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The lure of the deep sea: anglerfish as movie monsters

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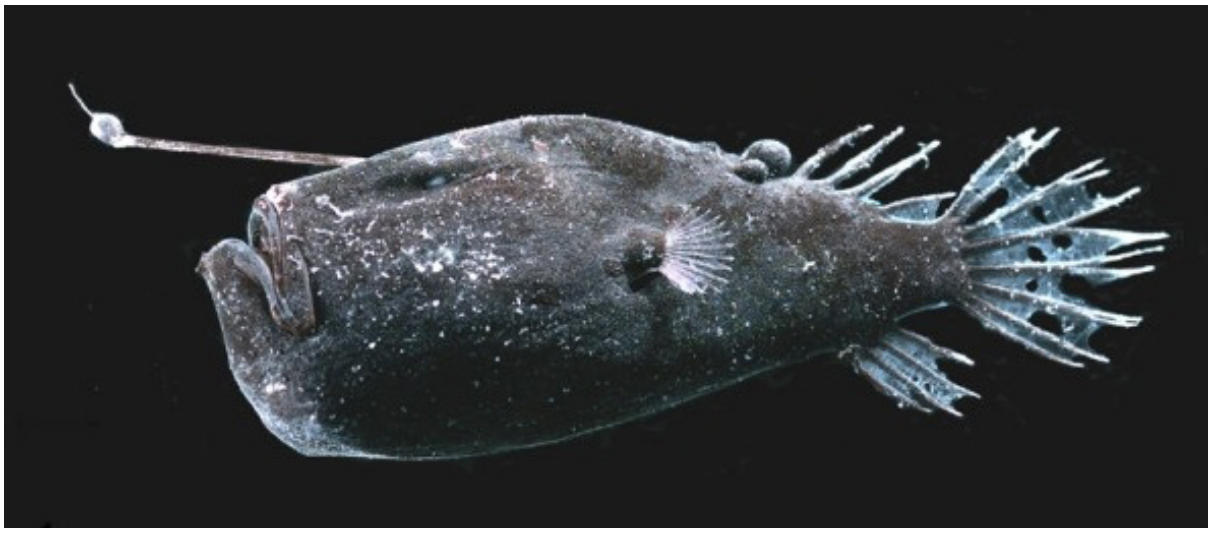

Figure 1. A deep-sea anglerfish, *Cryptopsaras couesii*. Image extracted from Miya et al. (2010: fig. 2B).

With its lure and sharp teeth, the anglerfish (Order Lophiiformes) is the iconic deep-sea monster. In this article we consider the aesthetics, morphology, and scientific background behind four anglerfish and anglerfish-inspired monsters in film: the Opee Sea Killer in *Star Wars Episode I: The Phantom Menace* (1999), the Ice Cream Lady in *The Sponge Bob Square Pants Movie* (2004), the anglerfish in *Finding Nemo* (2003), and Uncle Ugo from *Luca* (2021).

Anglerfishes are an order of bony fish (teleosts) named in homage to their conspicuous use of bioluminescent lures to ensnare prey (Fig. 1). Shallower water anglers, such as the monkfish, use lures but are perhaps not as iconic as the deep-sea mesopelagic anglerfish. Luring as a method for feeding occurs in both the plant and animal kingdoms (Pietsch & Grobecker 1978). This method is effective in conserving energy by remaining motionless and enticing potential predators by what appears to be their typical prey, only for the predator to become the prey. Lures can come in many guises, with some mimicking food, others enhanced by exhibiting prey-like behaviour, even some emitting false sexual cues.

Deep-sea anglers live in the deep-pelagic zone of the ocean, typically at depths between 200 and 1000 m where the last remnants of solar light are detectable (Sutton, 2013). This is often referred to as the 'twilight zone' (Warrant & Locket, 2002). A prerequisite for survival in the deep pelagic is therefore survival at ultra-low light levels. Such strategies include avoiding being preyed upon, preying upon others without

being seen, communicating without being detected by adversaries and selecting the correct sexual partners. All of these can be achieved through the manipulation of biologically derived light or 'bioluminescence' which is essentially a chemical reaction involving a light-emitting molecule (luciferin) and an enzyme (luciferase). Bioluminescence has many uses, including camouflage in downwelling light, mimicry, stunning or confusing predators, to attract mates, and many others (Haddock et al., 2010).

