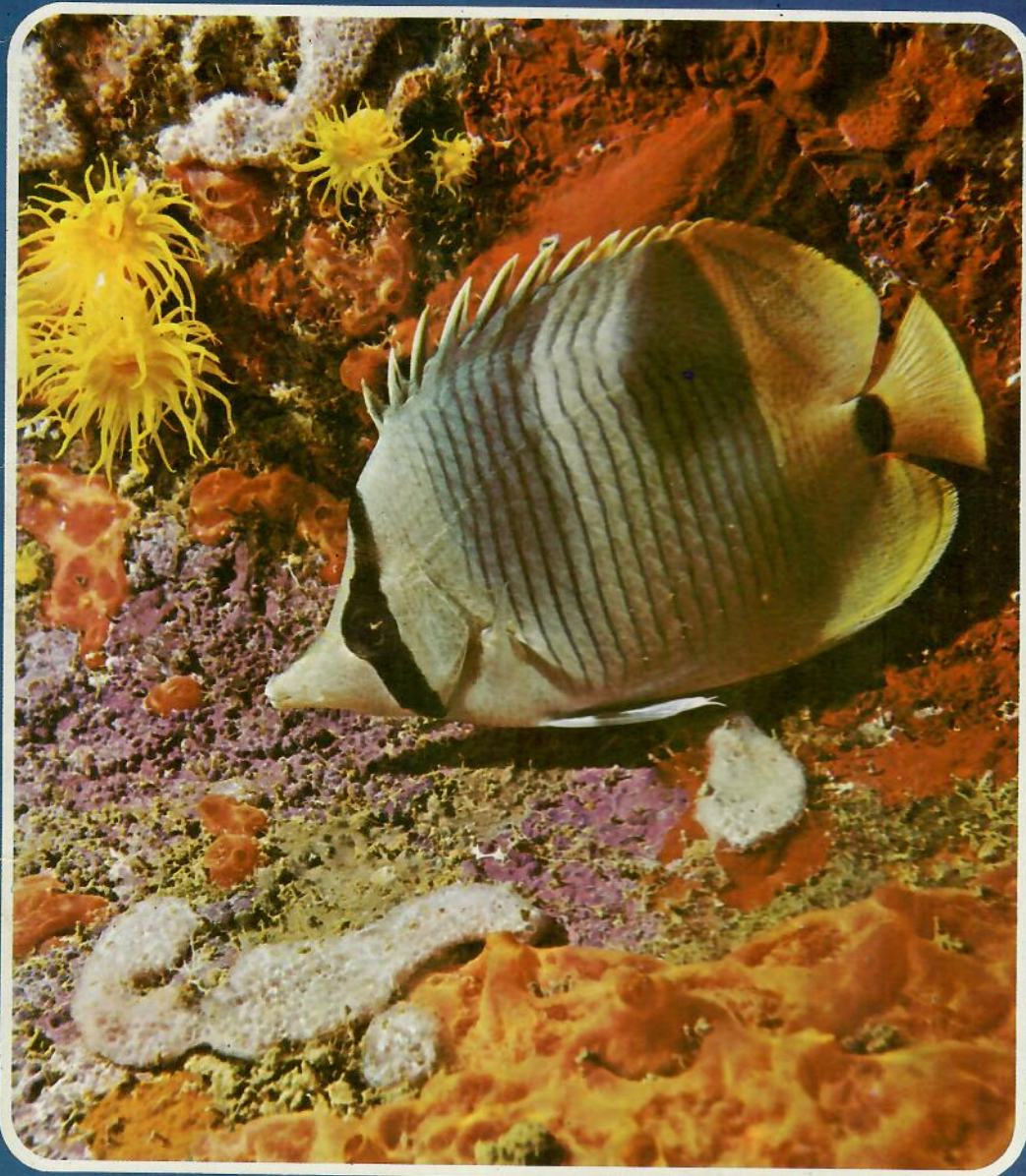


EXOTIC
FISHES & CORALS
OF HAWAII & THE PACIFIC

\$1.95

BY DOUG WALLIN



80 VIEWS IN LIVING UNDERSEA COLOR
Including The Story of Black Coral and Pink Angelskin Coral

Exotic Fishes and Corals of Hawaii and the Pacific

TEXT AND PHOTOS BY DOUG WALLIN

Doug Wallin, photographer and author, graduated from high school on Kwajalein Atoll in the Marshall Islands, in 1966. After studying at the University of California at San Diego for 2½ years, he returned to Hawaii, and in 1971 received a B.S. degree in geoscience from U.H. He then attended Brooks Institute of Photography in California, and graduated from their undersea photographic technology program. After spending a year in Guam and Truk, he has recently returned to live in Hawaii. A frequent contributor to oceanographic and diving magazines, Wallin has just completed a handbook of underwater photography, which should be on the market by the summer of 1975. He is also working on several other book projects.



In this book are shown and explained the two most interesting and colorful groups of animals to be found in the underwater world of Hawaii and the Pacific Ocean — the corals and the fishes. In addition to the informative pictures, I have also included a certain amount of text to give a basic knowledge of the ecology of the reef environment as concerns the corals and the fishes. It is the reef building corals which are responsible for the existence of coral reefs, which ultimately furnish the home environment for the countless numbers of fish which inhabit them.

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*all book cover
photos (6)
repeated.*

COVER — The beauty of the underwater world of the Pacific rivals, and in many cases surpasses, anything to be found on land. Here a 6 inch striped butterflyfish swims leisurely over a garden of red sponges and yellow coral polyps.

THE CORALS

38 Lophoc
There are many varied and beautiful types of corals to be found throughout Hawaii and the rest of the blue Pacific. When most people hear the word "coral" they generally think of the hard rock-like structure of the reef, or the colorful branches of fan coral. It is true that these skeletal structures are corals; but the word also applies to the minute animals who produced these structures. This is because the skeletal structures (in whatever shape they may be) represent the communal home for coral creatures known as polyps. Coral producing polyps are generally but a fraction of an inch in size, and for survival they band together into colonies and secrete a coral skeleton. And these skeletons are the coral rocks and sea fans familiar to most people. The exact species of polyp determines, in turn, which of the many shapes and colors the coralline community will take; for instance, soft coral, hard coral, fan coral, etc. It is, in fact, these small polyp animals which are responsible for the vast coral reefs that are found in Hawaii and throughout the entire Pacific area.

183 THE HARD CORALS

The hard corals are ones in which the coralline skeleton secreted by the polyps is rock-like, and not at all flexible. These are the common types of corals found on Pacific reefs, and they come in an endless variety of shapes and colors.



This is a larger variety of colonial coral, showing the individual yellow polyps, which are about an inch and a half across. Each polyp looks like a small sea anemone, and can contract back into the colony, out of sight, if bothered.



This is an extreme close-up of a razor coral, showing the small tentacles of the polyps which are protruded out of the skeleton when the animal is feeding on particles of food which float by.

