

## ***Trachipterus altivelis* — King-of-the-Salmon**

**By Susan McDougall**

*The people called their giant sisters “sea serpents,” but most often encounters with these immense fish took place at the shore, where upon leaving its watery home, the great Oarfish was transformed into a mass of gelatinous tissue, hardly a threat. And in the Strait, the appearance of the related “King-of-the-Salmon,” was considered a harbinger of good, rather than evil, for some believed that not far behind this strange fish the life-sustaining, bountiful salmon would follow.*

*Unique in many ways, young King-of-the-Salmon emerge from their large eggs fully prepared for a meal. No waiting for big teeth, or for any teeth at all. Suspended in a cloud of plankton, their jaw extends without hesitation, just as it does in their parents, and within seconds a first meal is consumed by the ravenous young fish. They resemble their cousins, confusing to those who would study them, although when it becomes their concern, the fish have little difficulty sorting out their close relatives. Enjoying the bounty of a cold sea, they grow quickly, metamorphosing to a distinctive juvenile form. Now six-inch fish that swim head up and tail down, they are decorated with long, feather-like extensions to their fins, an unusual adornment for any fish, young or old. Perhaps an aid to buoyancy, as the youngsters grow, they lose the filmy appendages and develop jaws large enough to capture a squid or a small fish. In time they will become solitary adults with a ribbon-like form and a distinctive vermilion dorsal fin.*

A member of an ancient order, the Lampriformes, the solitary King-of-the-Salmon (*Trachipterus altivelis*) plies the depths of the Salish Sea, including the cold waters of the Strait, where on occasion it washes ashore, or, more rarely, is snagged by an angler intent on catching a more palatable fish. With a tendency towards mushiness, a stranded, dying fish is rarely intact. Yet its sheer size makes this ribbonfish notable; as one of the largest fish in the inland waters, it occasionally exceeds 6 feet (1.8 meters) in length. The form is indeed shaped like a ribbon, with a dorsal fin extending from the back of a box-like head to an asymmetric caudal fin. With an undulating motion, reminiscent of a snake, the King-of-the-Salmon can move rapidly if briefly.

Also known as “dealfishes” in reference to a plank split from a larger board (“dealt”), the scientific King-of-the-Salmon genus name, *Trachipterus*, is derived from the Greek word “trachys” for “rough” and “pteron” for “wing”: the species name “altivelis” comes from the Latin “altus” meaning “high,” and “velum” for “sail.” These names allude to the elongated dorsal fin common to ribbonfish species. The order name, Lampriformes, is Greek for “light,” perhaps an acknowledgement of the brilliant orange of the Opah, an ancient relative of the King-of-the Salmon.

Besides the ribbonlike form, other features distinguish this strange fish, which, as with its handful of relatives, over the ages may have been one source for sea serpent stories. Although it is eel-like taken to the extreme, the two are unrelated, and the ribbonfish is not capable of traveling over land as some eels do. With a tendency to turn to a soft mass on shore, the long dorsal fin enables an undulating motion for the water-bound King. The eyes are large, the mouth small, and the teeth sharp. But when on the hunt for a meal it is the jaw that commands attention.

Modifications in connections between the jaw and face enable this species and its relatives to extend the jaw forward, forming a relatively giant maw, rather like a baleen whale that swims with its great mouth open, scooping up tiny plankton. The King-of-the-Salmon is more aggressive, however, capable of pursuing prey with an acceleration that may seem surprising for a fish with poorly developed muscles and soft bones. With the upper jaw extended, and the lower jaw lined with sharp canines, this versatile fish can sweep in prey that varies in size and configuration, from small crustaceans to the occasional octopus or squid.

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As if such a unique jaw were not enough to distinguish it, in the deep waters where it lives the King-of-the-Salmon adopts a quite at odds with most fish. Rather than making use of its large dorsal fin to move horizontally, it tends to swim in a position at approximately 45 degrees to the surface of the water.



**King-of-the-Salmon (*Trachipterus altivelis*) juvenile**

Possibly this makes the King-of-the-Salmon less visible to prey while at the same time giving the fish a better view of its surroundings, lit from above.

These documented behavioral features and physical attributes of the King-of-the-Salmon contribute to knowledge of the species and its family (the Trachipteridae) as well, but lack of research opportunities, as this is a fish with no commercial interest, and the difficulties in observing it imply that as a whole information about the

family is sparse. The-King-of-the-Salmon is amongst the list of poorly understood species.

