration of the sponges they have chosen as a perch.



the shape of their esca! The most common and most readily identified species are the following. The Painted frogfish (*Antennarius pictus*), up to 16 cm long, usually very bulky, can be bright red, white, black, green, purple or bright yellow and is usually found on sponges which it exactly matches in color: its body features several round ocelli and spots matching the holes of the sponge itself. The Giant frogfish (*Antennarius commersoni*) is larger (up to 30 cm) and usually found on jetty pylons, wrecks, corals and branching sponges: coloration is extremely variable, usually matching that of its perch and usually with spots, lines and wart-like growths in disruptive schemes. The Clown or Warty frogfish (*Antennarius maculatus*) is probably the most easily identified of them all, reaching 12 cm in size and sporting large, triangular red-brown spots on a bright white or bright yellow background. This species also features a permanently erect dorsal fin first ray above the eyes, and the skin shows easily visible, large pores and warts all over. A rarer but much sought-after species is the Striped frogfish (*Antennarius striatus*), reaching up to 20 cm and usually found in coastal areas with lots of vegetable debris and sponges. Background coloration can be brownish, yellowish, pinkish or whitish, but elongated blotches and

continued on page 95 >



*Now you see me, now you don't -
frogfish are true masters of camouflage*

Top far left, a portrait of *Antennarius commersoni*; bottom far left, a close-up of a sponge-mimicking *Antennarius pictus*; left, Shaggy frogfish *Antennarius hispidus* sitting undetected among a bed of oysters. Careful examination of the image will actually reveal the presence of two individuals - a bright fuchsia one on top and a brown smaller one below it. This is quite uncommon as frogfish are a solitary species, and it might involve courtship and mating behavior.



Clockwise, from top left: a bright yellow, sponge-mimic *Antennarius pictus* on black volcanic sand, a detail shot of the gill opening under the "armpit" of the pectoral fins, a brightly patterned *Antennarius maculatus* luring (note the illicium and the esca being wiggled in front of its mouth) and a detail of the paw-like, "fingered" pectoral fins, used by frogfish to securely perch on sponges.



Far left, close-up of a well-patterned *Antennarius commersoni*. Left, a portrait of the so-called "hairy" phase of *Antennarius striatus*, apparently restricted to a few selected biotopes. Its extraordinary camouflage is possibly habitat-induced. Observations by scuba divers and photographers seem to indicate the fleshy growths of Hairy frogfish are seasonally shed.

*Never believe what you are seeing
when you encounter a frogfish*

— A Hairy frogfish *Antennarius striatus* sits in the open on the black volcanic sand of the Lembeh Strait, in Northern Sulawesi, looking exactly like a clump of weeds. Notice the diagnostic, boomerang-shaped, fleshy worm-like esca resting above its eyes. This species is almost invisible to the untrained eye, and it certainly is to its fish prey.