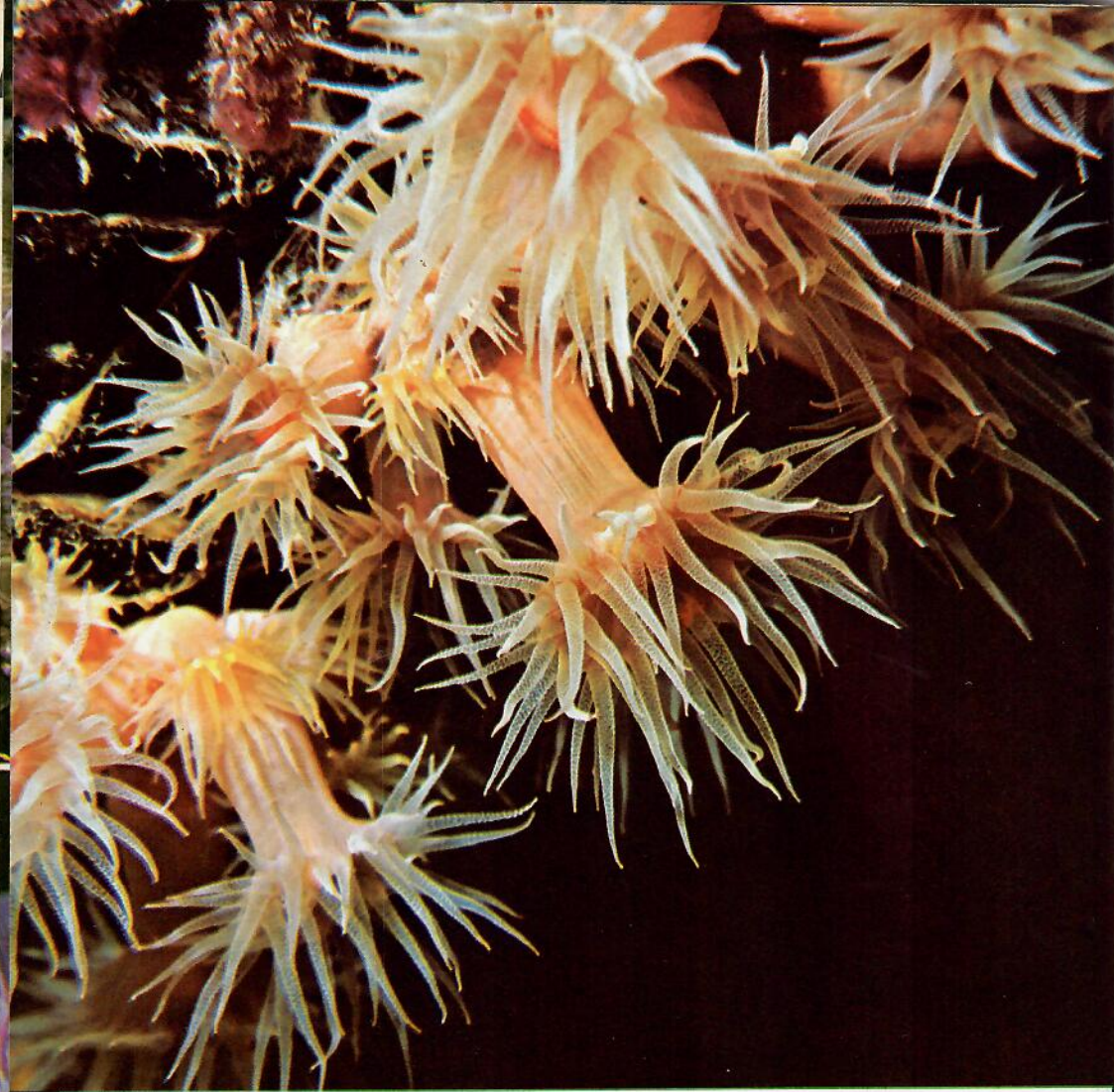
The razor or mushroom corals get their common names from their mushroom-like shape, and sharpness. They range in size anywhere from less than an inch to over a foot across. They are different from other corals in that they are solitary; each one is secreted and inhabited by a single polyp, and the coral is not attached to the rest of the reef.





This is a close-up of the individual polyps of a small colony of yellow corals. Although they look like flowers, coral polyps are animals, and carnivorous at that. Polyps of most types of coral generally feed at night, when microscopic organisms are most plentiful. During this time, the polyps extend themselves out of their protective rock-like home, and pick food particles out of the water with their supple tentacles. Coral polyps have evolved this symmetrical design, as it has proved to be the most efficient in the capture of prey. Once food is snared by the ever moving tentacles, it is then transferred to the creature's mouth, which can be seen as a tiny slit located in the center between the tentacles. The food is next digested within the stalk section of the polyp, and waste is expelled back out the mouth into the water.

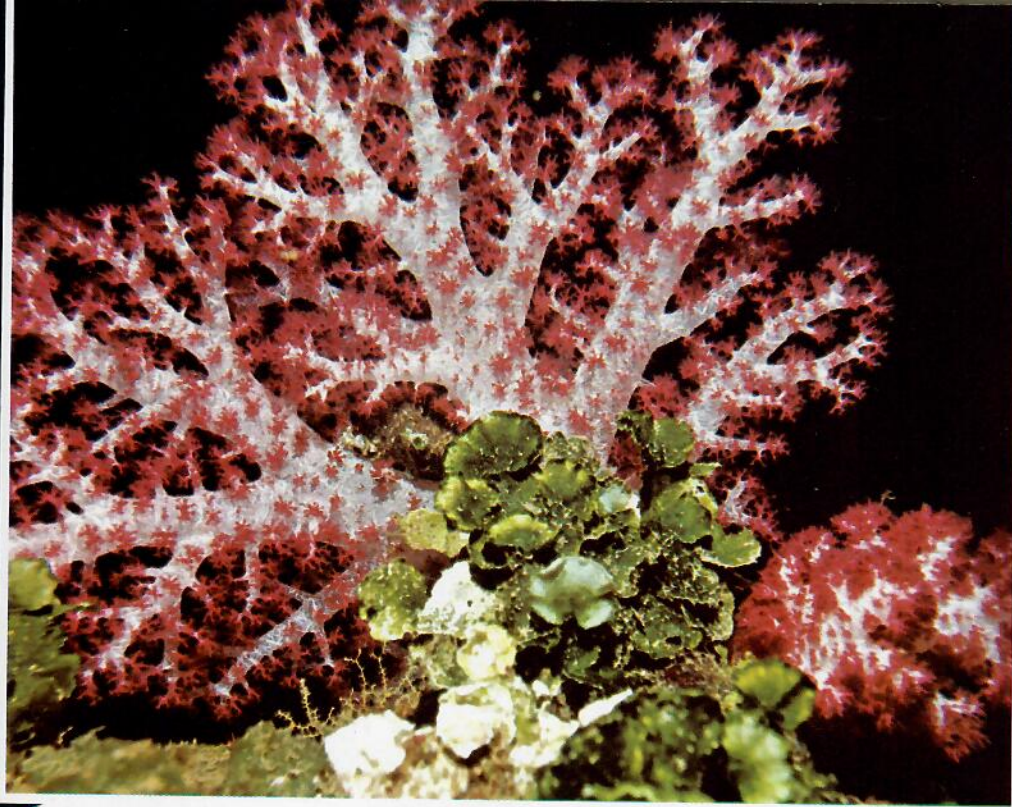
These little creatures maintain their extended position by drawing water into the body cavity. If approached too closely, or otherwise bothered in any way, they expel this water, and the body and tentacles shrink back, and disappear within the coral rock.



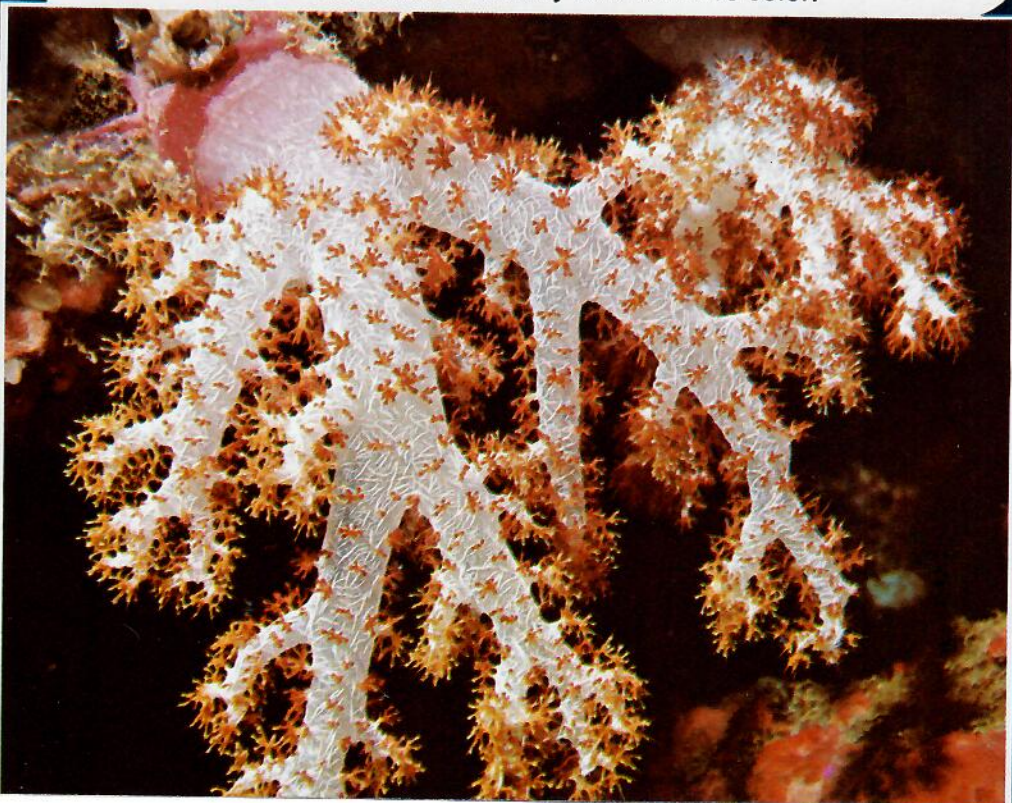
This is another color variety of large coral polyp, where each tentacle is about an inch in length. This whitish species illustrates well another characteristic of coral polyps, no matter what their type or size. And that is that each tentacle is covered with tiny stinging cells, called nematocysts, which are used by the animal in catching live prey. These minute stinging mechanisms can be seen as white dots along each tentacle, and contain a microscopic poison-filled dart which is shot out whenever a likely looking meal touches the tentacle. This harpoon apparatus is much too small to sting humans, though, and so there is no danger in brushing against them.

