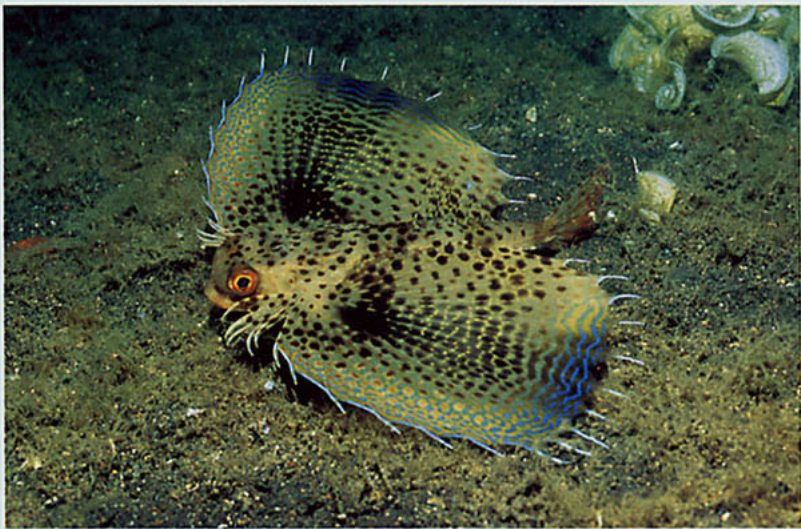


Scorpaeniformes I

(Gurnards and flatheads)

Class Actinopterygii
Order Scorpaeniformes
Number of families 4

Photo: An Oriental helmet gurnard (*Dactyloptena orientalis*) sleeping on the lava sand of the Lembeh Straits of Sulawesi Island, Indonesia. (Photo by Fred McConnaughey/Photo Researchers, Inc. Reproduced by permission.)



Evolution and systematics

The two suborders that comprise this chapter, the flatheads (Platycephaloidei) and flying gurnards (Dactylopteroidei) are mail-cheeked fishes (order Scorpaeniformes). This old group (first recognized in 1829), composed of approximately 1,400 species, is united by the presence of the suborbital stay. The suborbital stay is a bony strut that connects the bones under the eye with the front of the gill cover. Some authors have suggested that the suborbital stay in the flying gurnards evolved independently from the remainder of the scorpaeniform fishes. These authors place the flying gurnards in their own order (Dactylopteriformes).

In 1758 the father of binomial nomenclature, Carl Linnaeus, was the first naturalist to describe species of both the flying gurnards and the flatheads. Since the time of Linnaeus, six additional flying gurnards and 86 additional platycephaloids have been described. The seven flying gurnards are now classified into two genera (*Dactylopterus* in the Atlantic and *Dactyloptena* in the Indo-Pacific). The 88 platycephaloids have been classified variously into three to seven families, depending on the researcher. For the purposes of this review, the Platycephaloidei are split into three families: the flatheads (Platycephalidae, 64 species), the ghost flatheads (Hoplichthyidae, 11 species), and the deepwater flatheads (Bembrididae, 11 species). At this time, there is considerable debate about the placement and classification of both of these suborders, so the classification follows Joseph Nelson's 1994 book, *Fishes of the World*.

Traditionally, the flying gurnards have been allied with the sea robins (Triglidae and Peristediidae), because both groups share enlarged pectoral fins and free pectoral rays, which these fishes use like legs to "walk" on the seafloor. Recently, researchers have suggested that the suborbital stay in flying gurnards evolved independently of the strut found in other

mail-cheeked fishes. These ichthyologists have suggested that flying gurnards are related to the seahorses and their relatives (Syngnathoidei) or to the tilefishes (Malacanthidae). Because of these different views, the interrelationships of the flying gurnards remain unclear, and they are treated here as scorpaeniforms, pending resolution of their placement.

The placement of the flatheads and their relatives is not clear either. Historically, the three flathead families have been united because of their elongate bodies and depressed or "flattened" heads; hence their common name. Recent work by Hisashi Imamura has suggested that the sea robins and their relatives (Triglidae and Peristediidae) may have evolved from a flathead relative, suggesting that the sea robins should be placed in the Platycephaloidei. Clearly, further work using both morphological and DNA sequence data will shed light on the interrelationships and intrarelations of the flatheads and their allies.