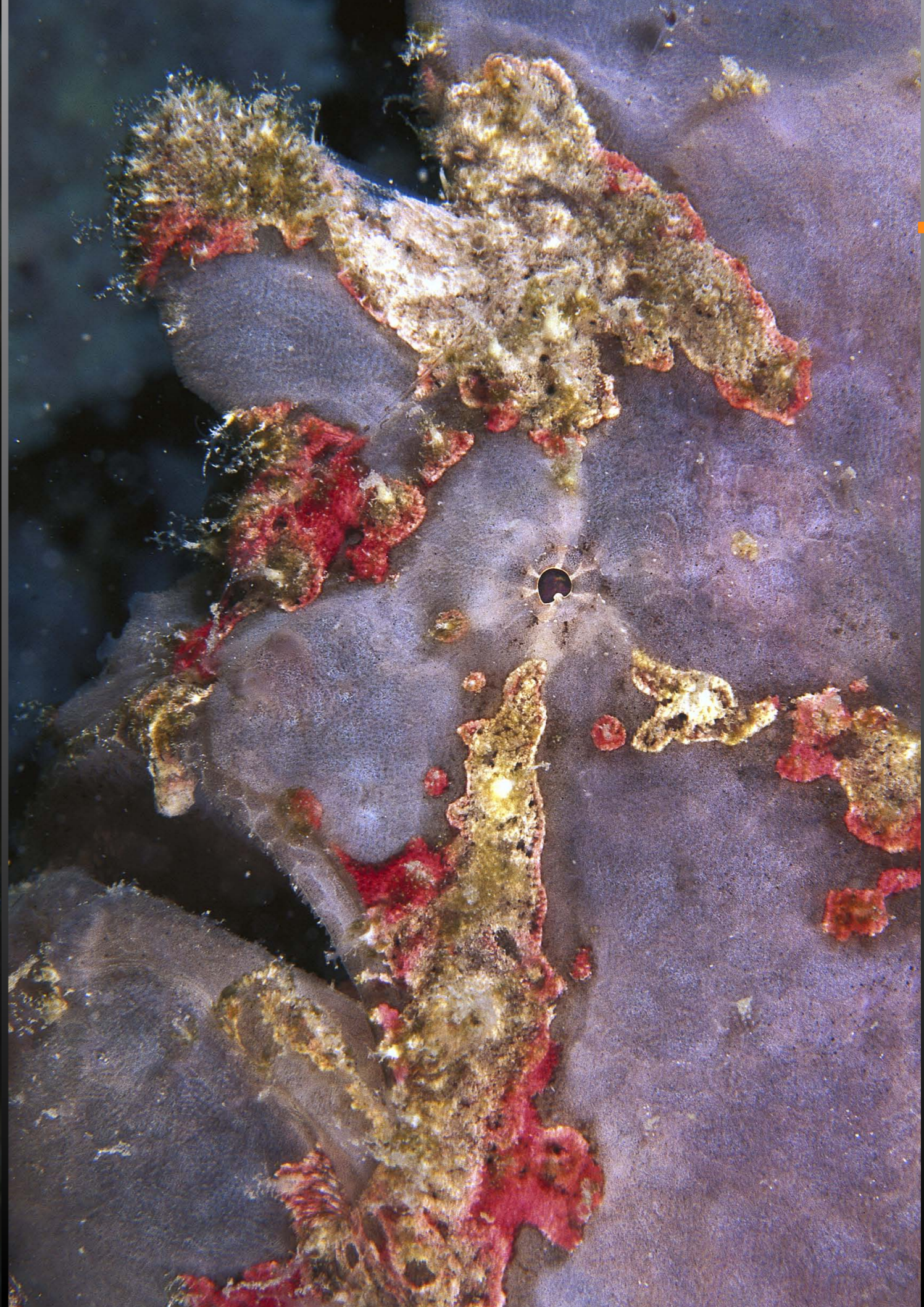
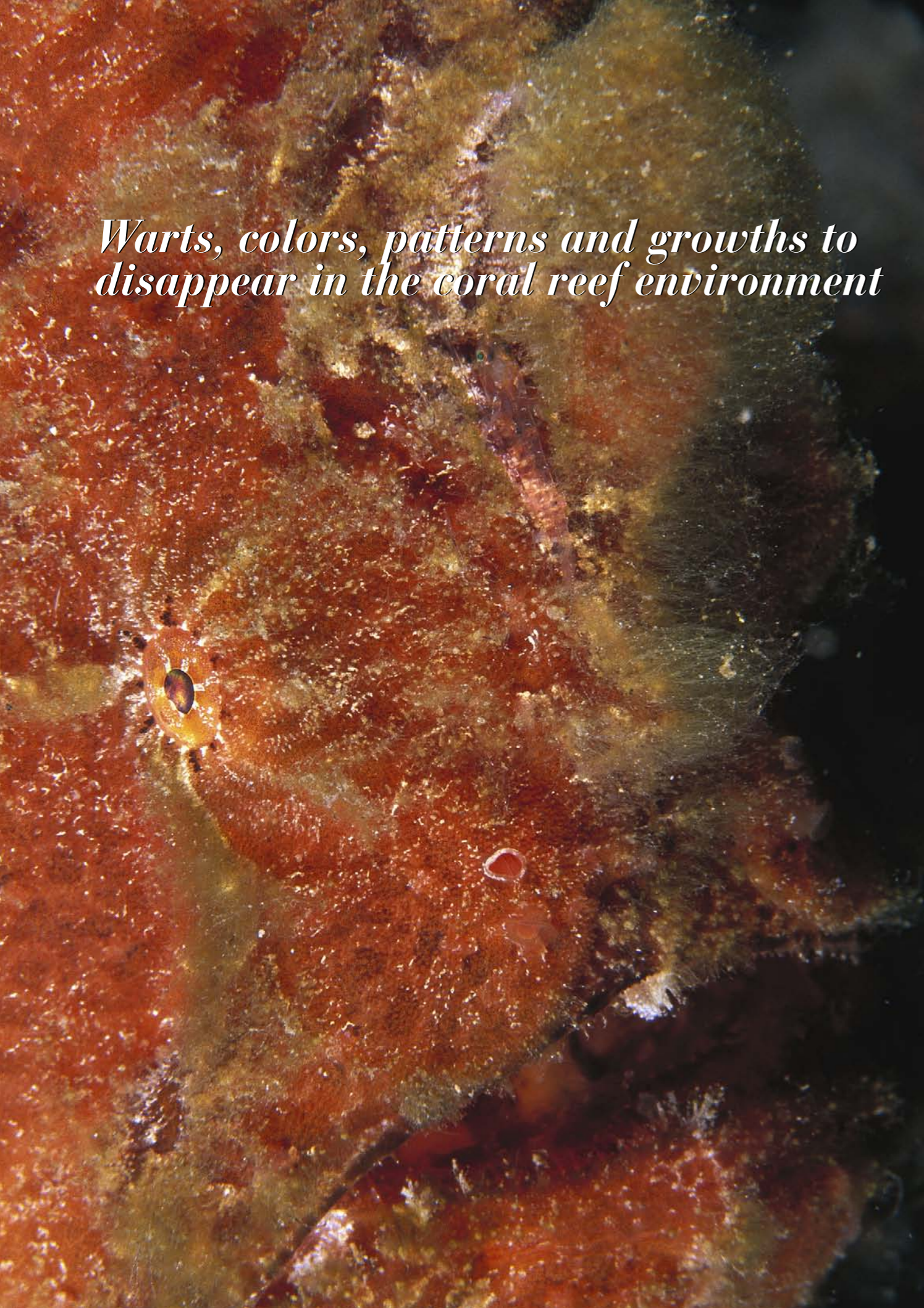
short darker stripes are always present, An interesting variation of this species is commonly observed in the Lembeh Strait in Northern Sulawesi, Indonesia, where Striped frogfish are also known as Hairy frogfish due to the long, hair-like dermal appendages they develop there, obviously as an adaptation to the peculiar local environment. Striped / Hairy frogfish are also easily identified by the large, fat, boomerang-shaped, worm-like esca. Less commonly (and less readily identified) observed species in SE Asian waters include the Spotfin frogfish (*Antennarius nummifer*) and the Freckled frogfish (*Antennarius coccineus*), both rather small and colorful but exceptionally well camouflaged, while the Sargassum anglerfish (*Histrio histrio*), reaching 15 cm, is a highly specialized species which is exclusively found on Sargassum floating mats: its coloration is exceedingly variable but always suiting its habitat, and this fascinating little fish can actually jump out of the water to rest on top of the floating mat if threatened from below, surviving for surprisingly long out of its natural element. Sargassum anglerfish are often found during the rainy season when large mats of Sargassum are washed to the shore following big storms, but otherwise live a pelagic existence. Several more species are present – some very small, others still undescribed – but