THE SOFT CORALS

Although the soft corals are produced by tiny coral polyps, as are the hard corals, the nature of the coralline community formed is much different. Just as the hard corals are so named because of the hard rock-like skeleton which is secreted, the soft corals receive this common name because they make a soft skeletal structure. Such soft coral colonies are not rigid, but rather are pliable and flexible. The most colorful of these take the shape of branching trees, and may grow to be many feet across. The soft corals also include the sea fans, which are a common sight on many Pacific reefs.



Soft coral trees come in a fantastic range of colors, though they all share in common this branching shape. The colony skeleton itself is generally white in color. It is the small coral polyps, which are much less than an inch in size, that give a colony its distinctive color.



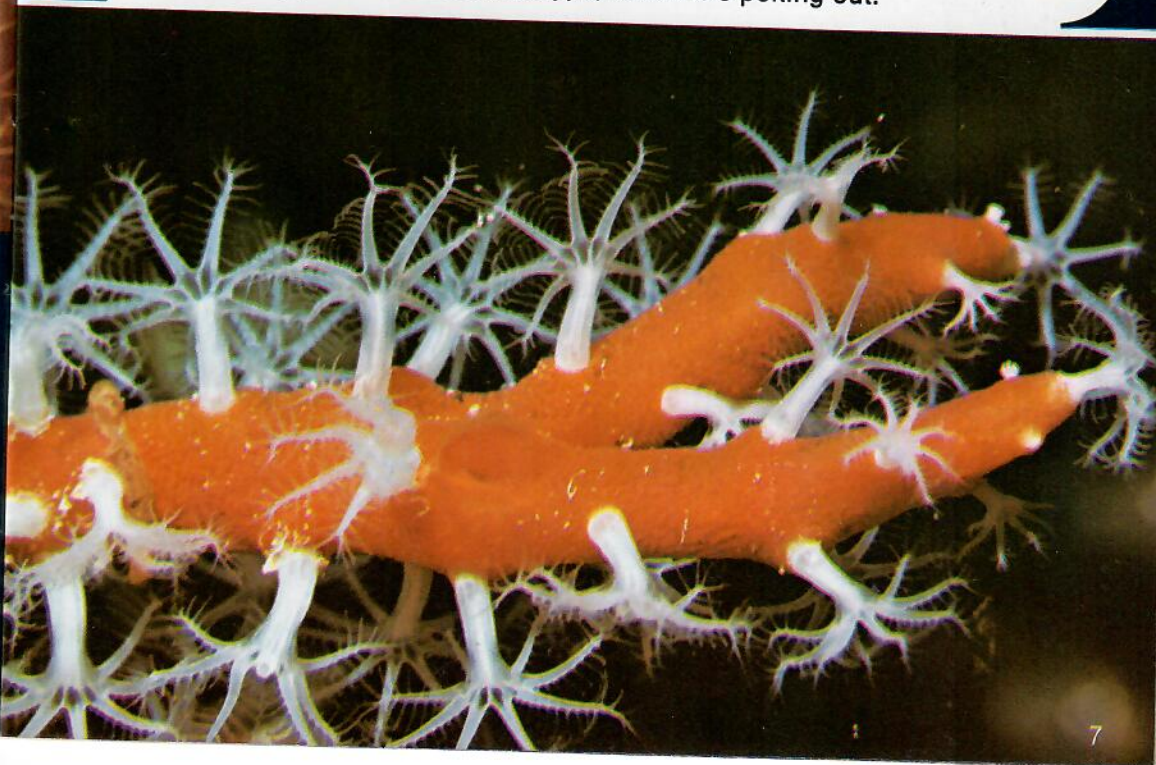


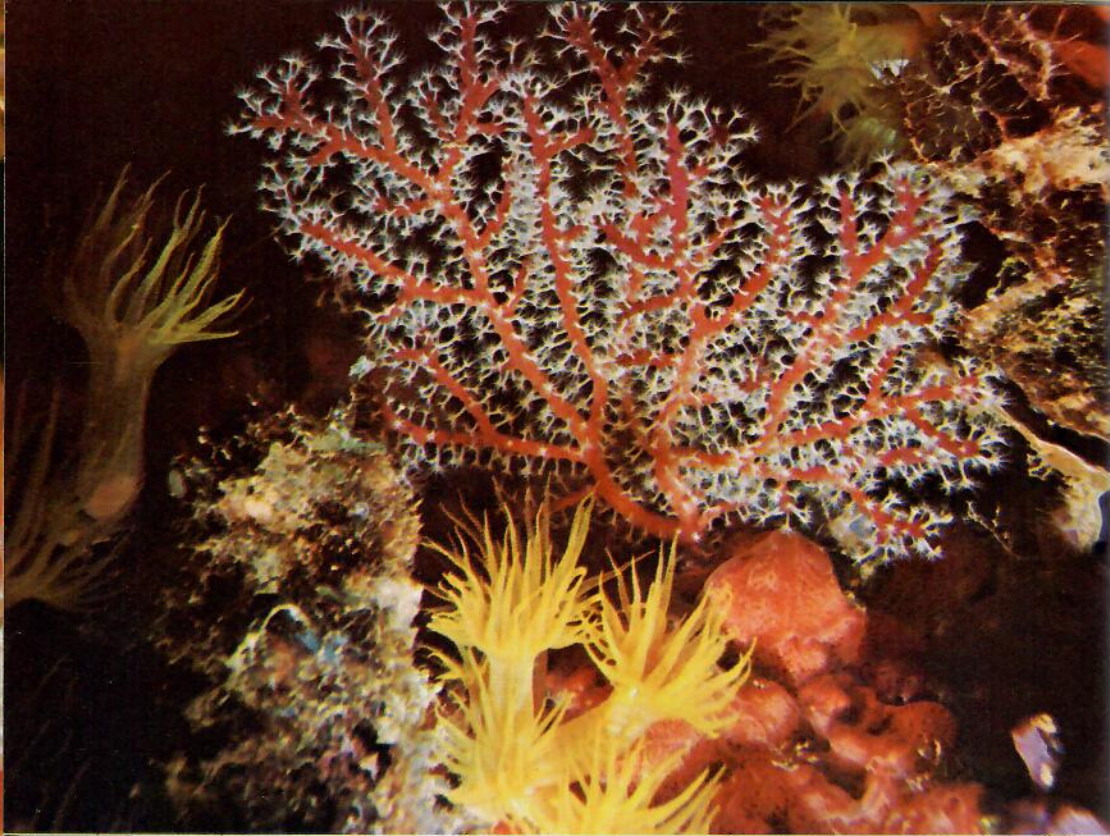
Although soft corals do not have the rigidity of hard corals, the colony is given firmness for support. This is accomplished by the secretion of small coralline spicules. These hard spicules are scattered throughout the entire body of the colony. These spicules can be seen in the extreme close-up shot of this soft coral branch as a mosaic pattern of slender white needles. The actual colonial skeleton is an opaque, fleshy substance, and in itself has very little firmness. But the presence of the spicules spread through this gives the entire structure some strength.

Also visible in this picture are the individual orange-red polyps. Notice that they are quite small, with many individual polyps being contained in each branching clump.



