

FLYING FISH

CARD 31

GROUP 4: FISH

ORDER
Cyprinodontiformes

FAMILY
Exocoetidae

GENERA
Exocoetus, *Thoracopterus*, *Fodiator*, etc.



Flying fish have an extraordinary way of escaping from enemies. They accelerate across the ocean surface like a seaplane, then spread their fins and glide above the water to safety.

KEY FACTS



SIZES
Length: Up to 18 in. (California flying fish).
Weight: Up to 1½ lb.



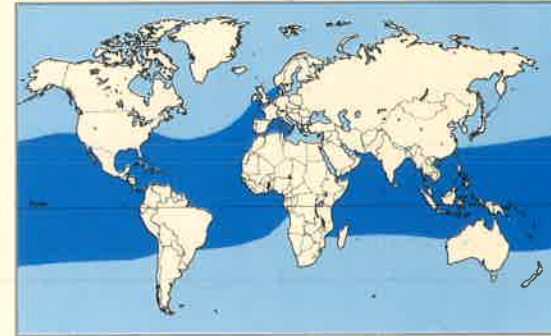
BREEDING
Mating season: Spring and early summer in warm and temperate waters.
Eggs: Free-floating in oceanic species. Filaments on eggs of shallow sea species catch in floating vegetation or debris.



LIFESTYLE
Habit: Sociable, but does not swim in tightly organized schools.
Diet: Small planktonic animals, including the larvae of other fish.
Lifespan: Unknown.



RELATED SPECIES
There are about 48 species of flying fish of various genera worldwide. The most closely related species are the tropical halfbeaks and the needlefish.



Range of flying fish.

DISTRIBUTION

Flying fish occur in the tropical zones of all the major oceans. The Atlantic flying fish often moves into northern waters around Europe and North America in late summer and leaves when the water cools in early winter.

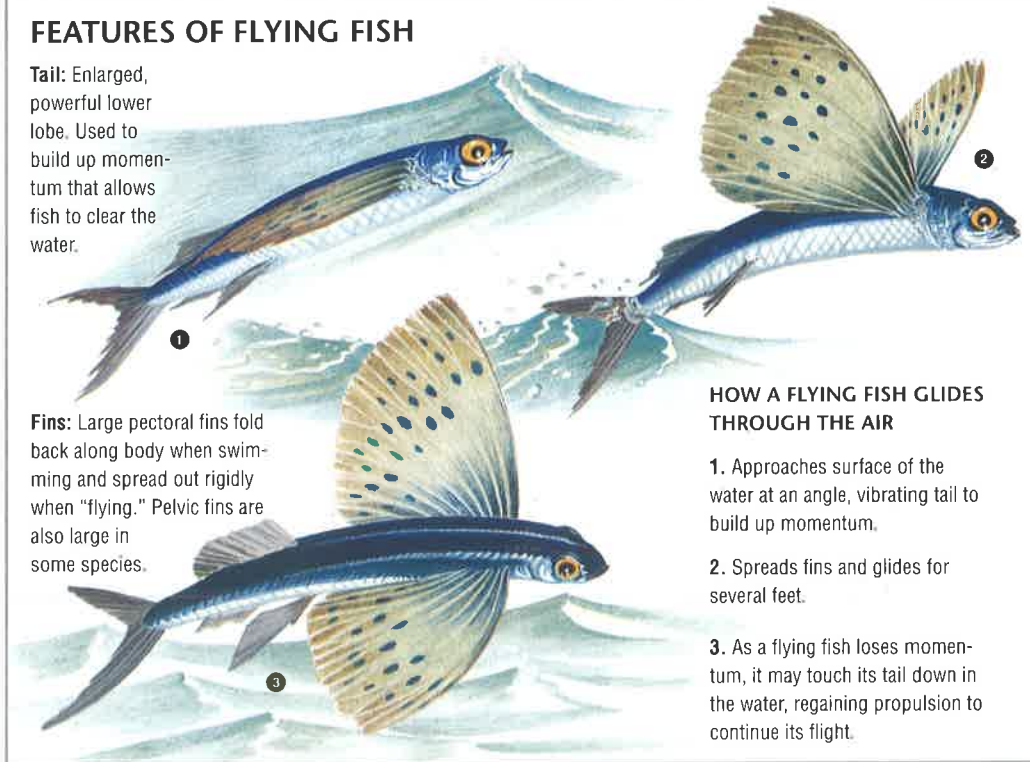
CONSERVATION

Although the California flying fish has some commercial value as bait for game fishing, no species is in direct danger.

FEATURES OF FLYING FISH

Tail: Enlarged, powerful lower lobe. Used to build up momentum that allows fish to clear the water.

Fins: Large pectoral fins fold back along body when swimming and spread out rigidly when "flying." Pelvic fins are also large in some species.



HOW A FLYING FISH GLIDES THROUGH THE AIR

1. Approaches surface of the water at an angle, vibrating tail to build up momentum.
2. Spreads fins and glides for several feet.
3. As a flying fish loses momentum, it may touch its tail down in the water, regaining propulsion to continue its flight.



Flying fish live mainly in tropical oceans, where they are favorite targets of predators such as tunas, sharks, and seabirds. Their celebrated skill in the air often helps them escape underwater attackers. But their prowess at "flying" may carry them away from one enemy, only to deliver them into the jaws of an airborne predator.

HABITS

While feeding in surface waters, flying fish are targets for tuna and bonito, which hunt in packs in warm seas. To escape these predators, flying fish leap out of the water and glide over the ocean surface.