It is the lurk-and-lure combination of behaviour and morphology that make the deep-sea anglerfish one of the true masters of light in the deep sea. In 10 of the 11 families of anglerfishes, the females have a bulbous luminous lure (the esca; Herring, 2007). The males lack such a lure and therefore the ability to produce bioluminescence is restricted to the females (Bertelsen, 1951). The esca is a complex structure that can have numerous protuberances, filaments, and reflector systems, and is suspended from the body by a long modified dorsal fin ray (the illicium or 'fishing rod'). Symbiotic luminous bacteria are contained within the bulb of the esca and are exposed to the exterior by a pore, allowing the host to control the emission of light. It is generally assumed that females of all anglerfishes have this light-emitting capability. The movement of the lure, which mimics the movement of the prey, adds to its 'fishing' function (Pietsch & Grobecker, 1978).

The lurk-and-lure combination is an energy conserving strategy in a food impoverished environment. The bodies of anglerfish are rather bulbous and flabby with spiked ragged fins that differ from those of more familiar shallower species as they are used primarily for stabilization rather than locomotion. Anglerfish are however capable of burst swimming albeit in a lethargic manner. Their jaws and stomachs can extend to consume prey much larger than itself, a strategy common in scavengers and predators in low food environments. They typically have very small eyes, and blackened bodies which are typical adaptations to living in low-light environments.

Anglerfish such as the Ceratiidae or sea devils also exhibit extreme sexual dimorphism, with females being much larger than the males (Pietsch, 1977). The males are often highly reduced parasitic dwarves, evolved to partake in an unusual mating strategy. They are polyandrous, with the female taking two or more male sexual partners simultaneously. For some anglerfish species to reproduce, the male will fuse with the female which is only possible due to the lack of immune system keys that permit maturation of antibodies and the production of T-cells, which would normally cause the female's immune system to reject the male (Swann et al., 2020). The parasitic dwarf males hatch with well-developed olfactory organs and large well-developed eyes to detect the scent and light from females in the darkness of the deep sea (Carazo, 2022). Some males are thought to be incapable or relatively ineffective at feeding and therefore never fully mature without fusing with a female. The male must, therefore, quickly find a female to survive.

The combination of the black body, beady eyes, big mouth, long sharp teeth, and the effectively invisible 'creature' lurking in the void accompanied by a small drop of dancing light is a powerfully evocative image of the deep sea and its dangers. It is the deep-sea anglerfish's unusual lifestyle, unsettling morphology and how these are both intrinsically linked to the terrors of the abyss that makes them such an iconic ambassador of the deep sea. While many films draw upon the anglerfish to evoke deep-sea alterity and therefore the danger presented to the protagonists, however, scientific accuracy tends to take a backseat in comparison to creating spectacle, with many anglerfish-inspired monsters being Frankensteinian assemblages of parts taken from multiple different animals.

OPEE SEA KILLER

The Opee Sea Killer is an aquatic monster that pursues Qui-Gon Jinn, Obi-Wan Kenobi, and Jar-Jar Binks in a Bongo

Figure 2. Opee Sea Killer. Source: *Star Wars Episode 1: The Phantom Menace* (Disney+, screen capture).

through the planetary core of Naboo (Fig. 2). An annotated description of the animal details its "bizarre amalgam of traits ordinarily found only in a range of disparate creatures" (Reynolds, 1999). Morphologically the Opee Sea Killer has 'multidirectional eye stalks' more akin to a chameleon (Family Chamaeleonidae) than a deep-sea fish (Ott, 2001). Similarly, it is capable of ballistic projection of a sticky tongue in the same manner as a chameleon (Moulton et al., 2016). Otherwise, most of its traits are drawn from deep-sea species.