At more than 50 million years old, the enigmatic *Pterygocephalus paradoxus* from the Monte Bolca formation in Italy may be the oldest known flying gurnard, but the fossil *Prevolutans faedoensis* from Eocene deposits in northern Italy is the oldest clearly identifiable flying gurnard. Flatheads first appear in the fossil record with an Eocene otolith (ear stone) record identified as *Platycephalus janeti* from France. Whole fossilized skeletal specimens of *Platycephalus* date to the early Miocene in Tasmania.

Physical characteristics

Flying gurnards are one of the most recognizable of all spiny-rayed fishes because of their large heads, greatly developed winglike pectoral fins, and free pectoral rays. Their bodies are covered with ctenoid scales. They have a very

characteristic “helmet-like” skull with a strong preopercular spine that gives them their other common name (helmet gurnards). Dactylopterids have a short snout with a subterminal mouth. Their jaws are filled with small, conical teeth. Flying gurnards have two dorsal fins separated by a deep notch, which typically have a couple of free dorsal spines detached from and preceding the first dorsal fin. As was found in the flatheads, sculpins (Cottoidei), and some sea robins, the dactylopterids lack true anal spines.

Typically, flying gurnards lie on the seafloor with their pectoral wings folded against the body. When dactylopterids have their wings folded, they are well camouflaged on the seafloor because of their dusky red and drab white, brown, and black markings. When startled, however, flying gurnards quickly spread their brightly colored pectoral fins (covered with bluish and whitish spots, for example) to distract would-be predators and make their quick escape. Flying gurnards can reach lengths of up to 15.7 in (40 cm).

Flatheads are recognized easily by their elongate bodies with depressed, broad heads. They typically are covered with ctenoid scales, except for their lower flanks and ventral surfaces, which often are covered by cycloid scales. The ghost flatheads lack scales, but their dorsal surface is overlaid with spiny, bony plates. All flatheads and their allies have large eyes placed close together high on their heads. The eyes of platycephalids often are covered with highly ornamented eye flaps. All platycephaloid heads are overlaid with bony or spiny ridges. These ridges are particularly well developed in the ghost flatheads. Platycephaloid jaws are filled with numerous bands of small, conical teeth, but *Ratabuhus megacephalus* has strong canine teeth. Flatheads have two dorsal fins, the first with true spines. Bembrids and hoplichthyids usually have a single anal spine, but true anal spines are lacking in platycephalids. Most flatheads are dark dorsally and pale ventrally. The dark colors are various shades of brown, black, or gray, but the more colorful taxa can be red, purple, and green. The deepwater flatheads tend to be red, orange, and light brown, and the ghost flatheads are typically yellow, pink, or brown. Ghost flatheads and bembrids usually are smaller (11.8–15.7 in, or 30–40 cm) than the larger platycephalids (up to 27.6 in, or 70 cm).

Distribution

The flying gurnards are distributed in tropical and temperate waters in the Indo-Pacific and Atlantic Oceans. They usually are found in nearshore environments, whereas larval and juvenile dactylopterids are found in open ocean (pelagic) environments, where they can be collected at night using attracting lights and handheld dipnets.

The flatheads and relatives are distributed in the tropical and temperate waters of the Indo-Pacific, Mediterranean, and eastern Atlantic. Platycephalids are found on the continental shelf at depths to 984 ft (300 m), but most are found at less than 330 ft (100 m). Bembrids also live on the continental shelf, but they typically are taken at deeper depths (hence their common name, deepwater flatheads), down to 1,900 ft (581

m). Although there are significantly fewer ghost flatheads, they have a much wider depth distribution, ranging from 200 to 4,900 ft (60–1,500 m).

Habitat

Both the flying gurnards and flatheads typically are found on the continental shelf in mud or sandy bottoms. There is also a second group of flathead species commonly found in rocky shore habitats and coral reefs.

Behavior

Although the common name of the dactylopterids suggests that these fishes can fly, they cannot; only the true flying fishes (Exocoetidae) are capable of flight. It is for this reason that many authors have suggested that the common name be changed to helmet gurnards. It is likely that the giant pectoral fins are spread quickly, to scare “would-be” predators, to communicate with conspecifics, or for controlled gliding over the seafloor for prey. Dactylopterids can produce sound by stridulating the hyomandibular bone. Flatheads and their allies are typical “lie and wait” predators that spend most of their time buried completely or partially in the sand or mud.

Feeding ecology and diet

“Walking” quickly over the seafloor by moving their pelvic fins and their short pectoral fin rays alternately, flying gurnards sift through the sandy bottom in search of the next crustacean or fish, which they stir up and capture.