Their "wings" are large pectoral fins and, in some species, pelvic fins. The fins are usually folded back along the fish's flanks. But when it "flies," the fish holds its fins out stiffly, like airplane wings.

As it propels itself through the water, a flying fish builds up momentum until it can glide through the air.

As it breaks the surface, the fish speeds up by vibrating

the lower lobe of its tail fin in the water. Then it spreads its "wings" and glides clear of the waves for several seconds before touching down.

The average "flight" lasts two to three seconds, but longer flights are common, sometimes lasting 10 seconds and covering over 30 feet. While flying is an ideal way of escaping from predatory tuna, it puts the fish in jeopardy from ocean birds such as the albatross and frigate bird, which snatch flying fish as they leap from the water.

Right: Flying fish are most common in tropical waters, despite the scarcity of food.

BREEDING

In the Mediterranean, the Atlantic flying fish spawns from May to July. The eggs are covered with fine threads, or filaments, that anchor them to floating objects so they do not sink to the seabed.

All coastal species of flying fish have similar eggs. But the eggs of open sea species have much

Left: By flicking its tail back into the water, a flying fish can continue its flight for some time.

shorter filaments that act like parachutes, slowing down the eggs as they sink in the water. The eggs hatch while sinking, and the larvae drift back to the surface to feed on plankton.

Unlike their parents, young flying fish are often brightly colored, with shorter pelvic and pectoral fins and a long barbel trailing from the chin. In one species the barbel is longer than the body of the young fish.

DID YOU KNOW?

- When accelerating for take-off, a flying fish vibrates its tail at a rate of over 50 beats per second.
- A record flight of 42 seconds covered 2,000 feet.
- Some marine predators, like dolphins, outwit a flying fish by swimming along its

path at high speed. When the fish reenters the water, the predator is waiting for it.

- Flying fish have been found on ship decks over 30 feet above sea level. They may reach this height by taking off into the wind and being swept up by air currents.



Above: A flying fish uses both pectoral and pelvic fins to power its "flight."



Left: A flying fish clears the water easily as it glides, escaping underwater enemies.

FOOD & FEEDING

Most flying fish live in the warm oceans of the tropics, where they eat zooplankton—tiny floating animals such as copepods and the larvae of crabs and fish.

Flying fish gather in areas where currents carry nutrients up to the surface waters. The nutrients are eaten by zooplankton, which in turn are eaten by flying fish.

Flying fish feed in the upper parts of the ocean, where plankton is densest. They strain water through their gill rakers to filter out edible particles. Larger plankton eaters such as whale sharks may join the flying fish when feeding.



FAIRY BASSLET

CARD 30

GROUP 4: FISH

ORDER
Perciformes

FAMILY
Serranidae

GENUS
Anthias



"Fairy basslet" is the general name for tropical members of the sea bass family. These are tiny, colorful fish that can change sex from female to male.

KEY FACTS



SIZES

Length: Up to 5 in., according to species.

Weight: 1-2 oz., according to species.



BREEDING

Sexual maturity: Not known.

Spawning season: Throughout the summer.

No. of eggs: Several thousand.



LIFESTYLE

Habit: Most species form large schools; others live in small groups under coral ledges.

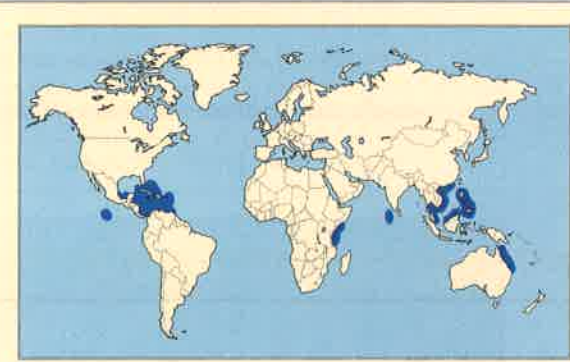
Diet: Zooplankton, tiny marine animals, crustaceans, and fish.

Lifespan: Not known.



RELATED SPECIES

Fairy basslets are related to over 400 species of the sea bass family.



Range of the fairy basslet.

DISTRIBUTION

Coral reefs throughout the world. Large populations also found in the Indian and Pacific oceans, especially near the Great Barrier Reef of Australia.

CONSERVATION

Fairy basslets seem to thrive, but continued destruction and pollution of coral reefs may threaten their future. Collection for home aquariums may also endanger some species.

FEATURES OF THE FAIRY BASSLET

Dorsal fin: Raised by the male during mating display. Adult males also have elongated dorsal spines.

Pacific fairy basslet

Head: Rounded. Medium-size eyes and large mouth with pointed teeth.

Hermaphrodite fairy basslet

Tail fin: Deeply notched. Often bordered with contrasting color.

Colors: Males have vivid coloration, often magenta or yellow with orange markings.



Fairy basslet



Royal gramma

Fairy basslets have a wide range of colors

and patterns. Like other coral reef fish,

the males of the basslet species are more

vividly colored than the females. They also

have more prominent dorsal fins.



BREEDING

The fairy basslet breeds at dusk, when light levels are low and the fish are least at risk from predators. The male displays to the nearby mature females. He makes his dorsal fin and spines stand upright and swims back-

ward and forward to show off his colorful body. One brightly colored species, *Anthias dispar*, displays especially vigorously.

The male rubs against the chosen female's sides and belly for a few minutes. Then the pair swims rapidly toward the surface of the water, away from the reef. As they reach the surface, the male releases his sperm, and the female releases thousands of eggs. The sperm and eggs drift together into open water, away from the many reef predators. The pair then dives quickly back to the shelter of the reef. This method of breeding is called *pair spawning*.