The Opee Sea Killer has twin bioluminescent lures on the end of two illicia that run from the dorsal position at the anterior to beyond the length of the body. The Opee clings within dark crags, using the lures on its head to draw the attention of potential prey (Reynolds, 1999), much as the same as female deep-sea angler do in the deep pelagic (Young, 1983). It is therefore likely that it can swing the lures in front of it, adopting the 'lurk-and-lure' strategy (Herring, 2001). Double (bifurcated) lures are observed in some species e.g., *Himantolophus albinares*, but only on one illicium (Iglésias, 2005). While lures are common among deep-sea anglerfish, the illicium that dangles the lure in front of the mouth are formed from tissue from a modified dorsal fin ray (Caruso, 2002) and therefore if there were ever two, they would likely both in the midline given this ontogeny, not side by side.

The large gaping mouth that it uses to gulp prey attracted to the bioluminescent lure is a common feature in deep-sea anglers as they dwell in an environment where food is very sparse, meaning that little effort is expended in hunting and prey size is maximised (Herring, 2001). The Opee Sea Killer also features prominent pectoral fins "for guidance" (Reynolds, 1999) which are of similar morphology as the coelacanth, *Latimeria chalumnae*, an ancient group of lobe-finned fish (Sarcopterygii, Class Actinistia), not typical of benthic or pelagic fish species (Miyake et al., 2016).

The back half of the Opee Sea Killer resembles that of the giant isopod *Bathynomus giganteus* (Family Cirolanidae) (Soto & Mincarone, 2001). This is evident in the pereon (thorax) on the dorsal side that is made up of segmented pereonites. The Opee Sea Killer, however, lacks the pleon at the posterior end. Its pereonites are serrated rather than smooth edged as seen in the giant iso-

Figure 3. Ice Cream Lady. Source: *The SpongeBob SquarePants Movie* (Netflix, screen capture).

pod. The tail legs, which "drive water and help the Opee Sea Killer cling motionless in rocky crags waiting for prey" have crustacean pereopod morphology similar to the uniramous pereopods of the giant isopod, but with only 3 sets. While their effectiveness at clinging to rocks is believable, their ability to 'drive water' is doubtful: in giant isopods this is mostly done using the pleon that is absent in the Opee Sea Killer, albeit other isopods are known to "walk through water" using modified pereopods (Marshall & Diebel, 1995).

In addition to swimming with its legs, the Opee Sea Killer uses jet propulsion by sucking in water through its mouth and emitting it through opening under the plates (pereonites). This trait does not exist in fish or crustacea, but the basic concept is seen in squid (Staaf et al., 2014). According to Lucasfilm Conceptual Researcher Jonathan Bresman, the Opee Sea Killer was initially intended to be "essentially a huge jaw grafted onto a fish/crab body" but became "more of a cross between an angler fish and a crab" (Reynolds, 1999). The Opee Sea Killer is a multi-animal amalgamation with a chameleon's head and ballistic tongue, the gaping mouth and bioluminescent lure of a female deep-sea angler fish, the body and legs of a giant isopod, the pectoral fins of a coelacanth, and the locomotion of a squid.

ICE CREAM LADY

The concept of an anglerfish-like antagonist with certain chameleon-like characteristics continues in *The SpongeBob SquarePants Movie*. Sponge Bob and Patrick venture out of Bikini Bottom into a boneyard where they encounter an old lady selling ice cream (Fig. 3). When SpongeBob attempts to take the bowl of ice cream it sticks to his hands and the ground breaks away to reveal that he is standing in the gaping maw of a huge red fish whose lure is a protrusion on its tongue. The monster largely possesses elements of the anglerfish, yet the 'sticky' tongue is also, more akin to that of a chameleon (Moulton et al., 2016). This particular representation of the anglerfish draws upon the features of demersal species, that is, species that are associated with the seafloor rather than the pelagic mid-waters. This is evident in the placement of the esca and the locomotion of the fish itself.