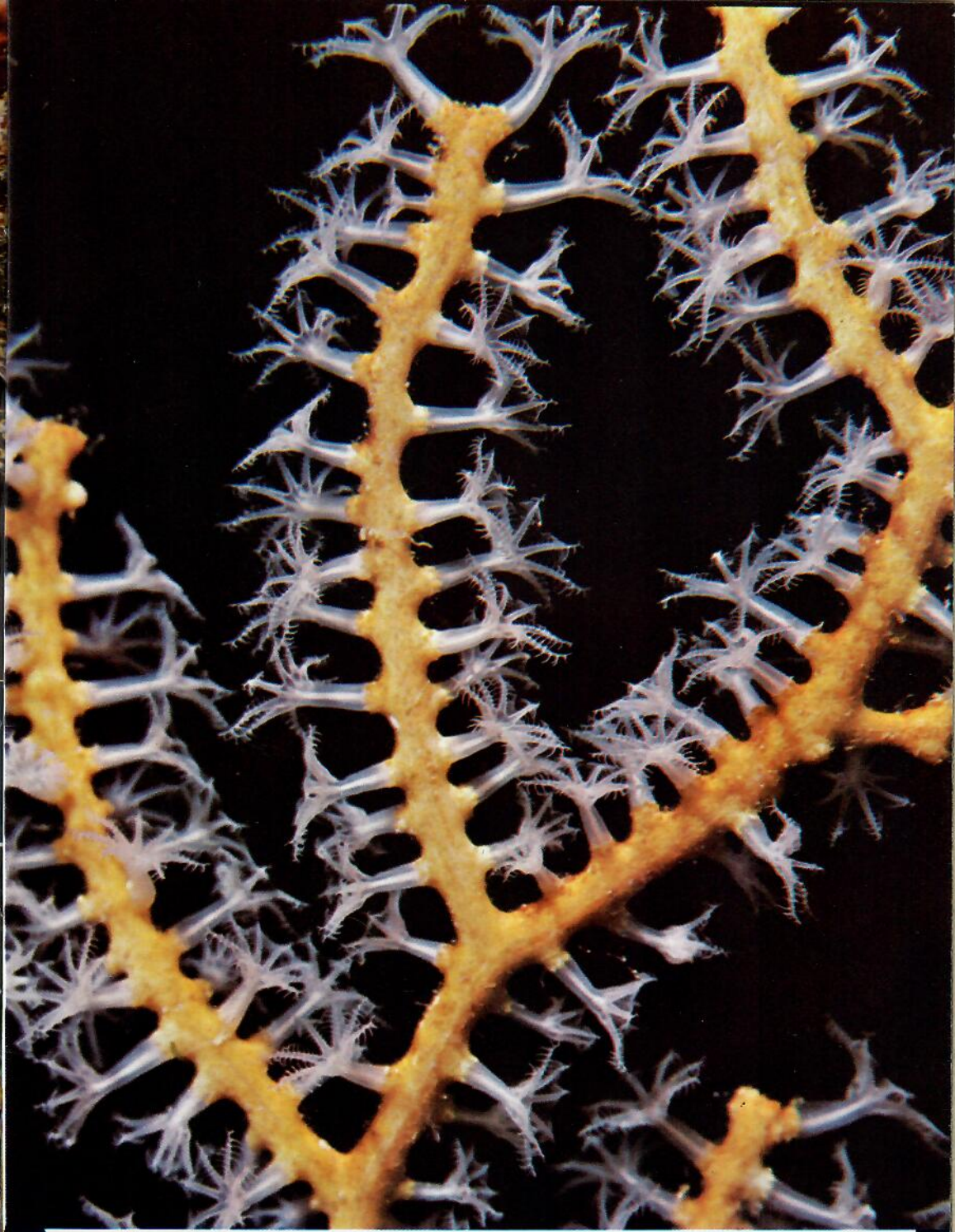
Another beautiful type of branching soft coral is this bright orange variety. Large bushes up to several feet across are common on some Pacific reefs. Below is an extreme magnification of a single limb of the colony. Notice the white, wispy tentacled coral polyps, which are poking out.



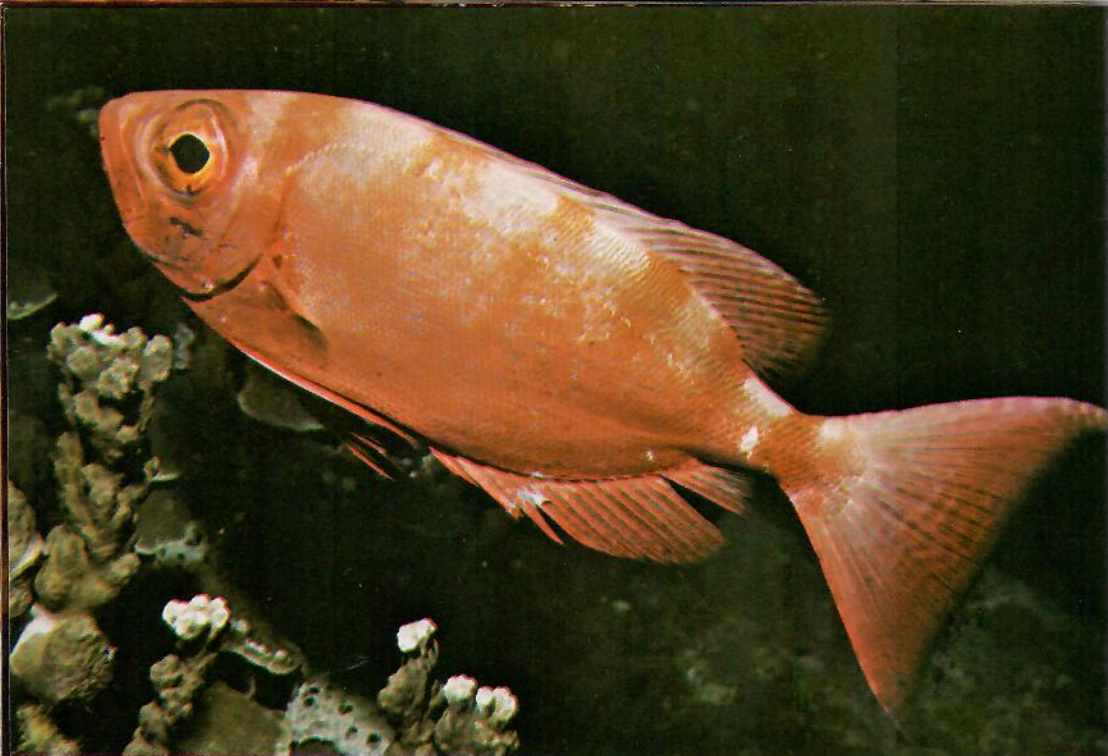


Still another gorgeous group of soft corals are the sea fans. They are found in an enormous range of sizes; from the (upper) red variety which is only a few inches across; to the ones which are several feet in diameter (below); to the giant sea fans which are as much as 10 feet. On all these types, the small coral polyps which are responsible for their creation can be observed sticking their tentacled heads out from the colony branches.





This ultra close-up of the tiny polyps of a golden sea fan shows their tentacled structure, which is characteristic of all coral polyps, no matter what the type. And although it may not look like it, when disturbed, the individual polyp animals can disappear into the branches.



THE FISHES

BIG-EYES

The big-eyes, or catalufa, receives its common name from the large eyes. The fish's eyes are so enlarged, because it is primarily nocturnal in nature, and roams the reef at night in search of food. The upper shot is the color pattern which the fish exhibits during the day. At night, though, when the fish is moving about, it changes to the coloration shown in the lower photo.



THE BUTTERFLY FISHES

One of the most colorful families of fishes to be found on any Pacific reef are the butterflyfishes. They receive this common name because of their quick, darting swimming style, and almost remind one of a butterfly as it flits from one flower to another. They are a very abundant reef fish, and average less than 8 inches in length.



The eye of this spotted yellow butterflyfish is camouflaged in the dark stripe which runs across the head. The black spot is meant to confuse would-be predators.



A common butterflyfish is the disc butterfly. It averages about 5 inches in length, and spends its time going from one rock to another in search of food.

This long nose butterflyfish has evolved an extended snout to help in picking food out of the nooks and crannies of the reef.





One of the best times to observe fish is at night. This is because after sunset the fish become accustomed to darkness, and are not used to any sort of brightness. But the underwater diver to see at night carries a flashlight, and the bright beam has a paralyzing effect on the fish. Above is a yellow-tail butterflyfish among a garden of yellow polyp hard corals, stunned to tameness by a flashlight. To the left is a large V-stripe butterflyfish similarly immobilized at night.



Night is also an interesting time to study fish, because in addition to the paralyzing effect of the flashlight, many fish experience a color change, which makes them look quite different than they do during the day. This yellow butterflyfish, for instance, is normally light yellow in color, but at night takes on a dark patterning.

A close relative to the butterflyfishes are the angelfishes. They are not nearly as abundant as the butterflies, and average much larger in size. This emperor angel, for example, is nearly 2 feet long.