Left: A goby basslet.

Right: The royal gramma is one of the smallest of the fairy basslets.

Below: Fairy basslets leave the reef to feed.



FAIRY BASSLET & MAN

Many species of fish from coral reefs around the world are now being included in home aquariums. The fairy basslet is among those now being widely collected.

The most popular fairy basslet species include *Anthias squamipinnis*, a bright orange fish with large, delicate fins; *A. huchtii*, which is yellow, with bright blue and red stripes; and the rare *A. pleurotaenia*, sometimes called the "purple blotch anthias." Because of their growing popularity, local populations may become depleted.

DID YOU KNOW?

- Many fairy basslet species have colorful common names. For example, *Anthias squamipinnis* is also known as "wreckfish," "jewelfish," and "lyre-tailed coral fish."
- The Caribbean jewelfish, which weighs up to 700 pounds, and *Gramma loreto*, at less than one ounce, are both members of the *Serranidae* family.
- Larger members of the sea bass family can be fierce predators. The Queensland grouper sometimes stalks shell and pearl divers and has even been known to attack them.

BEHAVIOR

The fairy basslet is one of the smallest fish living among coral reefs in tropical waters. Most species gather in large groups, or *schools*, of young fish and mature females, with just a few adult males. When the fish are not feeding, the schools stay near the reef. Here, they can take shelter from predators.

Fairy basslets have no defense against predators. But the large numbers in the schools provide some protection for individual fish.



SPECIAL ADAPTATIONS

Members of the basslet genus *Anthias* are *hermaphrodites*; that is, an individual fish has both female and male reproductive tissues and can change sex. The adaptation is probably a way of ensuring survival, since it gives each fish two opportunities to reproduce.

All fairy basslets are *protogynous*, or female at birth, and every female has the potential to become male. But research-

ers believe that the aggressively dominant nature of the male basslets in the school might keep the females from being stimulated to change sex when it is not necessary.

The most likely times for a sex change are when one of the males dies or when a school becomes very large. Then the senior female changes into a male within a few days and can produce sperm and mate with a female.

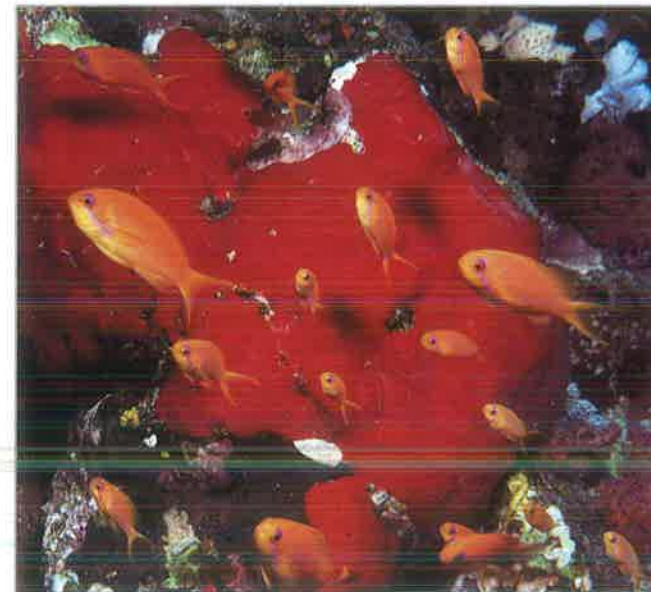
Below: A black cap basslet feeds at the edge of a coral reef.



FOOD & FEEDING

The fairy basslet feeds mainly on *plankton* (microscopic crustaceans and larvae that drift in the ocean), although the larger basslet species may also catch tiny marine animals and fish.

Large schools of fairy basslet swim out from the protection of the coral reef and travel through the water looking for plankton. They frequent the outer reef slopes and lagoon passes, preferring clear water with an active current that is a rich source of plankton.



CARDINALFISH

CARD 27

GROUP 4: FISH



ORDER
Perciformes

FAMILY
Apogonidae

GENUS
Apogon and other genera



Cardinalfish are small, brightly colored fish that live mainly in temperate seas and in the warm, tropical waters around coral reefs.

KEY FACTS



SIZES
Length: Up to 7 in., depending on species.



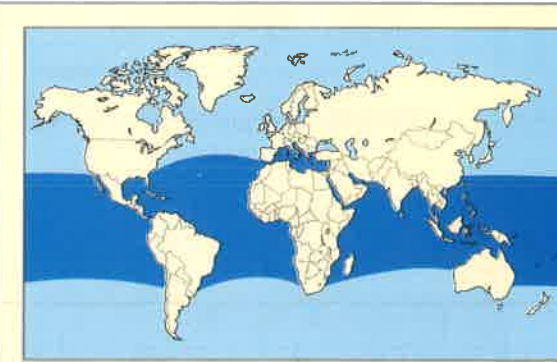
BREEDING
Sexual maturity: Not known.
Spawning season: Throughout the summer. Exact time depends on location.
No. of eggs: 150-22,000, depending on species.



LIFESTYLE
Habit: Many species form large schools, while others are solitary, living on a host and coming out at night to feed.
Diet: Tiny marine animals, larvae, fish eggs, and crustaceans.
Lifespan: Not known.



RELATED SPECIES
Cardinalfish are related to more than 8,000 other species of the order *Perciformes*, which also includes mackerel, tuna, and swordfish.



Range of cardinalfish.

DISTRIBUTION

Found in tropical seas throughout the world and in the Mediterranean. A few species live in freshwater streams on tropical islands.