Not all deep-sea anglerfishes have the esca suspended above the head on the illicium. Anglerfish of the genus *Thaumatichthys* or 'wolftrap seadevils', such as Prince Axel's wonderfish (*T. axeli*) are benthic

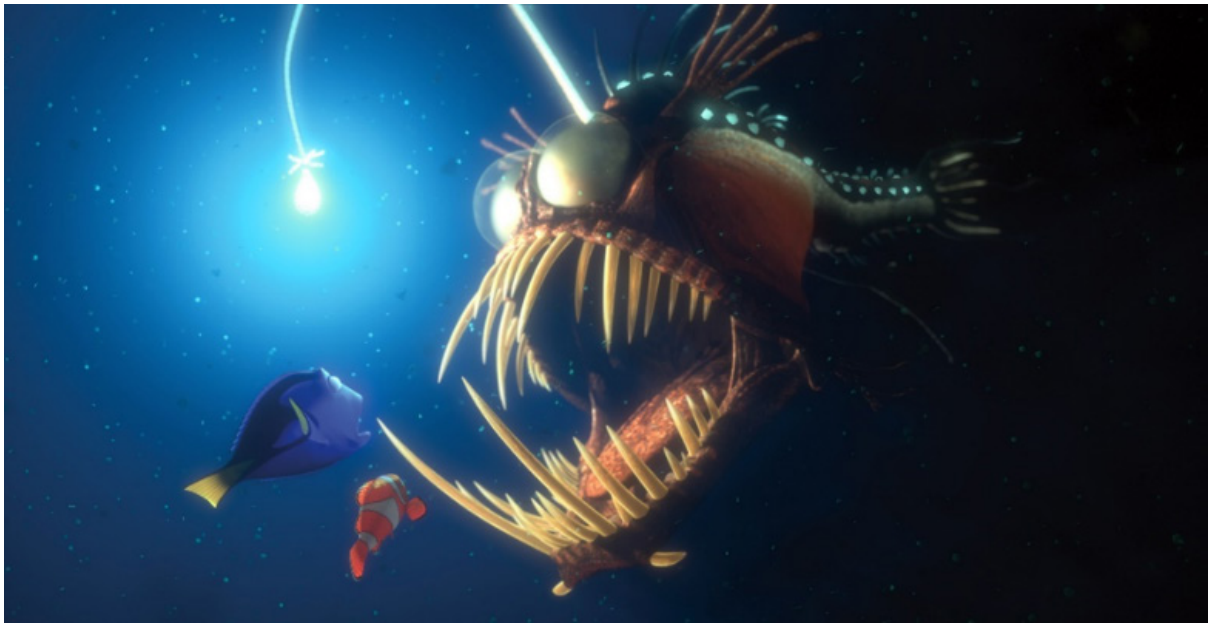

Figure 4. Deep-sea anglerfish. Source: *Finding Nemo* (Disney+, screen capture).

species in the Thaumatichthyidae family. While the pelagic species use the bioluminescent lure to mimic a small prey item suspended or swimming in the midwater, the benthic species have adapted lures that resemble something more typically benthic, i.e., sessile. Instead of suspending its lure in the water column, Prince Axel's wonderfish sits motionless on the seafloor and lures prey with a distinctive forked esca on the roof its mouth (Bertelsen & Struhsaker, 1977). Early observations referred to it as "the trap-mouthed wonderfish" (Gromova & Makhotin, 2022). Female *Thaumatichthys* have a long, broad, flattened head with enlarged premaxillary teeth on the upper jaw that overhang the shorter lower jaw. The jaws are hinged in such a way that the upper jaw with the longer teeth can be lowered down to enclose the lower jaw, which is how the fish attempts to eat SpongeBob.