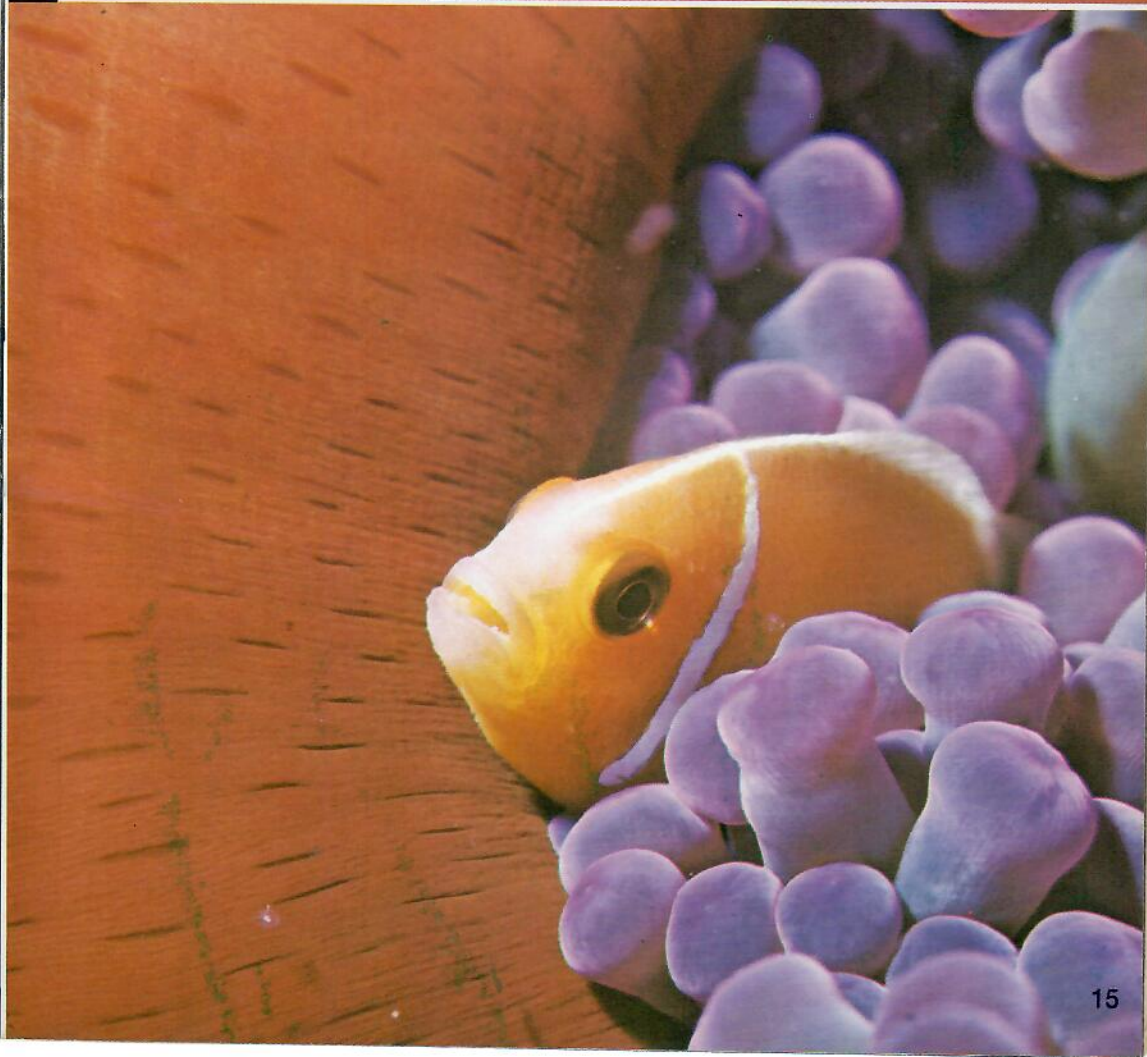
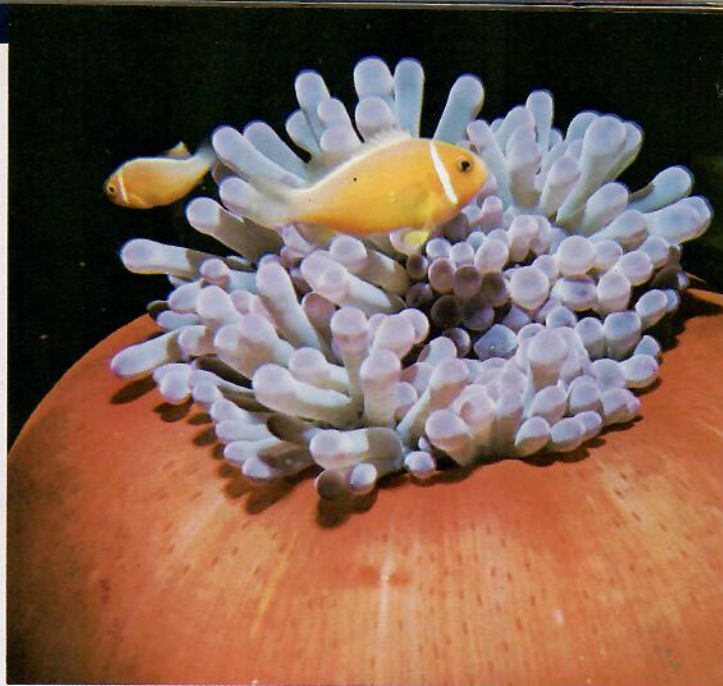




CLOWNFISH

One of the most curious fish is the clownfish. This name is attributed to them, because of their humorous antics and appearance that reminds one of a tiny painted clown. Clownfish are always found living in the company of tentacled sea anemones, with whom they share a symbiotic relationship. This means that by living together, both the clownfish and anemone gain a mutual advantage. In fact, the tentacles of sea anemones are poisonous to all but the clownfish, which have evolved an immunity to their sting. This stinging mechanism is the same as that exhibited by coral polyps, to whom the anemones are closely related.

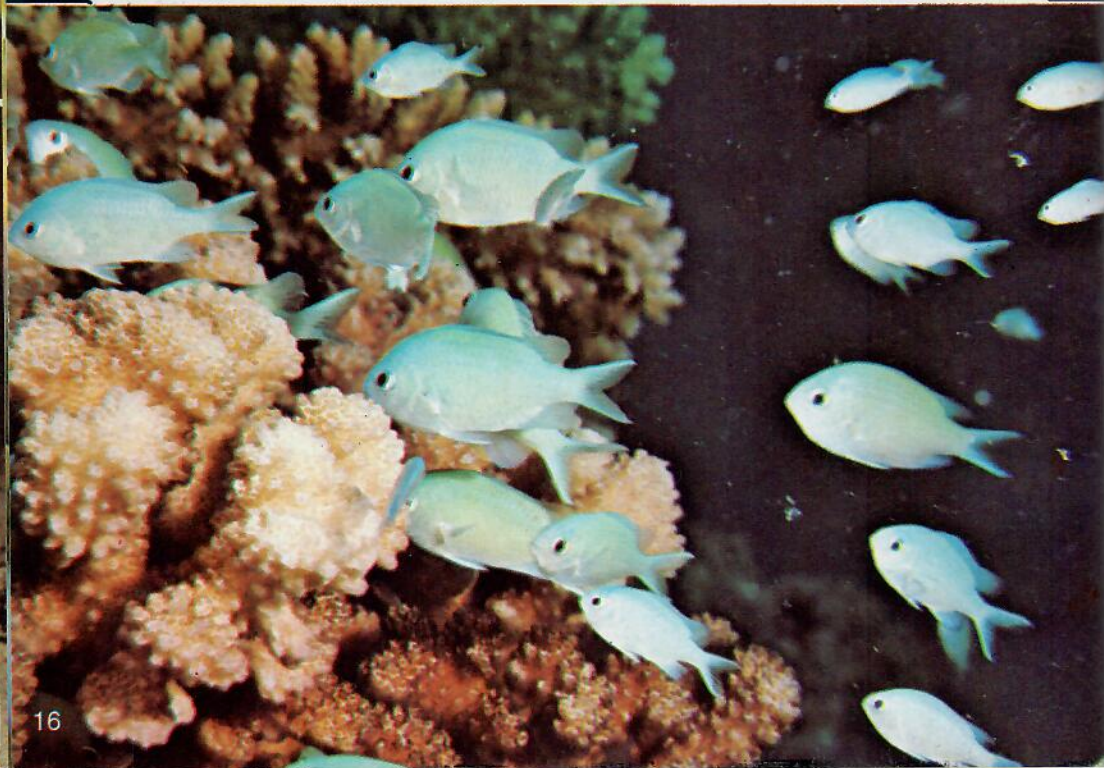
Although there are numerous species of clownfish, and they range anywhere from less than an inch to nearly 6 inches in length, most varieties are characterized by possessing at least one vertical stripe across the fish's body. This yellow clownfish is living in a particularly beautiful red and purple sea anemone. In the above photo, the anemone is in a contracted, or closed position, and is in the act of feeding on newly caught prey. The clownfish swimming around the exposed tentacles are feeding on scraps which the anemone misses.