CONSERVATION

The population seems to be stable, but it may become depleted because cardinalfish are becoming increasingly popular in home aquariums.

FEATURES OF CARDINALFISH

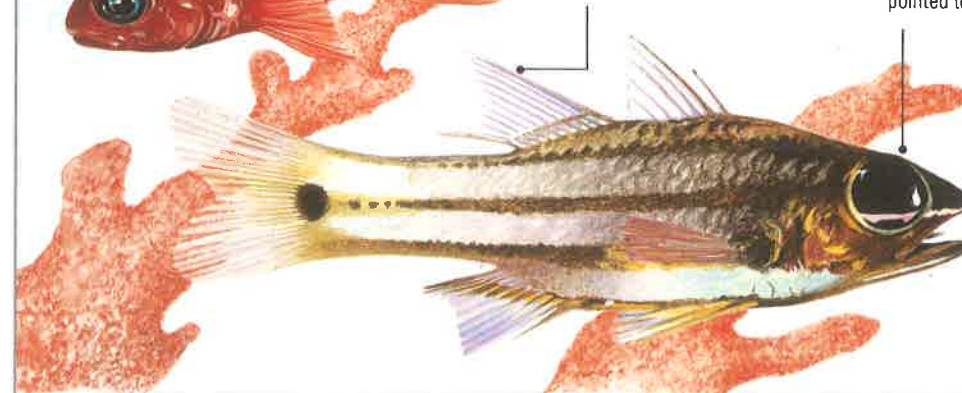
Body:
Generally short and deep in all species.



Fins: Two short, well-separated dorsal fins. Second dorsal fin is same size and shape as the anal fin, which has two spiny rays.

Color: Often red or patterned with red. Some species are black, silver, or yellow with stripes, wide bands, or spots.

Head: Large with prominent eyes and large mouth containing small, pointed teeth.



Cardinalfish are usually bright red or marked

with red patterns, but they can also be black,

silver, or yellow. Several species produce

an artificial light called bioluminescence.

These fish are popular in home aquariums.



BREEDING

Cardinalfish breed in summer, and most species are *mouth-breeders*—they carry their eggs in their mouths. The female lays her eggs in a single mass, and the male takes them into his mouth until they are ready to hatch. He then spits them into the water.

In one species the eggs are fertilized by the female. She inserts her genital organ into the male and removes the sperm for fertilization. In this species the male alone looks after the eggs. Cardinalfish that are not mouthbreeders lay their eggs in abandoned shells.

Left: A school of cardinalfish shelter under a staghorn coral.

Right: The Mediterranean cardinalfish is bright red.

DID YOU KNOW?

- The brownspot cardinalfish has an unusual defense posture. When threatened, it flops over and “plays dead” until the danger passes.
- Many species of cardinalfish have descriptive common names such as “pajama fish” and “flame fish.”
- Scientists studying a species of cardinalfish in Hawaii collected more than a thousand live specimens from one small area of reef.
- When a giant conch is taken from the sea, it opens its mantle cavity and releases cardinalfish.



HABITS

Cardinalfish are shy. Many species hide during the day and come out at night to feed. Other species, however, form large, active schools.

Several species have a close relationship with other sea animals. An example is the tiny *Astrapogon stellatus* cardinalfish, found in the Caribbean and along Florida’s coasts. During the day it hides in the shell of a giant conch or in the inner cavities of a sponge to avoid predators. This re-

lationship is not considered *symbiotic* (mutually beneficial to each species) because the conch or sponge does not appear to benefit from it.

By contrast, the *Siphamia versicolor*, an Indian Ocean species, has a symbiotic relationship with long-spined sea urchins. It swims between the spines to clean the urchin’s skin. At the first sign of danger, the urchin spreads its spines so the cardinalfish can hide among them.

FOOD & FEEDING

Cardinalfish feed on tiny marine animals and fish eggs. Some species eat small crustaceans such as shrimp.

Cardinalfish that have a

symbiotic relationship with a host such as a sea urchin may supplement their diet with parasites that they remove from the host.



SPECIAL ADAPTATIONS

Several species of cardinalfish produce an artificial light called *bioluminescence*. The reason for this adaptation is not yet clear. It is thought that the light helps cardinalfish find and attract nocturnal prey, avoid predators, and communicate. About 1,500 fish are known to produce this light.

One species of cardinalfish, *Apogon ellioti*, has a large population of luminous bacteria in a gland near its throat. The gland reflects the light into transparent muscles under the throat. The muscles act like a lens, concentrating the light into one beam.

CARDINALFISH & MAN

People have not been a great threat to cardinalfish because all the species are too small to be caught for food. But cardinalfish are in danger from ocean pollution and the destruction of their habitat.

Many species of cardinalfish are popular in home aquariums. These species include *Apogon endekataenia*, which is a typical bright red color; *A. margaritophorus* with silver and red stripes; and *Sphaeramia orbicularis* from the Pacific Islands.

Like most other tropical fish, cardinalfish are not protected by law. Some species may become scarce if the demand for specimens outstrips the numbers that can be safely removed from the sea.



Above: The marking of the ring-tailed cardinalfish is distinctive.

Below: Silver striping is another variation in coloring.



EUROPEAN FLOUNDER

CARD 25

GROUP 4: FISH

ORDER
Pleuronectiformes

FAMILY
Pleuronectidae

GENUS & SPECIES
Platichthys flesus



The European flounder's flattened body and ability to change color to blend in with its surroundings make it well adapted for a predatory existence in coastal waters.

KEY FACTS



SIZES

Length: 20 in.
Weight: 6-7 lb.