Lying on the seafloor buried partially beneath the sand, flatheads wait to ambush the next crab, fish, or shrimp that swims by. Like chameleons and flounders, flatheads have developed the ability to mimic the color pattern of the substrate on which they are lying. Platycephaloids are modified further for this “lie and wait” feeding strategy by specializations of the respiratory and pelvic structures that allow them to breathe while they are buried and to accommodate larger prey items. These numerous modifications make flatheads one of the premier ambush predators in the Indo-West Pacific.

Flatheads and gurnards are preyed upon by mammals (e.g. humans) and numerous species of larger, predatory fishes.

Reproductive biology

Very little is known about the reproductive biology of the flatheads and flying gurnards. All families produce pelagic, nonadhesive eggs. Japanese researchers have shown that some flatheads (e.g., *Suggrundus meerdervoortii* and *Cociella crocodila*) begin life as males and undergo sex reversal to become females as they grow older.

Conservation status

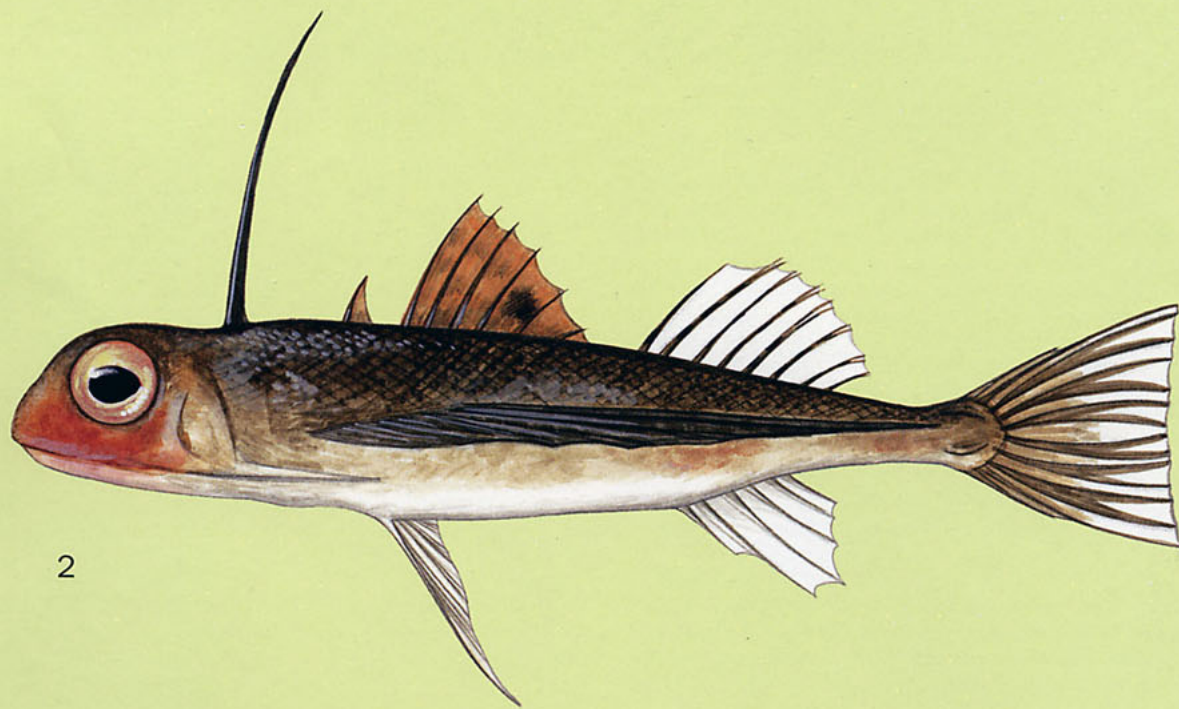
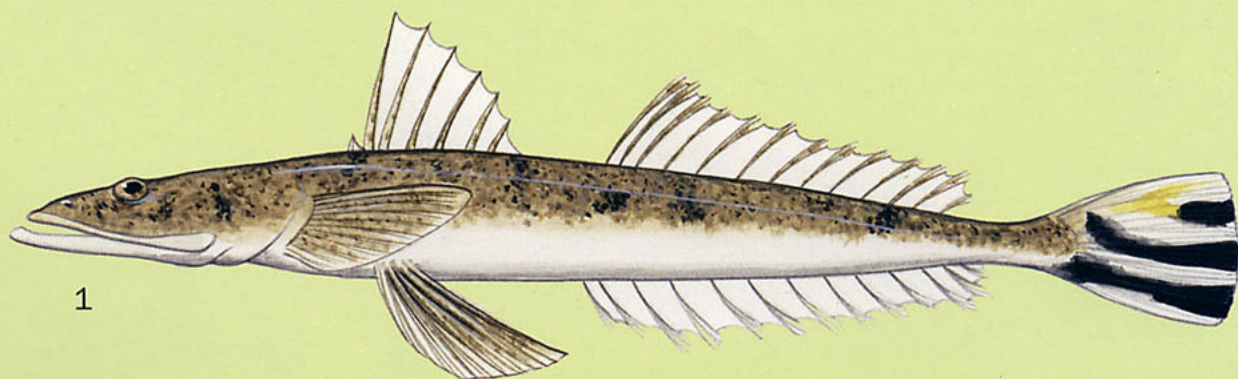
At the present time, no platycephaloid or dactylopterid species are included on the IUCN's Red List, although many species are quite rare.

