FINTASTIC

By Jeanne Liebetrau and Peter Pinnock

Humans have legs - fish have fins. Some have short and fat ones; some have long and slender ones. There are those that sport the athletic type and there are the lazy types. Of course there are the attractive and the sexy ones but they all follow the same principle of providing movement in some way or other, be it fast or slow. The functions of fins however, are far greater than that of mere propulsion. Fins are capable of being weapons, oars, brakes, paddles or hydroplanes, propulsion and communication devices, sex symbols and are even used for just plain sailing.

Anatomically speaking, fins are described by their position on the body. Many of these words are derived from Latin. For example, the word dorsal refers to 'on or near the back.' The dorsal fin is therefore situated on the uppermost part or back of the body. Pectoral refers to the chest. The pectoral fins are thus attached to the main body area. Similarly caudal is the tail end or caudal fin while the pelvic fins are located on the lower part of the fish's body. Logically the anal fin's position is near the anus. Fins are comprised of a number of rays and /or spines with membranes between. All fish have rays but not all have spines. It is in the dissection of fish that scientists and ichthyologists differentiate comparable species by counting the spines and rays. The numbers and shapes vary considerably from species to species, each being designed according the individuals lifestyle.

Lionfish, for example, are endowed with splendiferous fins that are extremely versatile. Each spine on the dorsal, anal and pelvic fins is hollow and can be impregnated with venom from a sac situated at its base, acting much like a hypodermic needle. These poisonous spines are used in defense against predators but can also be used to attack prey. Lionfish often display their impressive fins

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cautioning would-be predators by the imposing sight! It brings new meaning to the term 'looks can kill!' The predatory prowess of the lionfish is applaudable. In hunting mode the pectoral fins are angled in such a way that the prey is unable to see the movement of the tail fin. This deception enables the lionfish to creep unnoticed towards the unsuspecting prey. Once cornered, the large rays between the spines serve as a net trapping the prey and preventing escape. Yet another clever feature of the fins is the striated colourations which enhance hunting techniques. The markings are thought to imitate that of a crinoid or feather star in low light allowing the lionfish to ambush quarry whilst mingling with these harmless filter feeders.

Scorpionfish too have fins loaded with deadly poisons. Sedentary by nature, scorpionfish lie motionless on the reef waiting for innocent prey to pass nearby. Their fins are decorated with appendages and tassels resembling seaweed or reef debris creating a very cryptic disguise. Consequently the scorpionfish is a master of ambush. The rays of the pectoral fins are painted with vivid red patterns that are not apparent when folded against the body. When threatened these pectorals are splayed exposing these wild patterns. Simultaneously the poisonous dorsal spines are defensively erected - moves intended to scare off the predators. Yet despite these menacing threats and extreme defense mechanisms, scorpionfish are eaten by some fearless predators.

Few fish are predators sporting lethal weapon fins. The harmless and defenseless ghost pipefish rely entirely on mimicry for protection. Even their motion resembles seaweed being tossed around in a gentle surge. Their cousins, the harlequin ghost pipefish mimic crinoids and feather stars. The harlequin ghost pipefish swims snout pointing downwards amongst the tangles of the bushy crinoid. The frilly fins and speckled colouring is a perfect match to that of the crinoid's arms. The females in both

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pipefish species are considerably larger than the males, almost double the size in some instances. It's the extraordinary formation of the pectoral fins that makes these fish unique. The females pectoral fins are joined together to form a brood pouch. In this cozy environment her eggs are nurtured for approximately 3 weeks before reaching maturity. Strangely, in other pipefish families, it is the males who play mommy.

Remoras or suckerfish also sport fin modifications. Their dorsal fins have evolved into large suction discs. Remoras are the ultimate hitchhikers of the ocean. Using the suction discs to latch on to any large mobile creature (or even a ship) the remoras require absolutely no energy to travel economy class on long distant rides. Because they offer restaurant facilities, their preferred travel companions are sharks. As the shark slows down to feed at a kill, the remoras release their suction grip grabbing at the scraps from the casualty.

On a much smaller scale, many-host gobies also have a suction disc but theirs is formed from the fusion of the pelvic fins. These tiny fish habitually choose to live on long whip corals growing headstrong into plankton enriched currents. The suction disc is used to maintain a grip on the whip coral whilst the goby experiences a free roller coaster ride in the exhilarating currents. The strategic location at the end of the whip coral is the ultimate vantage point to reach passing food particles and plankton.

Crinoids and feather stars also love a current and as a result are usually found perched on the rim of a large gorgonian seafan or a huge barrel sponge where they sieve the current in the never ending quest for food. Inside some of these feathery looking creatures live crinoid clingfish. Clingfish (hence their name) have modified pectoral sucking discs specifically used to cling onto the crinoid in powerful currents.