BREEDING

Sexual maturity: 3-4 years.
Breeding season: February to May, depending on the temperature.
No. of eggs: Up to 2 million per female.
Incubation: 11 days.



LIFESTYLE

Habit: Does not form schools, but gathers in large numbers at the spawning grounds.
Diet: Bivalve mollusks, shrimp, marine worms, and similar species.



RELATED SPECIES

Closely related flatfishes include commercial food fish such as summer flounder, *Paralichthys dentatus*, and halibut, *Hippoglossus hippoglossus*.



Range of the European flounder.

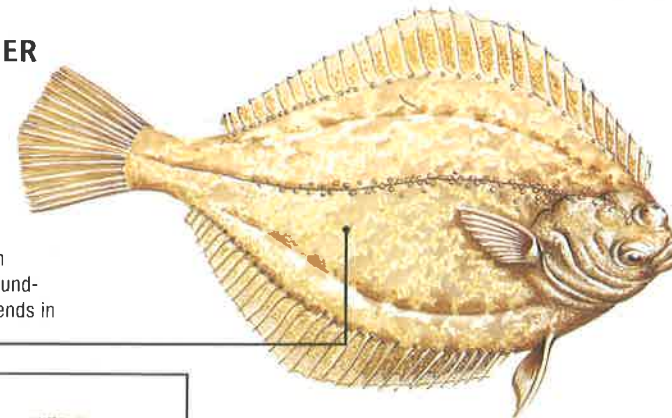
DISTRIBUTION

Found on all the coasts of Europe and the Mediterranean from the tide line down to 175 feet, as well as river systems and lakes accessible from the sea.

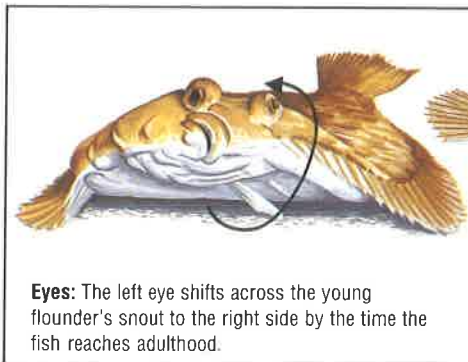
CONSERVATION

The European flounder is a popular fish with sport fishermen, but it has no commercial value and is in no danger of extinction from overfishing.

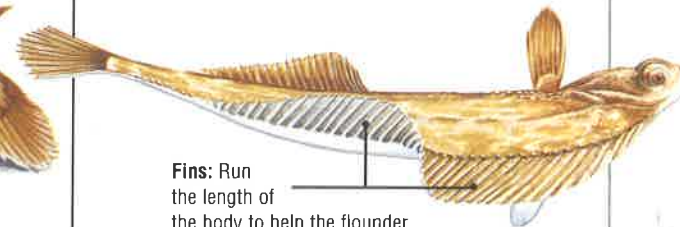
FEATURES OF THE EUROPEAN FLOUNDER



Camouflage: Upper side darkens in adulthood to mimic colors of surroundings. Within two or three days it blends in to new surroundings.



Eyes: The left eye shifts across the young flounder's snout to the right side by the time the fish reaches adulthood.



Fins: Run the length of the body to help the flounder move with tidal flow.

The European flounder is hatched in the surface waters of the sea but may spend much of its life in fresh water. Barely able to swim, the fish travels upstream on the tide to feed on small aquatic animals that live near the shore.

HABITAT

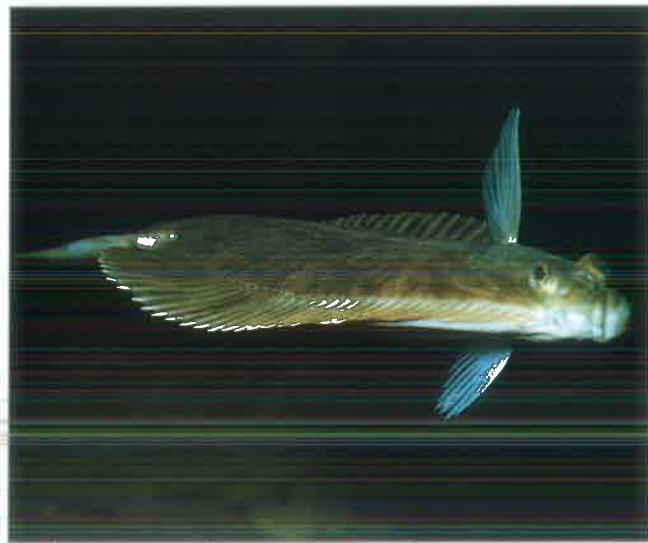
The European flounder is one of the most adaptable and widespread of all flatfish. Although native to European coastal waters, it can tolerate a wide range of temperatures: it has been caught as far north as the Arctic coast of Norway and as far south as North Africa.

The flounder also has the unusual ability to survive in both salt and fresh water. The flounder is especially common in brackish river mouths. It often moves upriver at high tide to feed in the tidal river waters. When the tide ebbs, the flounder lies stationary on the bottom of the river and

waits for the returning tide, which then carries it still further inland.

Unlike the flounder, most fish cannot live in both salt and fresh water. Aquatic animals must maintain a balance between salt concentrations in their body fluids and the saltiness of the water they live in. Because of this, freshwater fish are unable to survive in salt water and saltwater fish cannot survive in freshwater. The flounder is one of the few fish that can survive in both.

Below: The flounder relies on the rising or falling tides to help it swim.



BEHAVIOR

The flounder spends most of its life on the bottoms of the ocean and rivers. It lies on its flattened side in the sand or mud. In the adult flounder, the eye that would normally be on the side of its body that is flush with the ground is repositioned on the side facing upward.

