

Mobbing in fishes

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Mobbing is a behaviour in which potential prey harass a predator. Many examples are known from the bird world. An owl is sitting quietly on a perch, sleeping or minding its own business, when suddenly a bunch of finches, warblers, blackbirds, thrushes, or even little hummingbirds gather up around it. The little birds then cause a commotion, screeching and darting and sometimes even dive-bombing the predator. You can't help but get the impression that the owl must find the whole kerfuffle highly annoying. Indeed the big bird soon flies off in search of quieter surroundings. Presumably, such is the point of mobbing behaviour: to drive away a predator and discourage it from coming back. There might also be an ancillary function, which would be to teach juveniles about the identity of dangerous enemies.

Mammals are also capable of mobbing. When faced with a stuffed mechanical leopard installed in a forest clearing, chimpanzees scream, stamp their feet angrily, and throw objects at this "predator". Baboons gang up on lone leopards, ground squirrels rush gingerly at snakes, and meerkats nip at deadly cobras. Mammals can also be the *target* of mobbing, by birds to be precise, as anybody who has walked through a colony of terns can attest. And finally, the corvid fan in me must point out that crows are special, as they know both sides of the fence: they are eager mobbers of owls, but they themselves are the much less enthusiastic victims of mobbing blackbirds.

There are rather few known examples of mobbing in the fish world. Many of the cases could in fact be interpreted as extreme territorial or parental behaviour. But some aspects of the fish's behaviour, such as group action and the targeting of predators only, are reminiscent of mobbing by birds or mammals.

Sunfish versus turtles

As part of a study in the late 1970s on the mating system of bluegill sunfish *Lepomis macrochirus*, Wallace Dominey released a large snapping turtle into several sunfish colonies. In the words of Dominey, "as the turtle moved through a colony, dozens of nesting males, gravid females and males without nests rapidly approached (some individuals to within several centimetres), and followed the turtle across numerous territories until it left the colony area. The bluegill oriented towards the turtle, and approached from the rear avoiding the dangerous head region. Although some males gave lateral threat displays, the turtle was not physically attacked. As a control, an eastern painted turtle (*Chrysemys picta picta*, 17 cm shell length) was similarly released. The painted turtle, which is incapable of preying on adult bluegill, did not

elicit mobbing.” Dominey also saw, on one occasion in the Florida Everglades, several largemouth bass *Micropterus salmoides* bite and shake the tail and legs of a large Florida softshell turtle *Trionyx ferox*, driving it away from their nesting area.¹

French grunts versus barracudas

Juvenile French grunts, *Haemulon flavolineatum*, form shoals over coral reefs during the day. While diving near the Belize coast in 1995, Richard Hein made the following observations, when twice a barracuda appeared on the scene. Upon seeing the barracuda the grunts did not seek shelter in crevices. Instead they performed a standard shoal evasion manoeuvre, known as the “fountain”. The shoal split and the small fish moved from in front of the barracuda to behind it, gliding on both sides of it. But once behind, the grunts turned about and faced in the same direction as the barracuda. Then some of these grunts, one after the other, darted forward and nipped at the predator’s tail. The barracuda did not jump with an “ouch”, but it did start to swim faster, and away.²

Damselfishes versus the rest of the world

Territorial damselfishes are extremely aggressive. They basically don’t tolerate anybody within the boundaries of their territories. They will attack anything but the biggest predator. They even charge and nip at the body of divers who come too close.

In the whitebar gregory *Stegastes albifasciatus*, individuals defend their own small patch of coral rubble. The presence of many individuals creates a mosaic of contiguous territories. Sometimes, a single predatory devil scorpionfish, *Scorpaenopsis diabolus*, will swim over a territory. At this point the territory owner rises up to meet the intruder, and neighbouring territory owners often join it (a group action that suggests mobbing). These many damselfish dive to within a foot of the head of the scorpionfish, give lateral displays with erect dorsal fins, shake their body, and then spin away with a flip of the tail. Usually the scorpionfish does not seem very impressed by all this, but it does swim slowly out of the territory mosaic.³

During the breeding season, males of the neon damselfish, *Pomacentrus coelestis*, maintain breeding nests within densely packed colonies. Ambush predators such as lizardfishes, stonefishes, flatheads, and bastard halibut sometimes try to catch a male damselfish by partially hiding in sand or by sneaking from behind a rock. Masahiro Ishihara has observed that when such a predator is detected (which often happens after the predator has had a go at a potential victim), all the surrounding damselfish gather up and form a pack that mills around the predator. The damselfish repeatedly approach the back of the predator, sometimes as close as 15 cm. They do not make physical contact, but their presence must be somewhat annoying because in 48 out of 77 observed cases, the predator immediately moved out of the nest colony.⁴