Complicating matters, this fish hunts in deep waters, sometimes to depths of 6,590 feet (2,100 m). It is also known to forage in more shallow habitats, at least to the limit of the photic zone at 656 feet (200 m). In the cold waters, the female most likely broadcasts her large eggs (rather than constructing a nest or depositing them on the bottom), although the season in which spawning occurs is unknown. What has been observed, however, are the strangely beautiful juveniles that develop from fully formed larvae. Within a few months these active feeders metamorphose into a six-inch fish in an upright position. Captured on video, the undulating juvenile reveals its lineage with a squared face and tapering body, but it is decorated with long extensions to the fins that will be lost as it grows. Some researchers postulate that these soft rays are an aid to buoyancy, but as with many features of the King-of-the-Salmon, much remains to be learned. And a few related species retain these long dorsal fin projections into adulthood.

Three genera compose the Trachipteridae family — *Trachipterus*, *Zu*, and *Desmoderma*. With 10 species, *Trachipterus* is the largest genus, while the others include two species in each. Although small, the family is the largest of the order, and between them, the several Trachipteridae species inhabit most of the world's oceans, being absent from only the coldest waters of the Antarctic. The King-Of-The-Salmon ranges from the southeastern Bering Sea, south along the eastern Pacific coast to Valparaiso, Chile.

The Trachipteridae family is characterized by the long ribbonlike form, also referred to as "taeniform." However, the closest related family to the King — the Veliferidae — includes species with

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rounded bodies. And with only three species, the small Regalecidae family nevertheless is distinguished by a member that is the longest bony fish on the planet. Thus, although the ancient Lampriformes order may be small in numbers, the size range, the colors, the strange jaws, the shape, and the few that evoked nightmares in the sanest of medieval sailors and those of more recent times as well — all these and more place the Lampriformes species amongst the oddest of fishes.

### **Ribbonfish and Opahs**

Although the fossil record is scarce, the Lampriformes order is nevertheless estimated to have arisen during the Cretaceous period, about 80 million years ago, and perhaps a bit more, as at least one fossil, *Nardovelifer altipinnis*, a species considered a member of the extant Veliferidae family, has been found in strata possibly dating back 83 million years. The earliest species were bathysomes, meaning “deep-bodied.” The ribbonfishes evolved later, and apparently only once; they radiated during the Paleocene, 66 to 55 million years ago. Several common features distinguish the order, but the most distinctive is the altered face ligature which has endowed the member species with the ability to extend the jaw, effectively enlarging the small mouth, thus providing the opportunity to capture a wider variety of prey. Even the toothless, rounded Opah (*Lampris guttatus*) has a protrusible jaw.

Given that witnessing feeding by either the Opah or the King-of-the-Salmon is a rare event, the difference in form of the two species seems at odds with a supposed family connection. The Opah is disc-like and compressed, with a bright orange-and-blue body reminiscent of a tropical species. The King-of-the-Salmon body color is not as brilliant, but the vermilion fins are similar to the Opah. And, of course, there is the protrusible jaw. But why a ribbon-like form would evolve from a rounded one poses a question not easily answered. It is known that the Opah represents an older lineage; a closely related extinct fish plied the oceans approximately 60 million years ago. An extinct King-of-the-Salmon relative, found in Algeria, is dated to a much later time, perhaps 10 million years, or less. During that long time, the species moved downward into deeper waters and developed its distinctive sinuous body.

The King-of-the-Salmon and the Opah are most closely related to the Veliferidae, which, like the Opah is composed of rounded fish, although they are much smaller. This family includes two shallow water species known to occupy waters to 330 feet (100 m). It was the Veliferidae sister families, such as the ribbonfish, which developed the capability to inhabit deep oceanic waters. To do so, they relinquished the frisbee-like body for one that was streamlined, nearly serpent-like in appearance.

The ribbonfish shares this altered configuration with other fish of the dark sea. It has been observed that deep-dwelling fish often have an elongated form as well as a large head. Deep sea fish evolution appears to have peaked twice during cold planetary conditions; shallow water fishes are believed to evolve more rapidly during warmer periods, often in times of continental flooding. The advantages of the streamlined form include the ability to withstand deep water pressures, while the large head supports the structure of the extendable jaw, an organ that provides access to a wide variety of prey. The form and feeding style of the ribbonfish is a nearly perfect adaptation to such an environment, and if size is any indication, both the local King-of-the-Salmon and a close relative demonstrate the success of their adaptive form.