continued on page 97 >



Top far left, a bright orange *Antennarius pictus* mimics to perfection the sponge it is sitting next to. Bottom far left, *Antonella* watches a mauve *Antennarius pictus* on a Borneo reef. Left, the close-up of a large specimen - possibly *Antennarius biocellatus* - reveals a wealth of details. This individual is missing the esca at the tip of its illicium, possibly bitten off by a prey which was faster than its would-be predator.

Warts, colors, patterns and growths to disappear in the coral reef environment



The portraits of a Giant frogfish *Antennarius commersoni* (far left) and an *Antennarius pictus* (left) reveal widely different colorations and the occasional algal growth on the body which is shown by mature individuals living in murky waters. Notice how the colors and patterns shown by the mauve individual at left create a somatolytic (ie shape-breaking) effect, making the frogfish virtually unrecognizable.

the ones listed above are the most commonly observed, at least by persistent divers.

Lazy Liars

Frogfish are mostly sedentary, moving very little and remaining firmly affixed to their perches for days on end – and yet, when they have to move, they can do so with surprising speed and agility. Using their little webbed “feet” they can walk at speed on the substrate, moving with a slightly bouncing motion and looking exactly like little funny clockwork tin toys; and if forced to swim from one perch to the next, they will do so floating in midwater like air-filled balloons and propelling themselves not by flapping their fins as one would expect, but rather using jet propulsion, forcefully squirting water from their round gill opening situated under their pectoral fins “armpits”. Adding to all these wonderful peculiarities, small juveniles of at least two species – *pictus* and *maculatus* – will regularly and brashly sit out in the open, flaunting their bright, colorful liveries which they use to mimic poisonous nudibranches to avoid predation. Being so confident in their own camouflage, frogfish are easy to photograph...once you spot them! Check carefully among branching sponges, on encrusted jetty pylons and on wreck surfaces, examining strange-looking protrusions on exposed spots: once you’ve seen your first one, it will be much easier finding the next ones.



Three more examples of the variations shown by frogfish species and individuals. Top far left, a “hairless” phase of *Antennarius striatus*; far bottom left, a mauve *Antennarius pictus*. Left, a large, bright yellow, unmarked *Antennarius commersoni* rests on its elephant-ear sponge perch.