DAMSELFISH

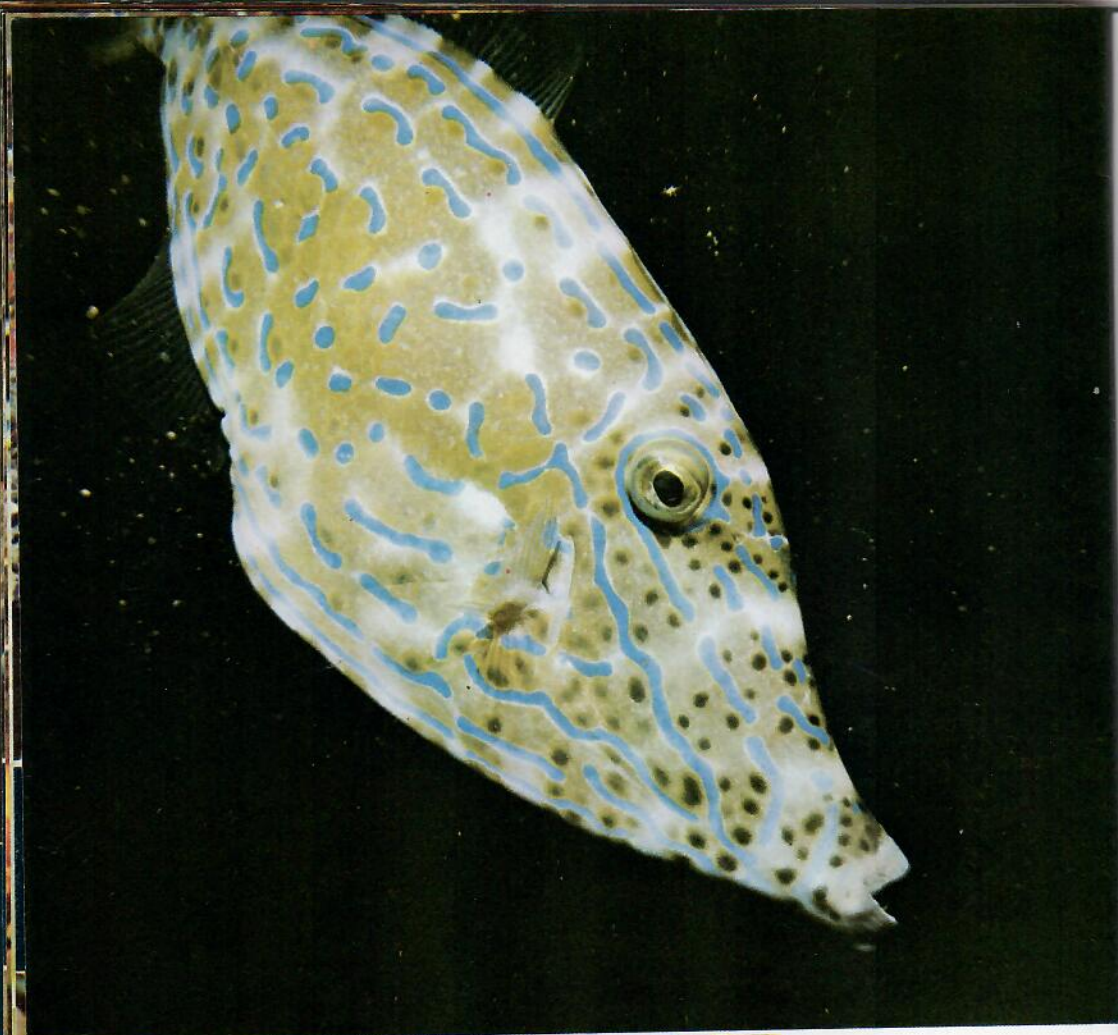
One of the most varied families of fish are the damsels. The larger ones are generally solitary in behavior, while the smaller ones often follow a schooling life style. The damsel in the upper picture averages about 4 inches, and is usually observed living alone. The much smaller green damsels below, however, are always seen in schools and disappear into branching corals if approached too closely.





Another variety of schooling damselfish is shown in the above photo. These are a rich blue in color, and can be seen swimming about a reef in great clouds of shimmering color, as they move from one rock to another. In the picture at the right is a school of black-and-white damselfish, which average around an inch and a half in size. They are particularly fascinating to watch, as the entire school swims in perfect unison; they all move in the same direction at the same speed, and change direction with exact timing.





FILEFISH

Most filefish are no more than a few inches long, like the orange spot filefish in the lower photo. Because of their small size, and mottled coloration pattern they are often hard to detect among the corals. The long tail filefish in the upper shot is much larger and grows to a length of several feet. These fish get their common name from the file-like nature of the scales which cover their bodies.



GROUPE

The family of fishes which probably exhibits the most incredible size range are the groupers. Some member of this group mature at about only an inch in length, where others of the giant jewfish variety may grow to be as much as 13 feet long. Groupers are characterized as having large mouths, and are thus often referred to as sea bass. The spotted grouper above is 3 feet long, and is taking refuge in the dark hold of a sunken ship, which is a favorite habitat for these fish, as such a wreck affords numerous hiding places.



SEA PERCH

These two shots are of rather uncommon sea perches. The yellow variety in the upper photograph are generally observed in small to large groups. These are not rare fish, but not too commonly seen, partly because they prefer to live in grottos in deeper water.

The magnificent violet sea perch below is even less commonly sighted than the yellow species, though they often live in the same vicinity of a reef. Both of these fish are rather small, and average around 4 or 5 inches in length.

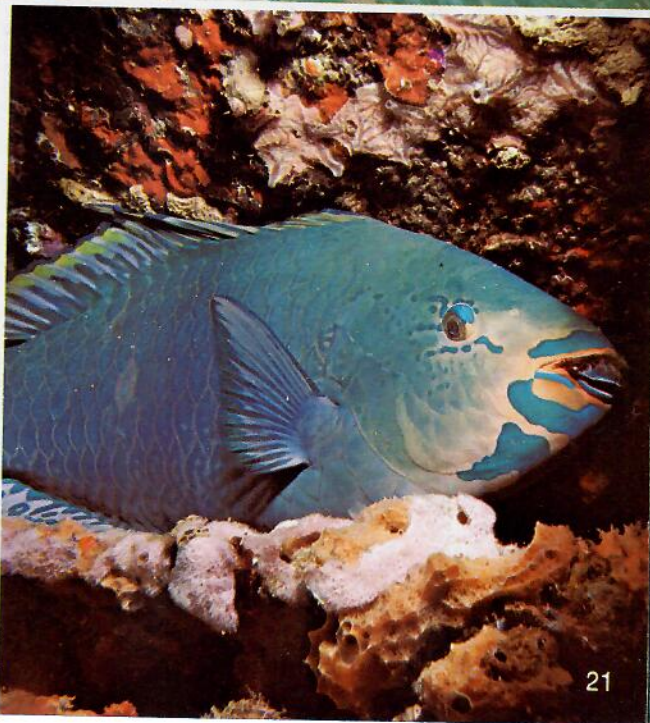


PARROTFISH

Parrotfish are so called because they resemble parrots in their gaudy colors, bug eyes, and beak-like mouth. There are basically two types of parrotfish; smooth and bumphead. An example of a smooth head parrotfish is shown in the lower photo. The upper photo is of a bumphead.

The fish employs this bony bump to help break up rocks, in which the parrotfish finds food.

The bumphead parrotfish is also displaying an interesting habit; when sleeping at night, many parrotfish secrete a transparent mucous envelope. It's sort of like a fish's pajamas.





PUFFERFISH

Puffers range anywhere in size from just a few inches to a couple of feet in length, depending on the species. The common name for the pufferfishes comes from their remarkable ability to inflate themselves when disturbed. This is accomplished through the action of numerous sacs which line the fish's intestine. The creature can inflate the body by drawing water or air into these intestinal sacs. If pulled from the water, these strange animals will inflate themselves with air as a defensive measure. If then thrown back into the water, they will remain puffed up and float on the surface for many minutes, before deflating and submerging. This is especially true of the large pufferfish in the upper photo on the opposite page. The little 4-saddle puffer above is only a few inches in length, and does not have a tendency to inflate, but merely seeks refuge in the rocks if bothered.



The grey puffer in the upper photo is shown in its normal, deflated condition. This type of fish grows fairly large, and is usually about a foot in size.

The tiny blue spot puffer is but a few inches in length, and can normally be seen in abundance swimming among the rocks of a reef.



SCORPIONFISHES

This family of fishes is especially interesting, because it includes not only the most poisonous fish in the world, but also a gradation from some of the prettiest fish in the Pacific, to some of the ugliest.

Although not all members of this family are dangerous, most species are characterized by possessing numerous poisonous spines. The magnificent lion (left) and zebra (below) fishes are part of this otherwise gruesome family, and although they are two of the most beautiful and ornate fish to be seen on a reef, they too contain a number of poisonous spines. The average size for these fish is around 6 to 8 inches, but individuals as big as 18 inches have been reported.