Significance to humans

Of the four families, only the platycephalids are a commercially important food source for humans. Flying gurnards

occasionally are fished for human consumption, but the fisheries are primarily for personal use. Bembrids and hoplichthyids do not have commercial fisheries, although the flesh of the ghost flatheads is supposed to be of good quality.

Although none of these fishes is as common in the aquarium trade as their lionfish or scorpionfish relatives, both dactylopterids (e.g., *Dactyloptena orientalis* and *Dactylopterus volitans*) and the crocodilefish (*Cymbacephalus beauforti*) occasionally are available in the aquarium trade.



Barbara Duperron © 2003

1. Indian flathead (*Platycephalus indicus*); 2. Oriental helmet gurnard (*Dactyloptena orientalis*). (Illustration by Barbara Duperron)

Species accounts

Oriental helmet gurnard

Dactyloptena orientalis

FAMILY

Dactylopteridae

TAXONOMY

Dactyloptena orientalis Cuvier, 1829, Red Sea.

OTHER COMMON NAMES

French: Grondin volant oriental; Spanish: Alón oriental; Japanese: Semihôbô.

PHYSICAL CHARACTERISTICS

Grows to 15.7 in (40 cm) maximum length. Body moderately elongate with large, heavily armored head and greatly expanded winglike pectoral fins. Head broad and blunt, with large eyes and a small subterminal mouth. A unique fish that is gray to light brown, with dark brown and black spots on its back and upper sides. The elongate first dorsal spine is well separated from the second dorsal spine and the remainder of the first dorsal fin. The enlarged pectoral fins also are spotted, with striking blue wavy lines near the margins of the fins.

DISTRIBUTION

This widely distributed species ranges from the western Indian Ocean and Red Sea east to the Polynesian and Hawaiian Islands.

HABITAT

A benthic species that spends most of its time on sandy bottoms.

BEHAVIOR

A bottom-dwelling fish that quickly expands its pectoral fins as a defensive behavior.

FEEDING ECOLOGY AND DIET

Feeds primarily on benthic crustaceans, clams, and fishes that it stirs up as it "walks" along the seafloor.