### **The Big and The Small (and an Odd Size Reduction)**

Few fish of the Strait exceed the six-foot length of the King-of-the-Salmon, but by comparison to a truly oversized and closely related species, our local ribbonfish appears as a mere juvenile. This huge

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relative is the Giant Oarfish (*Regalecus glesne*), which, at a maximum length of 56 feet (15 m) ranks as the longest bony fish on the planet. The name “oarfish” supposedly is in reference to the oar-shaped pelvic fins, but the elongated, ribbonlike body is unmistakably like that of the King-Of-The-Salmon. The bones are soft, the flesh somewhat mushy, and its prey similar to other ribbonfish, only more of it. This is a widely distributed giant, one that surely could have been an inspiration for sea serpent stories. For, as with its relatives, the Giant Oarfish will occasionally rise from a depth of 3,300 feet (1,000 m), undulating towards the surface, ruffling the waters with its upright head.

By contrast, the rounded Spinyfin Velifer (*Metavelifer multiradiatus*) stretches to less than a foot and swims the shallow waters of warm seas in relative anonymity, its small size unlikely to inspire terror in even the most superstitious sailor. Meanwhile, the Giant Oarfish and its closest relative, Russell’s Oarfish (*Regalecus russellii*) will on occasion reduce their length with a self-amputation of the tail end, a behavior that may provide defense against a predator. Complete amputations are typically followed by a regrowth of the posterior end of the fish; this may occur several times during its life. Perhaps it is an adaptation to such a long body, one which can afford to lose a few inches; even the smaller Russell’s Oarfish can grow to a length of over 26 feet.

Adding to their unusual lifestyle, Oarfish are also known to inhabit shallow waters, sometimes onto the beach, where stranded, they die, often in the company of others. Such suicidal behavior adds to the mystery of these strange fish, perhaps on a dark night near a restless sea inspiring the myths of giant sea serpents and other monsters of the deep.

The King-of-the-Salmon and its family members do not employ self-mutilation for defense but instead rely on short but quick bursts of speed to escape hungry pursuers. In the Strait, seals and dolphins do not hesitate to chase the undulating, soft-bodied fish, if they are fortunate enough to find one. As for their appeal to two-legged hunters, it is minimal; unfortunately, when caught the fish is discarded as bycatch, with little information gathered. Nevertheless, most often escaping, the King-of-the-Salmon finds relative sanctuary in its deep-sea home, hopefully safe from nets, but unavailable to researchers as well.

### **Escape in a Cloud?**

With its tapered body, strangely shaped head, big eyes, and brilliant long fins, the King-of-the-Salmon is amongst those fish that fail to have a “regular” appearance. If caught, identification is easy, at least until the fish begins to fall apart, as they are inclined to do. Eating one is apparently not a particularly exceptional culinary experience, while recording their presence is uncommon. But they are typical in other respects. Escape depends on swiftness, large size, their up-down position, as well as the darkness of the deep waters where they often dwell. Apparently, there is little else to deploy, as these striking fish do not escape by employing any other defense.

But greeting the occasional scuba diver with an even more bizarre behavior, another Lampriformes family, the crestfishes (Lophotidae), also known as unicorn fishes, shrouds itself in a cloud more reminiscent of an octopus than a fish. This inky defense is also used by another family, the Radiicephalidae, or Tapertails. This adaptation is apparently unique to vertebrates, a defense mechanism that only adds to the mystery of these uncommon dwellers of deep and shallow waters alike.

Indeed, the Lampriformes are amongst the most unusual of fishes.

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*Alone near the bottom of the sea, the King-of-the-Salmon searches for a meal in the planktonic masses. Free from parental duties, the six-foot fish forgoes horizontal travel, moving upwards towards the surface head-first, its one-sided tail pointed downwards towards the deep sea. The long fin along its back undulates, enabling a respectable speed, hopefully sufficient to escape a hungry predator. Encountering an octopus, a small fish, or a group of little crustaceans, it protrudes its jaw, engulfing all within reach of its wide gape. This is a solitary fisher, but not one confined to a single place. Returning to the depths, the King resumes its search, unaware that humans may watch for its passing as a sign, a harbinger of a more plentiful and tasty fish, for which it bears its unique name.*