Pictured at left is the red-and-white striped lionfish, with many poisonous spines being visible along the back.



SQUIRRELFISH

These fish get their common name from the squirrel-like eyes, which help them see at night. They are primarily a nocturnal fish, and most active at this time of day. However, they are very visible during the day, hiding in dark caves, and occasionally hovering just above the reef in groups as in this photo. This is a species of silver squirrel fish, and they shimmer brightly in the tropical sun, almost blinding the diver.



The red squirrelfish below average about 10 inches, but sometimes go as high as 14 inches. They are fairly common on many reefs, and sparkle like jewels in the shallow water.

GAME FISH



Pacific Blue Marlin



Swordfish



Sailfish



Striped Marlin

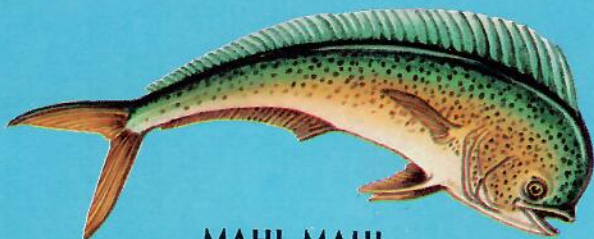
BILLFISHES

The billfish include varieties of swordfish, sailfish, and marlin. All these fish are characterized by possessing a long, narrow sword or bill, which is a projection of the upper jaw. These are the most sought after of all the game fishes, because of the great fight they put up when caught.

Probably the most popular of the billfishes is the Pacific blue, or black marlin, which can grow to as heavy as 1400 pounds and reach a length of 11 feet. The striped marlin averages over 250 pounds, and is known for making spectacular, twisting leaps out of the water.

Although the sailfish and swordfish are commonly hunted game fish, it is the marlin which are the real prize, as they are the fighting aristocrats of the sea. They are noteworthy for their fighting styles as compared to other game fish. Some marlins, for instance, will fight the hook on the surface, twisting and tail-walking; while other fish will sound deep, and boating them entails a long and tedious battle.

OF HAWAII



MAHI MAHI

Being a very common fish in Hawaii, the Mahi Mahi feed on flying fish, which can often be seen flying through the air while being pursued by a Mahi just below the surface of the water. It is actually a beautiful fish, with iridescent shades ranging from purple and bluish gold, to bright emerald. After being caught, however, and laying on the deck of a boat for just a short time, these colors turn to a dull grey. This popular game fish weighs up to 70 pounds, and is delicious to eat.



Skipjack



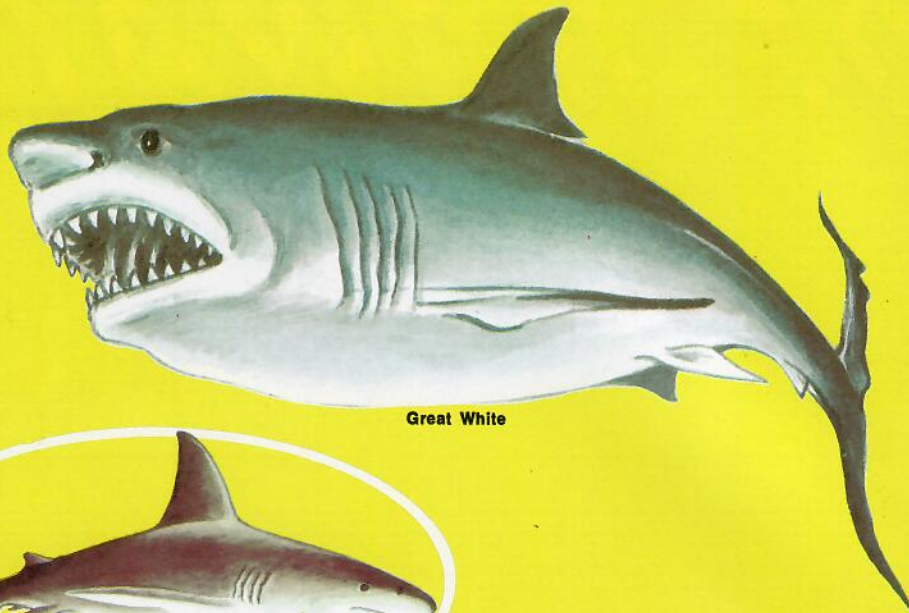
Bluefin



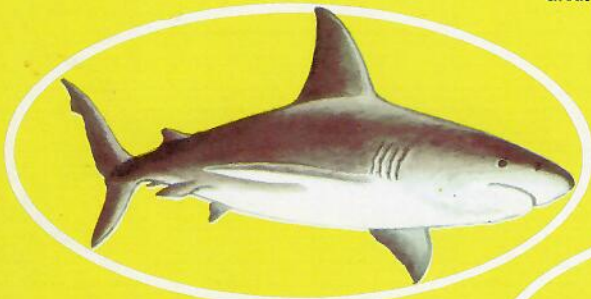
Yellowfin

TUNA

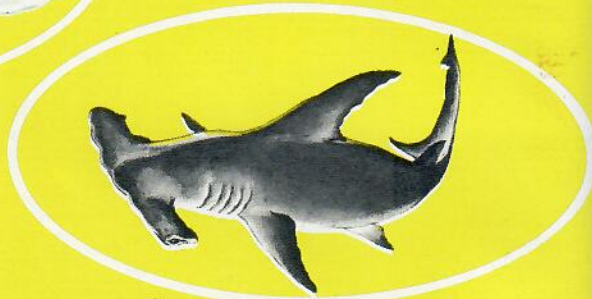
These are a popular game fish because of their fast, gallant fighting style when hooked. Probably the best known and most sought after of the tunas are the skipjack (called Aku in Hawaiian) and the yellow fin (called Ahi). A fishing boat finds schools of these fish by searching out schools of diving sea birds, which can be seen as black clouds in the distance. These birds are attracted to the small fish and squid which are driven to the surface by the pursuing tuna. Once the fishing boat reaches the school, it slows to a few knots, and bait fish are thrown in the water to keep the tuna around. During this time the crew gets the poles ready and throws the lure in the water. Commercial fishermen under favorable conditions can pull as much as 10 tons of fish aboard in just a few hours.



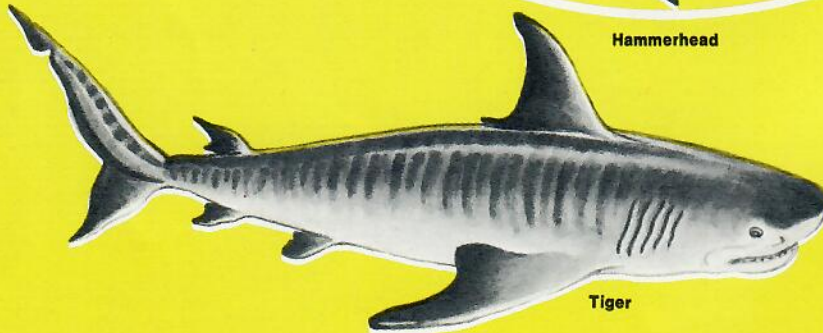
Great White



Sandbar



Hammerhead

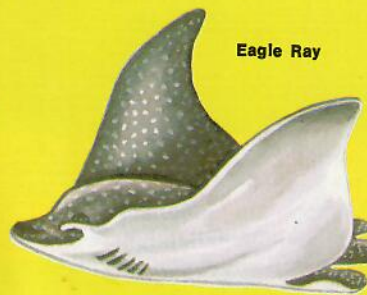


Tiger

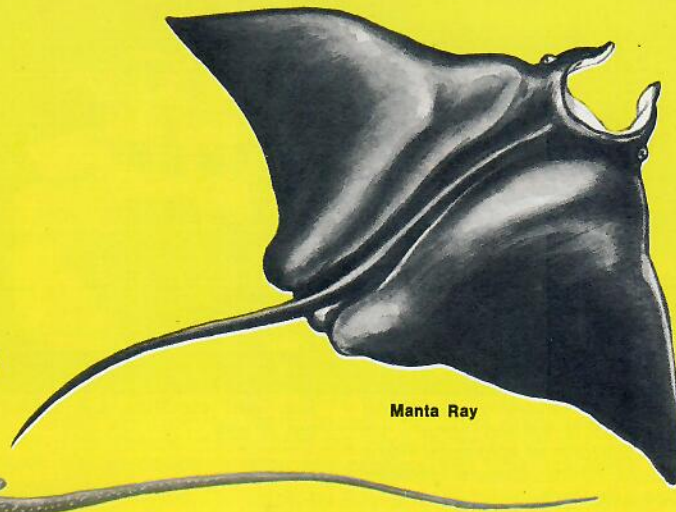
SHARKS

The sharks and rays are distinct from all other fish in the sea, in that their skeletons are composed of cartilage rather than normal bone. There are over 250 species inhabiting the oceans of the world, but only a few dozen species are well publicized, due to their reputation as being maneaters. The rest are either deepwater or harmless varieties, and so generally are unknown in popular folklore of the sea.