Once the lure is revealed to be a trap and the whole body of the fish emerges from the benthos, it chases SpongeBob on foot. While this seems strange, "walking" is not uncommon in some demersal anglerfish. Monkfish (*Luphius piscatorius*) walk across the seabed using a combination of both the pelvic and pectoral fins, with the pelvic fins bearing weight and both generating propulsion and aiding in stability (Angus, 2003). Other fish, such as frogfishes are known to 'walk' (Pietsch & Grobecker, 1990). The Ice Cream Lady can therefore be described as a demersal anglerfish with an oral lure (but on the floor of the mouth rather than the roof), with a sticky chameleon tongue. This character is more comical and combines less disparate features in comparison to the Opee Sea Killer, but still behaves as the jump scare antagonist. It is slightly more developed as a 'character' as opposed to simply a 'monster', like the Opee, albeit in the somewhat bizarre guise of a sentient lure masquerading as an old lady selling ice cream on the outskirts of the city.

FINDING NEMO'S ANGLERFISH

Marlin and Dory descend into a deep-sea trench to find a scuba mask, on which is written the address where Nemo was taken. In the trench they are captivated by a light, which is then revealed to be the bioluminescent lure of an anglerfish (Fig. 4). While its general body morphology, colour, long thin teeth, gaping mouth and single bioluminescent lure are very in keeping with the generalised model of a female deep-sea angler fish, other elements are drawn from other species (Anderson & Leslie, 2001). For ex-

Figure 5. Uncle Ugo. Source: *Luca* (Disney+, screen capture).

ample, anglerfish in the deep sea are known for having very small eyes relative to the body, but the anglerfish in *Finding Nemo* has large, soulless eyes. These eyes are much more binocular, and in fact resemble the eyes of the binocular fish *Winteria telescopa* or the large cloudy domed eyes of the barrel-eye *Macropinna microstomsa* (Wagner et al., 2022). The unsettling eyes paired with the fact that the anglerfish does not speak renders it significantly less anthropomorphised in comparison to the expressive, talking fish that populate the rest of the film.

The anglerfish illuminates its array of photophores which are typical of mesopelagic species such as the hatchetfish *Argyropelecus hemigymnus* (Krönström et al., 2005). This type and arrangement of photophores have evolved to provide camouflage against the downwelling solar light from the surface when viewed from below by mimicking the light intensity with bioluminescence emitted by the photophores on the ventral surface (Herring, 2002). However, in the anglerfish in *Finding Nemo*, these photophores are on the dorsal surface meaning that they would never work as camouflage: quite the opposite. Photophores on the dorsal surface would illuminate the fish against the dark surroundings when viewed from above and would still be visible through its silhouette, perhaps even enhancing it if viewed by a predator from below. However, in addition to the esca, females of some anglerfish species have sacs (caruncles) containing luminous bacteria on the dorsal surface, but usually only 2 or 3 situated in front of the dorsal fin (Munk & Herring, 1996).

The lurk-in-the-dark jump scare moment in *Finding Nemo* in which the fish behind the lure lights up is enhanced by equipping the anglerfish with features from other distinctive deep-sea morphologies. Despite being the only 'realist' text in this article in which fish are ostensibly based on real species, the anglerfish's morphology is fantasy.

UNCLE UGO

Luca's Uncle Ugo is a sea monster who lives in the deep sea and subsides on a diet of whale meat. In contrast to Luca's rational and loving immediate family members, who are brightly coloured with expressive eyes, Ugo is a somewhat unhinged and unsettling character estranged from the family (Fig. 5). Unlike the Opee Sea Killer or the *Finding Nemo* Anglerfish who are obstacles for the protagonists of their respective films, Uncle Ugo is a character with his

own personality and reasons for his quirks. However, his association with the deep sea still associates him with alterity. On first appearance Uncle Ugo is a clumsy humanised representation of morphologies from many families of fish (with additional exotropia), however, he has two physical elements that place him strictly within the deep-sea fishes.

Based purely on morphology, Ugo is obviously deep-sea fish-inspired because of the bioluminescent lure on top of his head that even illuminates his face while he speaks. The combination of the lure suspended on the illicium in front or above a wide mouth with sharp teeth is the common anglerfish feature, however, the presence of the lure technically makes Uncle Ugo a female (Herring, 2007). If we assume sea monsters conform to contemporary Western configurations of gender construction, Uncle Ugo might be considered trans or intersex.

