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THE SCUBA DIVER

SPECIAL FEATURES:
Australian Marine Stamps
Sunken Warriors

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Ascidian
Basking Shark

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Our Distant Relatives

ASCIDIAN

Gary Graf

If I were an ascidian, I'd be inclined to sue for defamation of character. I would make it a class action, brought against all those divers who through ignorance or indifference identify ascidians as 'I dunno, some kinda sponge I guess'.

Harumph! While they often may live right next door to each other along the same walls and ledges, look somewhat alike and even feed in a similar way by taking in water and filtering out plankton, sponges and ascidians actually are, in the words of one senior racing driver, 'like chalk and cheese'.

Sponges are lowly creatures only a step up in the phylum pecking order from single-celled protozoans. Whereas ascidians, a class of tunicates perhaps better known as sea squirts, are perched right up there at the top in Phylum **Chordata**, along with birds, fishes, reptiles, mammals, you and me.

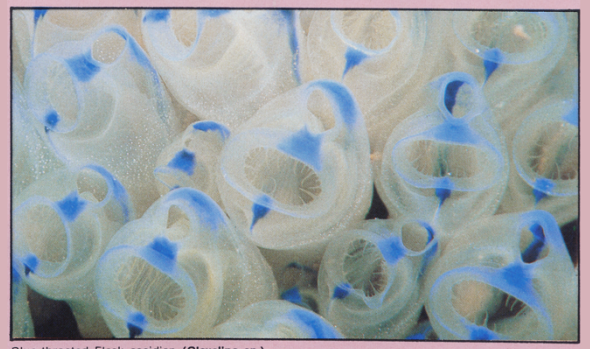
This hasn't always been so. Until the mid-nineteenth century those scientific types who'd actually encountered ascidians figured them for some sort of invertebrates like anemones or mollusks or something. But in 1866 a clever Russian researcher named Aleksandr Kovalevsky discovered that in their formative larval stages ascidians bore a remarkable anatomical resemblance to vertebrates. Kovalevsky, the founder of comparative embryology, noted that once their eggs hatched, these young ascidians appeared as tadpole-like creatures only a millimetre long, but possessing what were essentially backbones, like such lofty being as Man. And Woman.

Not surprisingly, the similarity seems to end in a hurry. While they are also blessed with a nervous system of sorts, a rudimentary brain and an unusual circulatory system, ascidians have some rather more primitive features like gill slits, an eye spot and two or three protuberances called papillae.

The ascidian way of life is on the primitive side as well. Following a brief exploratory swim usually lasting no more than a few hours, the larvae use their papillae to anchor themselves head-down to a handy rock or somesuch. And there they will sit for the rest of their sedentary lives. Their tails are soon resorbed into their bodies and the animals rotate to a mouth-outward perspective. Then they proceed to metamorphose into either simple or compound adults.

Simple ascidians are the larger. They come with their own separate ▶

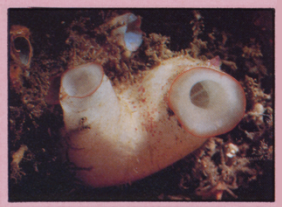
Close-up of the sponge encrusting the siphon area of a Giant Sea Squirt. Jervis Bay, NSW.



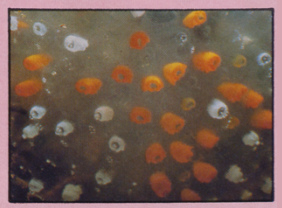
Blue-throated Flask ascidian **(Clavelina sp.)** - The individual lobes come together to share a common base. Clusters of this striking specimen may also be found with white rather than blue markings.
Ship Rock.

Jelly ascidian **(Polycitor sp.)** - Orange (and sometimes yellow or white) zooids protrude from the thick jelly matrix to feed on plankton and suspended sediment.
Jervis Bay.

Brain ascidian **(Sycozoa cerebriformis)** - A compound ascidian, its convoluted matrix is made up of numerous individual, interconnected zooids.
Ship Rock, Port Hacking, NSW.



Red-throated ascidian **(Herdmania momus)** - This simple ascidian, its translucent white skin often overgrown with hydroids or algae, is very common from New South Wales to Western Australia.
Hole-in-the-Wall, Avalon, NSW.



Micro close-up of what is probably a rare Jelly ascidian mutation.
Barrenjoey Sponge Gardens.

Sea Tulips **(Pyura pachydermatina)** - Bobbing and weaving clumps of this species are pretty common on shallow-water rocks where there's plenty of wave action. Its skin, when old and heavily encrusted with organisma, can be shed.
Bangalley Head, Whale Beach, NSW.
Hole-in-the-Wall. ▶

inhalant and exhalant siphons. And due to their generally bulbous appearance and tough, leathery tunic, they are most likely responsible for the classification name **Ascidacea**, which comes from the Greek word for leather bottle.