Other parts of the flounder's anatomy remain in the positions that are customary for most fish. Its pectoral fins, for example, are on opposite sides of its body. The gill covers are also on each side of the flounder's body; one opens upward and the other opens downward. When the fish is lying half-buried on the bottom, the expelled water from the lower gill is usually pumped out through the upper gill. The flounder can

escape from predators by gulping water and ejecting it through the lower gill, which allows it to rise vertically from the seabed.

The flounder's main defense is its chameleonlike ability to change color to blend in with its surroundings. Its top side



Above and left: The flounder is so well camouflaged that it is barely visible on either the seabed or riverbed.

flounder disguises itself by digging into the bottom and covering itself with sand or gravel.

The flounder rarely swims; instead, it moves with the current. It can swim if it must by undulating its body up and down. Its frill-like dorsal and anal fins provide extra momentum.



becomes pale when the fish is on sand, dark when it is on mud, and mottled when it is

on gravel. Because the change in coloration takes several days to complete, the

FOOD & FEEDING

The flounder has powerful crushing teeth in its throat that crack open the hard-shelled mollusks that make up much of its diet. It mainly eats cockles, shrimp, and marine worms.

At low tide these animals lie buried in sandy or muddy beaches, but at high tide they emerge to feed on in-shore plankton. The aquatic animals are easy prey for the flounder as it glides over the flooded beach.

Flounders that swim upriver have a more varied diet, and many feed on the swarms of tiny, threadlike *elvers* (young eels) that they follow upstream from the sea each year.

BREEDING

Although a flounder can live and feed in fresh water, it must return to the sea to breed.

It *spawns* (produces eggs) on the ocean floor in water 80 to 130 feet deep, but the eggs are buoyant and they float to the surface. When the hatchlings emerge, they stay in the surface waters and feed on tiny floating organisms

and then gradually move toward shallow water.

A newly hatched flounder has an eye on each side of its snout. As the fish matures, the left eye usually shifts right, next to the other eye. The side with the two eyes changes to a darker color. The fish then sinks to the bottom and lies on its left side, with its eyes facing up.

Right: The adult flounder's left eye has shifted to join the right eye, and the once straight mouth has twisted vertically.



DID YOU KNOW?

- Sometimes a flounder's right eye shifts to its left side. This fish lies on its right side.
- Adults often migrate long distances to the spawning grounds and may lose up to one-tenth of their body weight in the process.
- The sole has a characteristic not found in its relative, the flounder. Not only does one of the sole's eyes shift to join the other on its top side, but its mouth shifts to its bottom side.
- The flounder can blend in with almost any background. When it is placed on a chessboard, for example, it adopts a roughly checkered pattern.

HAGFISH

CARD 23

GROUP 4: FISH



ORDER
Myxini

FAMILY
Myxinidae

GENUS & SPECIES
Myxine glutinosa



The North Atlantic hagfish lives on the seabed of the northern oceans. It emerges from the mud to feed on both dead and living fish.

KEY FACTS



SIZES

Length: Usually about 1 ft. Occasionally up to 2 ft.



BREEDING

Mating season: Spring and summer.

No. of eggs: About 30 oval eggs, each 1 in. long.



LIFESTYLE

Habit: Solitary; lives in burrows on the muddy ocean floor.

Diet: Dead fish, bottom-living crustaceans, and worms.

Lifespan: Unknown.



RELATED SPECIES

There are 32 species of hagfish in the order *Myxiniiformes*. They are often grouped with the lampreys (40 species) in the class *Agnatha* (jawless fishes), but their true relationship is uncertain.



Range of the North Atlantic hagfish.

DISTRIBUTION

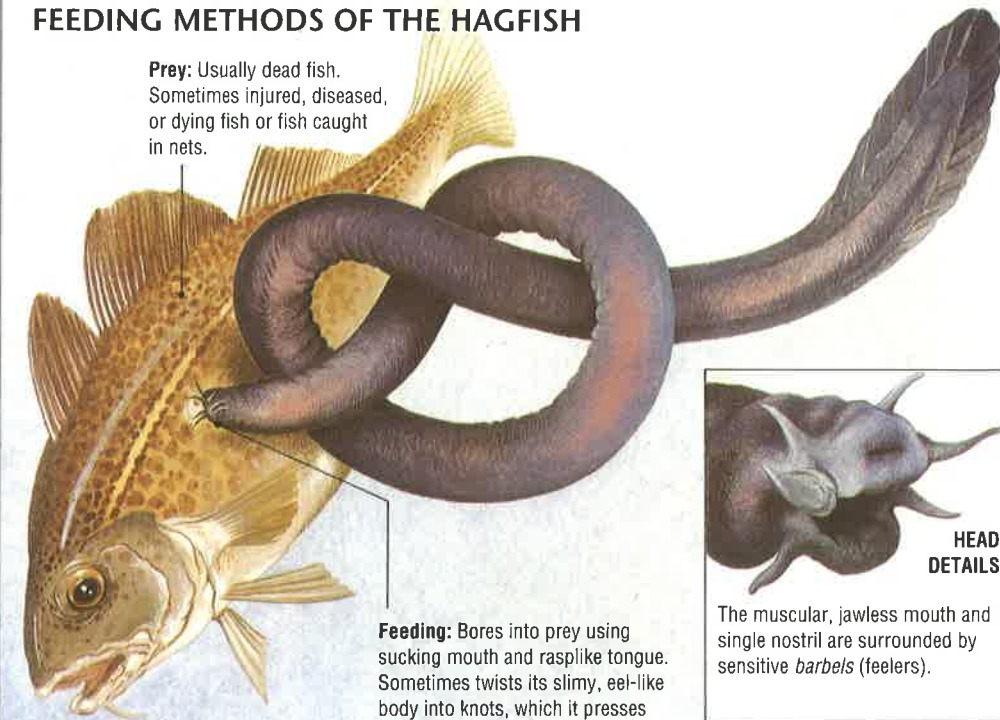
Found in European coastal waters from Norway to Corsica and in North America from northern Canada to North Carolina.