Gene Helfman has seen single threespot damselfish, *Stegastes planifrons*, approach and nip at the tails of Atlantic trumpetfish, *Aulostomus maculatus*, a predatory species. If the trumpetfish was busy stalking another fish, it ignored the damselfish's intervention. But if the trumpetfish was just cruising, it "jumped" and accelerated away.⁵ Approach and nips by a single fish is not like avian mobbing, which is usually done by groups, but the fact that the target was a predator hints at more than just territorial defense. As in mobbing, the valiant damselfish may have incited the predator to go away and not come back.⁶

The rest of the world versus moray eels

It seems nobody on the reef likes moray eels. Maybe it is because of their looks – morays have a face only a mother could love. Okay, I'm just joking, although the moray's looks are indeed involved: the wide mouth of morays betrays them as unrepentant predators. Like owls they are mostly nocturnal, and like owls they seem somewhat uncomfortable during the day, and thus amenable to harassment. So it is no surprise to learn that many reef fishes are keen mobbers of morays.

Longspine squirrelfish, *Holocentrus rufus*, have been seen displaying, nipping, chasing, and grunting at moray eels that unwittingly entered their territory.⁷ The grunting brings to mind avian mobbing, which also features much calling. It must be said, however, that squirrelfishes are chatty creatures in general: they vocalize pretty much during any aggressive interactions. (See "Most vocal fish" on the page Fish Trivia III: Some records in the fish world)

Another example features butterflyfishes, surgeonfishes and parrotfishes which, upon seeing the head of a moray protruding from a crevice, will singly take station 5 cm (2 inches) in front of that head, present their side, and beat their tail at the moray, even making contact sometimes (but it is a gentle contact, the tail beating only slowly). In response the eel sometimes exits its shelter hole and tries to find another one some distance away.⁸

The whitebar gregory and the neon damselfish, which we have already met, can also gather up and spread their fins at a moray eel that approaches the vicinity of their territory. The neon damselfish may even bite the side or back of the eel's head.⁹

¹ Dominey, W.J., 1983, Mobbing in colonially nesting fishes, especially the bluegill, *Lepomis macrochirus*, Copeia 1983, 1086-1088.

² Hein, R.G., 1996, Mobbing behavior in juvenile French grunts (*Haemulon flavolineatum*), Copeia 1996, 989-991.

³ Donaldson, T.J., 1984, Mobbing behavior by *Stegastes albifasciatus* (Pomacentridae), a territorial mosaic damselfish, Japanese Journal of Ichthyology 31, 345-348.

⁴ Ishihara, M., 1987, Effect of mobbing toward predators by the damselfish *Pomacentrus coelestis* (Pisces: Pomacentridae), *Journal of Ethology* 5, 43-52.

⁵ Helfman, G.S., 1989, Threat-sensitive predator avoidance in damselfish-trumpetfish interactions, *Behavioral Ecology and Sociobiology* 24, 47-58.

⁶ For one more example of mobbing by damselfish, this time in the German literature, see: Fricke, H., 1973, Ökologie und Sozialverhalten des Korallenbarsches *Dascyllus trimaculatus* (Pisces, Pomacentridae), *Zeitschrift für Tierpsychologie* 32, 225-256. And while you are up for some reading in German, check also, for an example of mobbing by labrids and sparids: Abel, E.F., 1960, Zur Kenntnis des Verhaltens und der Ökologie von Fischen an Korallenriffen bei Ghardaqa (Rotes Meer), *Zeitschrift für Morphologie und Ökologie der Tiere* 49, 430-503.

⁷ Winn, H.E., Marshall, J.A., and Hazlett, B., 1964, Behavior, diel activities, and stimuli that elicit sound production and reactions to sounds in the longspine squirrelfish, *Copeia* 1964, 413-425.

⁸ Motta, P.J., 1983, Response by potential prey to coral reef fish predators, *Animal Behaviour* 31, 1257-1259; Dubin, R.E., 1982, Behavioral interactions between Caribbean reef fish and eels (Muraenidae and Ophichthidae), *Copeia* 1982, 229-232.

⁹ Ishihara, M., 1987, Effect of mobbing toward predators by the damselfish *Pomacentrus coelestis* (Pisces: Pomacentridae), *Journal of Ethology* 5, 43-52; Donaldson, T.J., 1984, Mobbing behavior by *Stegastes albifasciatus* (Pomacentridae), a territorial mosaic damselfish, *Japanese Journal of Ichthyology* 31, 345-348.