Compound ascidians are the prettier ones, displaying a myriad of intricate patterns and gorgeous colours. They're actually colonies of tiny individuals called zooids and are usually embedded in a common matrix of a substance of their own secretion called tunicin. Each constituent zooid, measuring only a few millimetres in length, has its own intake siphon but shares with its mates a single, much larger exhalant aperture.

Whatever their configuration, all ascidians feed in a like manner. As sessile animals they must have their food home delivered. They rely on ocean currents to bring plant and animal plankton close enough to be drawn into their inhalant siphons, or mouths. Inside is a large sac which functions much like a fish's throat. Along each side of this throat, called the pharynx, are numerous gill slits where minute, rapidly-beating cilia keep the microscopic food moving in the right direction. While the water continues through the gills and out the exhalant opening, a mucous secretion traps the floating food before it can escape. Once this sticky mucous becomes chock-full of nutritive matter, it mysteriously rolls into a cord and passes down into the gullet for digestion. When this process has been completed, the ascidian gives a mighty squeeze of its body and squirts water bearing soluble waste products back into the sea. Not unlike a hugely satisfying burp.

Just like fish, the ascidian uses its pharynx with its gill slits to absorb oxygen into a true blood circulation system complete with a thumping heart. But this heart isn't your ordinary, run-of-the-bloodstream heart. This one's reversible. It beats 30-40 times one way, then switches direction and beats 50-60 times the opposite way. Let a sponge try that.

When it comes to sex, most ascidians are what you might call AC/DC. In other words, hermaphroditic. Each individual ascidian boasts its own set of fully functional ovaries and testes. The simple ones release the ova and sperm into the water for fertilization. Their compound bretheren tend to hold onto the fertilized egg until the tadpole-like larvae develop. Many ascidians can also reproduce through budding, which leads to the formation of encrusting colonies or clusters of zooids in a common matrix.

Incidentally, it's probably not a good idea to try and establish any sort of lasting relationship with an ascidian you particularly fancy. You could end up very hurt. The colonial variety lives only six months or so. The solitary ones usually hang on for some 18-24 months.

Although they may experience a rather short life span, they do enjoy a quite wide distribution. Ascidians are found all over the world, from intertidal shallows to the edge of the continental shelf. Several forms even manage to cope in the oceanic abyss. Most, however, prefer to settle down near the shore, attaching themselves to rocks, wharf piles, coral reefs, submarine cables or the occasional elderly mollusc. A select few do get to travel, affixed to the bottoms of ships.

So next time you're finning around down there and you run across a creature that looks like 'some kinda sponge', take a closer look. It could actually be a vastly superior animal - like yourself. A distant relative, the ascidian.

Micro close-ups of Dark ascidians **(Botrylloides nigrum)** - This colonial investing ascidian comes in a variey of shapes and sizes, depending on its age and the surface it blankets. Colours are equally varied, including white, brown, purple, yellow or orange.
Hole-in-the-Wall.
Barrenjoey Head.
Bangalley Head.