CONSERVATION

Although threatened by marine pollution, like all sea creatures, the hagfish is not fished commercially and is in no immediate danger.

FEEDING METHODS OF THE HAGFISH

Prey: Usually dead fish. Sometimes injured, diseased, or dying fish or fish caught in nets.



Feeding: Bores into prey using sucking mouth and rasplike tongue. Sometimes twists its slimy, eel-like body into knots, which it presses against prey for leverage.



HEAD DETAILS

The muscular, jawless mouth and single nostril are surrounded by sensitive *barbels* (feelers).

The slimy and boneless North Atlantic hagfish

is one of the most successful scavengers in

the cold-water oceans, in spite of the

fact that the fish is almost totally blind,

has no jaw or teeth, and does not

have a true heart.

CHARACTERISTICS

The slimy, eyeless, jawless, boneless, and wormlike hagfish has no known living relatives. But it does share many features with another group of eel-like fish called lampreys.

Lampreys and hagfish are considered to be less highly evolved than other fish. The hagfish's spine, for example, is a flexible rod of gristle, rather than the chain of vertebrae found in nearly all other fish. The hagfish has no bones at all, and this gristly spine provides the only reinforcement for its muscular body.

Below: *A hagfish is coiled near the cold, sunless floor of the ocean.*



The hagfish's jawless mouth is no more than a small, muscular slit surrounded by sensitive *barbels* (feelers). It gnaws its food with a raspy tongue. A layer of skin covers the hagfish's tiny eyes, making it unable to see anything but light and dark.

The hagfish's most unusual feature is slime, which oozes from glands in rows down its sides. The slime lubricates its skin as the hagfish gnaws its way into its prey. The hagfish produces so much slime that it must frequently scrape off the excess by knotting its body and sliding through the coils.

FOOD & FEEDING

The North Atlantic hagfish is a predator as well as a scavenger: it feeds on both live and dead fish. It also eats small crustaceans and bottom-living worms. Sometimes the hagfish attacks fish that are trapped in nets and cannot escape.

The hagfish's limited sense of smell allows it to detect prey only at close range. Once it finds prey,

such as a dead fish, the hagfish begins to cut away at its skin with its raspy, toothed tongue. Within minutes it has bored into the fish's body and begins to suck its flesh out.

When the prey's skin is especially tough, the hagfish knots its eel-like body and pushes against the fish for leverage.



Left: *The hagfish can swim on either its abdomen or its back by making muscular side-to-side contractions with its long body. It extends its barbels, or feelers, to search the water for prey, but it probably cannot detect scent beyond two feet.*

DID YOU KNOW?

- Instead of a heart, the hagfish has a series of pumps that push blood from one part of its body to the next.
- A single North Atlantic hagfish will turn the entire contents of a bucket of seawater into slime.
- A hagfish's single nostril

frequently becomes clogged with slime. The fish simply pushes blood from one part of its body to the next.

- A hagfish's wound heals cleanly and quickly. Scientists believe that the protective coating of slime around the fish's body has antiseptic qualities that prevent infection.

BREEDING

Little is known about the North Atlantic hagfish's breeding behavior. Each hagfish grows an internal *ovary* or *testis* (female or male reproduction organ), but it has no visible organs. This suggests that eggs are probably fertilized externally by sperm that the male sheds as he swims over the egg cluster.

No more than 30 inch-long eggs are laid at a time. The eggs have tufts of sticky fibers

at each end that fasten them together and to the seabed. This protects them from being swept into open waters, where they would be eaten by other fish.

Unlike most fish, which hatch as larvae, the hagfish emerges from its egg fully formed. Within hours of hatching, each young fish begins to search for the scent of its first meal.

Right: *Sticky fibers fasten the eggs to one another and to the seabed.*



EUROPEAN EEL

CARD 22

GROUP 4: FISH



ORDER
Anguilliformes

FAMILY
Anguillidae

GENUS & SPECIES
Anguilla anguilla



KEY FACTS



SIZES

Length: Males 1-1½ ft. Females, 1½-3 ft.
Weight: Up to 8 lb.



BREEDING

Sexual maturity: 7-12 years.
Spawning: Probably spring.
No. of eggs: Unknown.
Larval development: 3 years.



LIFESTYLE

Habit: Migratory between spawning and feeding grounds.
Diet: Worms, mollusks, shrimp, aquatic insects, crayfish, crabs, small fish, frogs.
Lifespan: 25-50 years if prevented from moving to the sea.



RELATED SPECIES

Another member of the genus *Anguilla* is the American eel, *A. rostrata*.



■ Range of the European eel. ■ Spawning grounds.

DISTRIBUTION

Young European eels originate in the Sargasso Sea and migrate across the Atlantic to Europe. Mature adults return to the Sargasso Sea to breed.

CONSERVATION

This species is still common in freshwater habitats over most of its range, although pollution is a potential threat.