Throughout Hawaii and the Pacific, the larger and more aggressive shark, such as the tiger, hammerhead, and white have been deified in local legend. Rituals were often developed by islanders, and the people were careful to observe them so as to bring blessings from their shark-god.



Eagle Ray

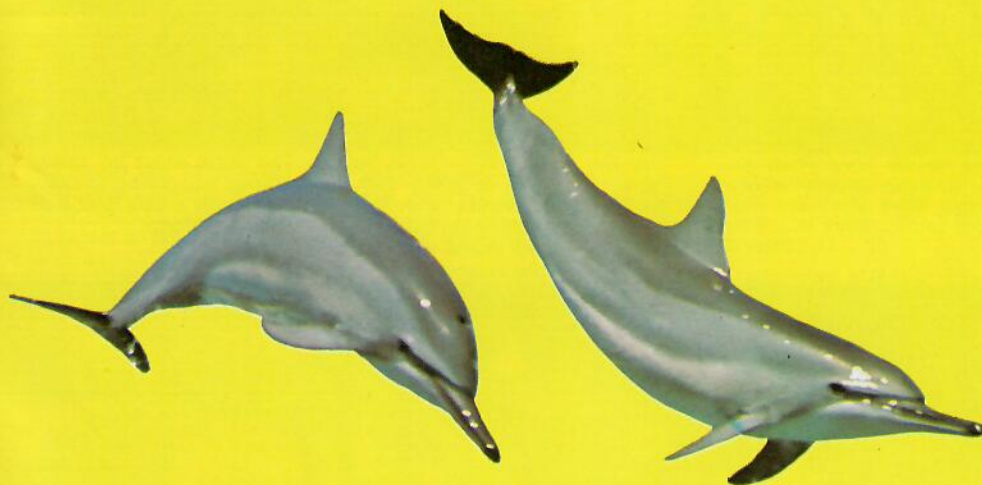


Manta Ray

RAYs

Rays are commonly seen individually or in small schools. Many spend much of their time half submerged in the sand, and represent a threat to waders, as the whip-like tail of the sting ray contains a sharp barb which can inflict a nasty wound.

Manta rays differ from sting rays in that they contain no barb on their tail. They are also much larger, and sometimes exceed 12 feet from wingtip to wingtip.



PORPOISES

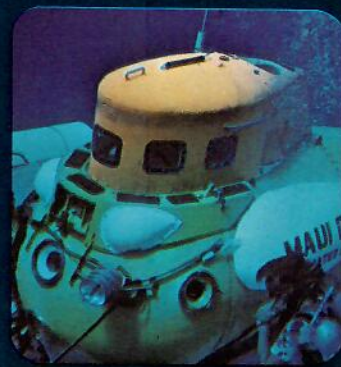
Porpoises are one of the more playful creatures in the sea, and are often seen swimming around boats in the open ocean or near land. They will sometimes stay with a boat for hours; racing the boat by swimming just in front of the bow, as if putting on a show for the people on board. Porpoises are not actually fish, but are aquatic mammals closely related to the whales. And unlike fish which are water-breathing, the porpoise are air-breathing, and must return to the surface at regular intervals to breathe. Besides the regular, or common porpoise, there is another variety known as the Hawaiian spinning porpoises. These fascinating creatures can leap into the air and spin in 4 complete revolutions before hitting the water again.



The Maui Divers' deep diving mini-sub is loaded aboard its sea platform at Makapuu Point across from Oahu's famous Sea Life Park.



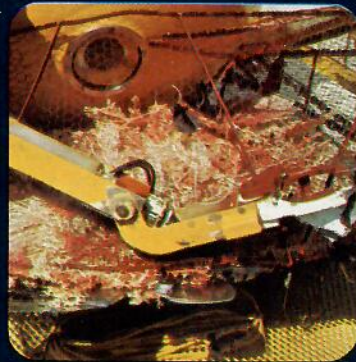
Sub and platform are pulled out to sea.



Sub is made ready to dive deep for the rare Hawaiian Pink Coral after sub and platform are lowered.



A large black coral tree on display at Maui Divers' Honolulu office.



The sub, which often finds no coral, has had a good day. The sub's mechanical arm and hand must gently break the pink coral and place it in the basket. A difficult operation.



The coral must be sorted and graded according to color. Occasionally a rare piece of gold coral is found.



A coral branch being inspected.



The coral is cut, ground and polished into stone for jewelry.



Hawaii's gems from the ocean are made into some of the world's most beautiful jewelry.

The story of the collection and making of the precious gem corals, black coral, pink angelskin coral and gold coral.

BLACK CORAL

Black coral is considered a rare gem, not just because it is only found in a few places, but also because it grows in areas in the ocean which make it very dangerous for divers to mine.

Interestingly enough, black coral is not something exclusive to Hawaii; in fact, for centuries it has been collected and used by people around the world for various purposes. For instance, the Greeks once collected black coral, and made it into amulets which were supposed to protect the wearer from evil. Books in the 17th and 18th centuries were written about the black coral found in the Red Sea, and gem stones were made into ceremonial jewelry, and worn by the ruling priests of India. However, these forests of black coral were soon wiped out, and it became virtually unknown for many years. It was first discovered in Hawaii in 1956 by Jack Ackerman. This discovery prompted the creation of a new industry in Hawaii, and organizations came into existence to mine and process this precious coral.

Black coral trees, like other coralline structures are made by tiny animals known as coral polyps. To protect themselves against the elements, these minute creatures secrete black coral communities, which take the form of large bushes many feet across. Once collected, these trees are sorted, cut up into gem sized pieces, shaped, polished, and finally set into jewelry of different kinds.

Black coral is now primarily mined from the deep channel between the islands of Lanai and Maui. It is found anywhere from 150 to 300 feet. And along with such great depth goes great danger. For this far beneath the surface often exist strong ocean currents, and also large varieties of man-eating sharks. An effect known as nitrogen narcosis tends to make a diver dizzy the deeper he goes. And finally, if a diver returns to the surface too quickly, he will get the bends, which can leave a person crippled for life. The dangers are great, but so are the rewards, for the Hawaiian black coral is the best and most valuable in all the world.

PINK ANGELSKIN CORAL

Unlike black coral, pink angelskin coral is not picked directly by skin divers. This is because it is found only in very deep water about 1200 feet down. The first mining techniques used were known as dredging, whereby a large scoop connected by cable was towed behind a boat and scraped along the bottom, in hopes of snaring some trees of pink angelskin coral. This was a somewhat hit-and-miss method. Today, however, more modern techniques are employed and a small submersible submarine is used for the collection. Although this is a much more effective way to commercially mine this precious coral, it is still very difficult to locate in the dark depths. To make pink angelskin coral even more of a rarity, it only grows at the incredibly slow rate of one inch every 200 years. Therefore it is not a product which once mined, will replenish itself in a few years.

Like black coral, pink angelskin coral trees (which usually average less than a foot in size) are sorted, cut up into gem sized pieces, shaped, polished, and set into jewelry. It is a painstaking process, but the finished product is certainly well worth the effort.

GOLD CORAL

Occasionally, among the pink coral trees, is found an extremely rare tree of gold coral. These gold coral trees are cut to size, polished and made into jewelry exactly like the pink coral. First discovered in 1967, there was not enough found for commercial use until a discovery in 1974 of an entire bed of gold coral trees off Kaena Point on the island of Oahu. A third dimension has now been added to Hawaii's previous gem corals.

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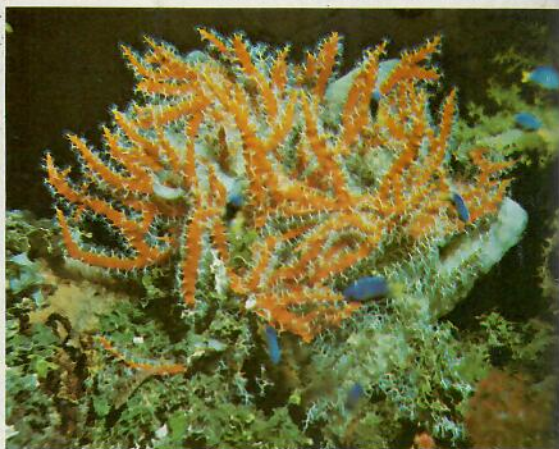
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