When he visits Luca's family his heart stops due to the increased oxygen levels of the water, and Luca must punch him in his transparent chest to save him. This provides two further connections with the deep sea. Firstly, his intolerance of ambient oxygen levels in the shallow seas suggest he is adapted to low oxygen levels that are typically found in the oxygen minimum zones (OMZs) of the ocean (Paulmier & Ruiz-Pino, 2009). OMZs are where oxygen saturation in seawater is at its lowest which typically occurs at depths of ~200 to 1500 m but can vary regionally but are found worldwide. Uncle Ugo is from the Italian Riviera (Liguria) in the Ligurian Sea region of the Western Mediterranean. Oxygen in the surface waters is between 200 and 240 µmol/kg but decreases rapidly to ~190 µmol/kg by 400 m (Mavropoulou et al., 2020). Therefore, if he struggles with oxygen in the surface waters, he is likely to be from depths ~400 m. This puts him either on the continental slope or in one of the 2 canyons: the Polcavera or Bisagno Canyons.

Ugo's transparent body may have been inspired by the gelatinous encapsulation of the head of the barrel-eye fish, which has a completely transparent head (Wagner et al., 2022). However, the reference to Ugo's visible heart suggests transparency of the main body, which can be common in some deep-sea fish families. Beyond the larval phase, there are not many deep-sea fish that are as transparent as Ugo who is presumed to be fully mature. The deepest fish in the ocean, the hadal snailfish (Liparidae), are largely transparent where internal muscles and organs are visible through the gel-like sub-dermal extra cellular matrix (Gerringer et al., 2017). This 'gel' offers a solution to help in obtaining neutral buoyancy and hydrodynamic streamlining without maintaining expensive tissues, such as skin and scales, in a food scare environment.

The deep waters off the Italian Riviera happen to underly the "Santuario dei Cetacei" or Cetacean Sanctuary. This explains why Ugo has a penchant for whale meat and allows audiences to further make the connection with the deep sea, of which whale falls are a well-known feature (Smith & Baco, 2003). There is a plethora of deep-sea species who will exploit whale fall carcasses (Smith et al., 2015); however, Uncle Ugo is morphologically unsuited to scavenging due to his bioluminescent lure, illicium and gaping mouth. His lure marks him as a pelagic lurk-and-lure predator, not a scavenger. These inconsistences are perhaps part of the inexplicably complex character of Uncle Ugo. In comparison to anglerfish discussed above, Ugo actually has a personality and shows kindness to Luca, even if Luca is not convinced. However, his association with the deep-sea prescribes a portrayal as ugly, ill-coordinated, and obtuse. His off-putting quirks and description of his deep-sea home ultimately convince Luca to run away from his family and live on land—it would be a very different film if Luca had been more curious about the deep sea.

DISCUSSION

Based on our assessment of four different anglerfish in film, we draw some broader observations about the role they play in

popular culture. The anglerfish, identifiable by its iconic lure, is a powerful representative of deep-sea alterity. When anglerfish are represented in visual media, they are rarely based off a singular species and instead take the scariest features from multiple creatures, including non-aquatic features, sacrificing scientific accuracy for spectacle. This happens regardless of whether the text is speculative (science fiction and/or fantasy) or realist (based on real places and things).

Anglerfish, as well as deep-sea animals/monsters more broadly, demonstrate a significantly lessened degree of anthropomorphism than the non-deep-sea animals in any given text. When assigned any gendered attributes, anglerfish tend to present as male. This is likely a manifestation of an underlying patriarchal ideology that sees femininity as incompatible with ferocity and therefore monstrosity (Ferguson, 2018). Another example is this can be found elsewhere in *Finding Nemo*. Bruce the Great White shark is a male character who flips between being a kind and pleasant jokester and a mindless carnivorous monster, appears to lack claspers and is therefore morphologically a female. While anglerfish are certainly a powerful icon of the deep-sea and its depths, there is a distinct lack of scientific accuracy in on-screen Lophiiformes. This goes hand-in-hand with the lack of sympathetic representation. Anglerfish may seem scary, but they are just trying to do what all fish do: eat, mate and survive.

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