REPRODUCTIVE BIOLOGY

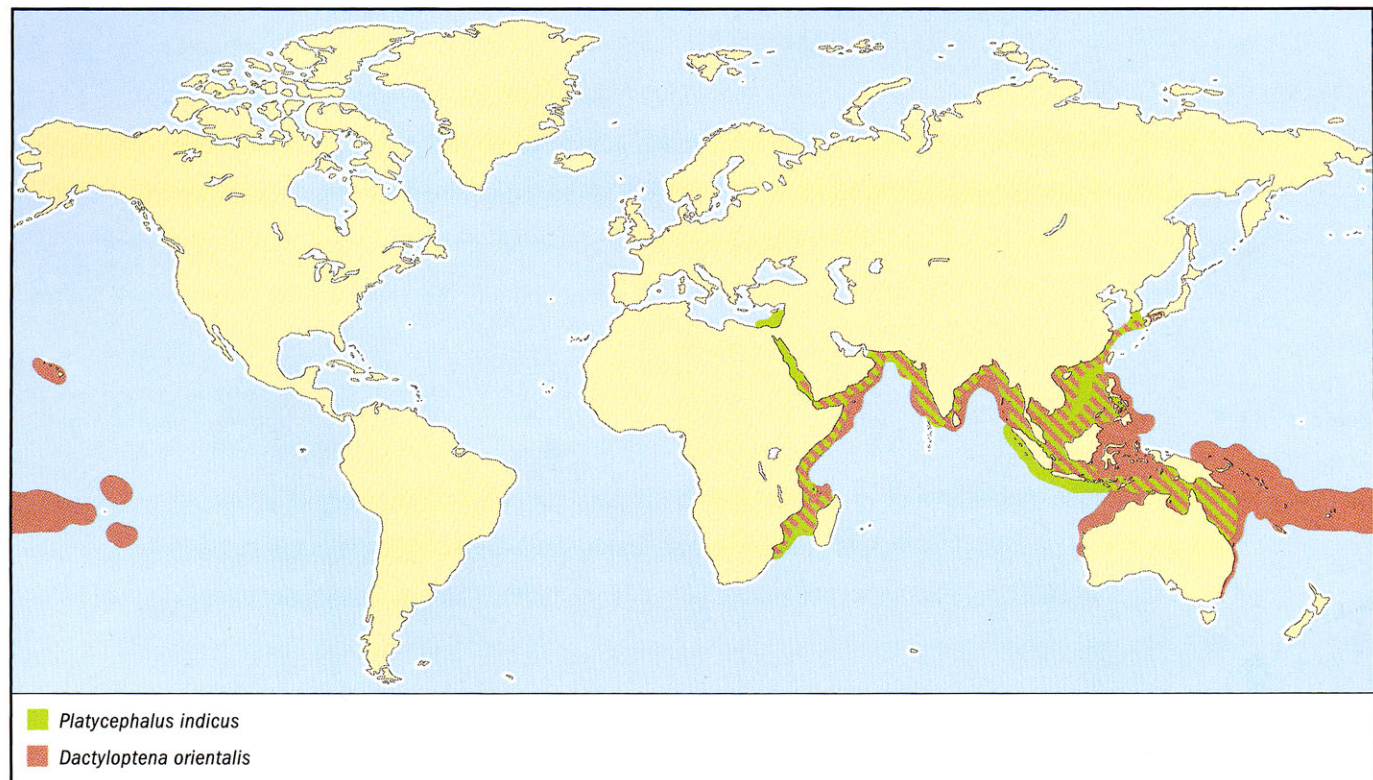
Little is known about the reproductive biology of the Oriental flying gurnards in the wild, although one aquarium wholesaler has started offering aquacultured flying gurnards to aquarists.

CONSERVATION STATUS

Not listed by the IUCN.

SIGNIFICANCE TO HUMANS

A specialty item in the aquarium trade and incidentally fished in the Indo-Pacific, but not commercially collected for consumption. ♦



Indian flathead*Platycephalus indicus***FAMILY**

Platycephalidae

TAXONOMY*Platycephalus indicus* Linnaeus, 1758, Asia.**OTHER COMMON NAMES**

English: Bartail flathead; French: Platycéphale des Indes; Spanish: Chato índico; Japanese: Kochi.

PHYSICAL CHARACTERISTICS

Grows to 39.4 in (100 cm) in maximum length. Characteristic flattened head with various spinous ridges. Vomerine and palatine teeth are canine-like, with broad bands of villiform teeth in jaws. The two dorsal fins are well separated, with an isolated short spine before the first dorsal fin. Body covered with small ctenoid scales. Brownish coloration with eight or nine obscure dusky bands over the back. All fins, except the caudal fin, are covered with dusky spots on the rays. Caudal fin has a median longitudinal black band below and two oblique bands above.

DISTRIBUTION

Known from Israel and Egypt (entered the Mediterranean through the Suez Canal), eastern Africa, India, Indonesia, China, southern Japan, the Philippines, and Western Australia.

HABITAT

Typically found on rocky and soft bottoms at depths from 33 to 656 ft (10 to 200 m).

BEHAVIOR

A bottom-dwelling fish that spends most of its time buried beneath the sand or among rocks waiting to ambush its next prey.

FEEDING ECOLOGY AND DIET

Feeds primarily on benthic crustaceans and small fishes.

REPRODUCTIVE BIOLOGY

Little is known about the reproductive biology of the Indian flathead.

CONSERVATION STATUS

Not listed by the IUCN.

SIGNIFICANCE TO HUMANS

Occasionally harvested, but not a fish of great commercial importance. ♦

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