LIFECYCLE OF THE EUROPEAN EEL

1. Larvae are transparent and flat, measuring less than ¼ inch in length. In 3 years they grow to 2¾ inches.



2. The elver develops the cylindrical form of the adult, shortening in length.



3. Now known as the yellow eel because of its yellow belly, the eel begins to swim instinctively upstream.



4. At 7 to 12 years of age and a length of about 3 feet, the final change occurs: the cylindrical silver eel emerges.



The European eel is remarkable for its long, thin shape and ribbonlike fins. But the lifecycle and migratory habits of this serpentine fish are even more unusual.



For centuries the origin of the European eel remained a mystery. The adults can be found in abundance in European fresh waters, but only a hundred years ago did scientists discover where the eel begins its lifecycle.

FOOD & FEEDING

The European eel hunts for food mainly at night, catching prey on the bottoms of fresh and brackish waters. The two distinct forms of eel in this species have different feeding preferences. One has a more pointed snout and feeds on small invertebrates, while the other, with its broader snout, catches larger animals like crabs.

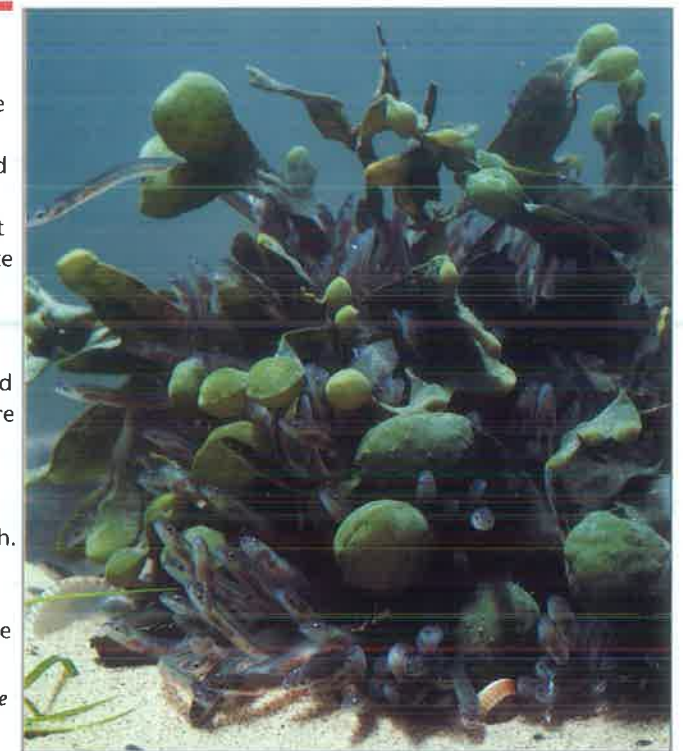
As it reaches the silver eel stage, the European eel stops eating. Its mouth becomes smaller, its lower jaw weakens, and its digestive system shrinks to make space for developing sex organs. During its journey across the ocean, it must live on the fat reserves in its body.

BREEDING

Little is known about the movement of silver eels once they return to the ocean in the fall, but they are believed to swim at great depth to spawn in the Sargasso Sea. It is possible that they complete the trip by spring; if so, they must swim more than 18 miles a day.

When the eels have finished their journey, they are mature and ready for mating. No eggs have ever been seen, but breeding is thought to take place at moderate depth. The waters are warm, at about 68° F. The eggs form new larvae, but the adults die soon after spawning.

Right: *The transparent elvers are well hidden among seaweed.*



LIFECYCLE

The European eel starts its life as a tiny larva in the Sargasso Sea, some 3,000 miles from Europe. Gradually the Gulf Stream carries it toward Europe. A few months before it arrives, the larva shortens and becomes cylindrical. It is now known as an *elver*. On arrival, the elver heads for an *estuary*, or river mouth, where it becomes a dark color.

Now called a *yellow eel* because of its yellowish belly,

the fish swims upriver. It makes its home in a stream, pond, or lake and continues to grow. A final change occurs at 7 to 12 years, when the belly becomes silvery, the head pointed, and the eyes larger for vision in deep water. Now known as a *silver eel*, the fish heads downstream. It moves at night and sometimes even travels over ground before swimming back into the ocean.

DID YOU KNOW?

- Because no eggs or young eels were found in rivers, Aristotle suggested eels came from earthworms.
- Yellow and silver eels were once thought to be two different species.
- In winter yellow eels may retreat to deep water and hide in the mud.
- Nourished by their fat stores, silver eels can survive for a few years in tanks without feeding.



Above left: *Yellow eels feed to promote growth. During the first few years, they eat invertebrates and insect larvae, but the larger eels will begin to feed on small fish.*

Left: *In cold waters it is common for eels to swim to deeper frost-free waters, where they bury themselves in the bottom and rest for long periods.*

EUROPEAN EEL & MAN

The European eel has long been a food fish and is sold fresh, salted, and smoked. Yellow eels are caught with hooks, traps, and specialized "eel spears." Silver eels are especially prized. Eels are often raised in fish farms.

One of the advantages of the European eel as a food fish is that it can survive for long periods out of water. Its thick skin lets in oxygen but resists water loss. Its gills can close, which also helps to restrict water loss.



NATUREWATCH

The small transparent elvers appear in the estuaries of Ireland and along the Atlantic coast of Britain after October and along the North Sea coast around March. From there, many move into fresh water.

The yellow eel is the form most commonly seen. Yellow eels appear in European rivers, lakes, and ponds, as

well as estuaries. They like rivers with muddy bottoms and are sometimes seen resting on the bed with their bodies upright.

The change to silver eels takes place in late summer. Downstream migration occurs in September and October, when eels are sometimes seen slithering across wet fields.