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One of my favourite underwater creatures is the frogfish. Aptly named for its really ugly looking appearance, the frogfish is a master of disguise and a seriously lazy hunter. The ambiguously shaped frogfish adopt exact markings and colouring of

sponges found in their immediate environ. No doubt fish even have a problem distinguishing frogfish from reef. Because the first dorsal spine has been modified to act as a fishing lure, frogfish are sometimes referred to as anglerfish. The 'fishing lure' or illicium, is a fine filament ending with either a lumpy or a worm-like appendage or esca. Frogfish temptingly dangle the esca in the hope of enticing prey to investigate. As the innocent prey swims within reach, the frogfish opens its huge mouth and simply sucks in its victim in a lightening movement. The lazy frogfish doesn't swim unless it's absolutely necessary. The pectorals resemble the webbed feet of a frog and are efficient for walking or galloping, not swimming. It is with great difficulty that their unstreamlined blob shape is set in motion. In fact, the frogfish swallow water expelling it through their gills to create jet propulsion movement.

Water is 800 times denser than air. Fish need to be streamlined but fins create turbulence which causes drag. This drag is reduced by either shortening or lengthening the fin or as in the case of the tuna, tucking it away into a groove when moving at high speed. Other species, such as jacks, are designed with a keel or scute that channels the water away from the caudal fin. When needing to get away in a hurry most fish lay their fins flat against their body to reduce turbulence. The more efficient swimmers often have moon shape tails that deflect the turbulence to the tips. The dorsal fins of the ravishingly beautiful bannerfish are extended with a filament to reduce the drag. The size of the dorsal fin further prevents the bannerfish from yawing or rolling over.

Supreme in the streamlined category are the ultra-fast swimming tuna. These nomads of the sea have no swim bladder. The purpose of swim bladders is to maintain neutral buoyancy by virtue of the air space. Interpreted, this means that should the tuna stop swimming they would sink and drown. Tuna thus need to constantly move keeping water flowing over their gills, exchanging oxygen at a high rate and burning energy in

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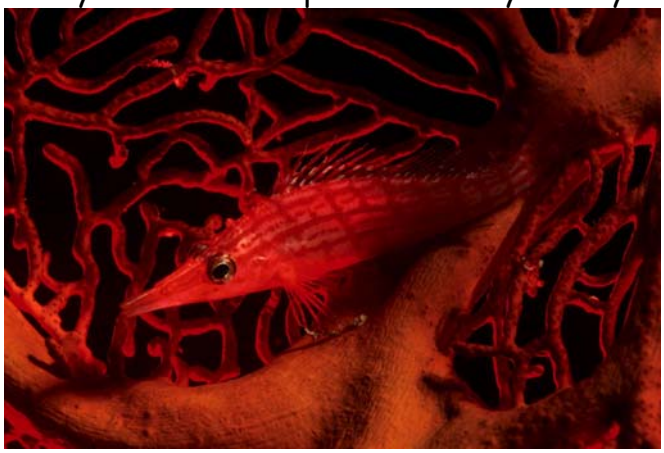
the constant movement. To reduce the energy required to keep afloat, fast swimming fish frequently have a forked caudal tail design. This hydrodynamic design creates a vortex pushing the fish even faster through the water.

Some fish that possess swim bladders use their resting abilities to survey their surroundings for predators or prey. The pectoral fins are often stouter just for this purpose. The exquisite longnose hawkfish are a fine example of this. Darting amongst the fronds of the black coral ferns they consider home, the longnose hawkfish expend a lot of energy searching for passing plankton. These little fish always return to the same frond for a quick breather. As they rest on their pectorals they survey the scenes for dangers. Lizard fish also rest on their pectorals. These voracious predators perch at an angle scanning the surroundings for prey. The strong pectorals and the slightly elevated position are important for launching rocket-like into the water column to snatch prey within striking range. Allegedly their hit rate is extremely accurate.



Triggerfish have developed their fins for a completely different use. Their conspicuous trigger-like dorsal spine can be locked into an erect position. This is used to wedge the triggerfish in the sanctuary of reef crevices. At night triggerfish sleep soundly in the reef, safe from being extricated by the calculated positioning of their dorsal spine. Surgeonfish on the other hand, have a sharp erectile spine on each side of their caudal fin. When attacked they become Samurai warriors as they wield their swords slashing their attackers with the sharp spines.

Butterflyfish and batfish have no means of attacking or escaping their predators. The highly flattened bodies are capable of hiding amongst the maze of branching corals. For defense, they use the illusional advantage of

pretending to be far bigger than they really are. The large dorsal and anal fins greatly exaggerate the actual body size creating an appearance of depth fooling some predators into thinking they are too big to be eaten.

Perhaps the most unique use of fins is that seen in the shrimp and goby symbiotic relationship. The blind shrimp spends its day cleaning out the home shared with the shrimp goby. In return the goby warns the shrimp of pending dangers. As the shrimp leaves the sanctity of home it places a feeler on the goby's caudal fin. The goby flicks warning signals to the shrimp via the caudal fin. The shrimp interprets the pulses knowing when to scuttle back into the protection of home.

The endless designs of fins are unique to each species. The incredible colouration of fins also plays an integral part in their function. Some species have ingeniously painted 'eyes' on their fins bamboozling fish into believing that they are huge, mean creatures. Others use their fins to attract the opposite sex or indicate their predominance as male. The list of applications is endless. Humans on the other hand, have 2 legs - all with the same number of bones. Yet legs are relatively boring in design when compared to the diversity and capability of fins.

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