Unidentified reef ascidian.
Heron Island, Queensland ■


DANGER
EXPLOSIVES
In the wrong hands they blow fingers off.
Detonators may be small, but they can be extremely dangerous.
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So if you find a detonator, don't touch it. Leave it right where it is and tell a CityRail employee or the Police.
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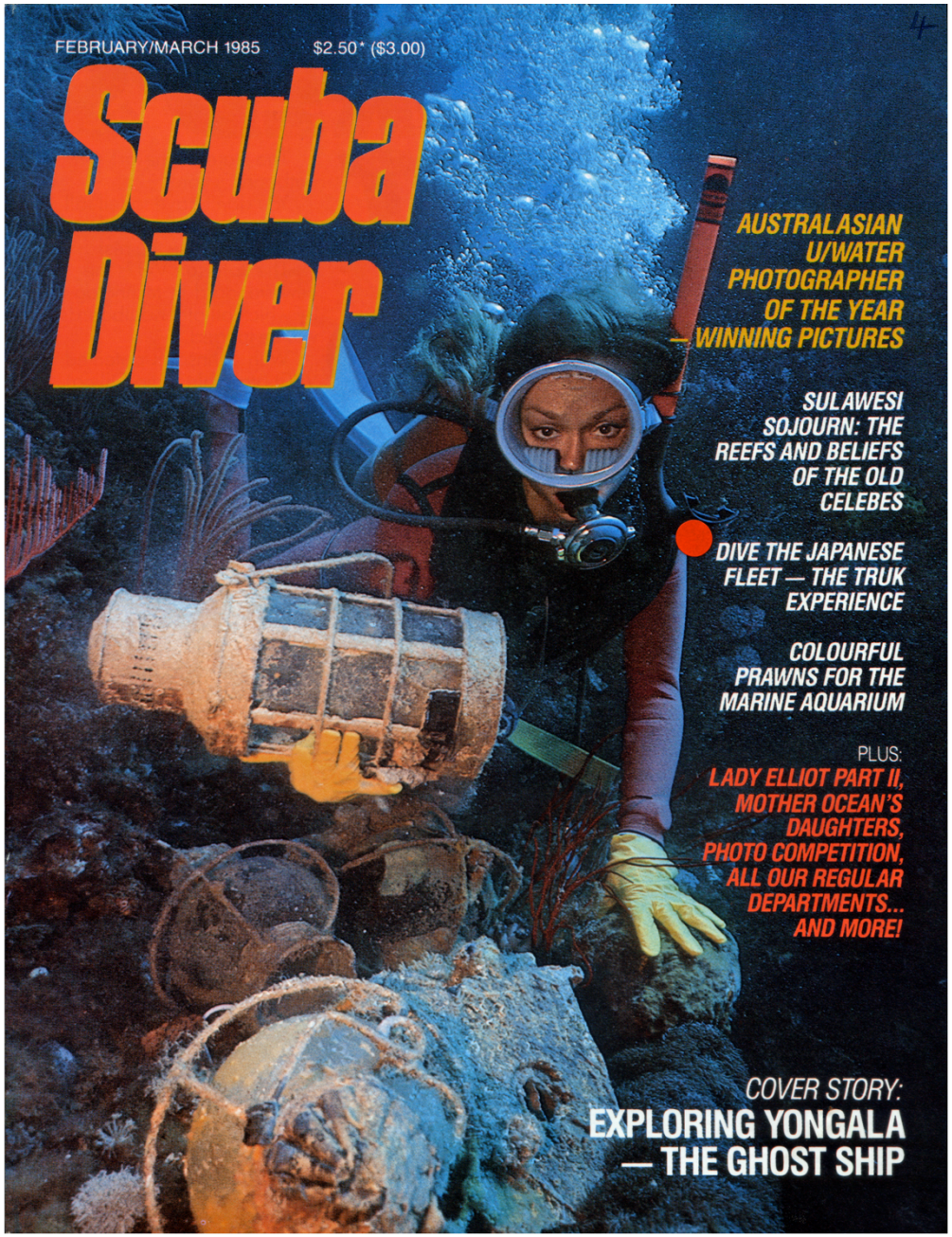
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COVER STORY:
EXPLORING YONGALA — THE GHOST SHIP

When it comes to the animal kingdom, you can't get much more basic than a sponge. It manages to make due without a heart, liver, stomach or any other internal organ. It lacks a nervous system and a brain. In fact, it doesn't even have a mouth.

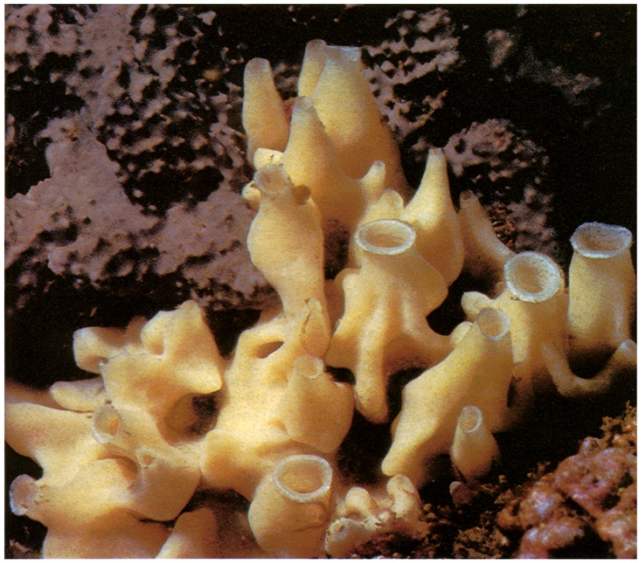
Although Aristotle reasoned that these strange porous bags were animals more than 2,000 years ago, scientists who followed the great Greek took their time in coming round to his way of thinking. They believed that since sponges looked sort of lumpish, didn't respond much to prodding and could never be seen to eat anything, they must be some type of sea vegetable. Or maybe a worm form. Some experts even opted for non-living solidified foam. And they didn't get it right until the mid-1800s.

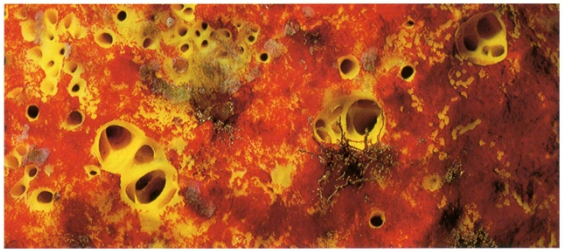
When the scientific community finally took a good, close look, it discovered that sponges were animals alright, but animals quite different to any other. The least

"As far as size goes, there's a huge, much-photographed barrel sponge off Sunset House on Grand Cayman that bears a striking resemblance to a cannibal's pot."

complex of multicellular creatures, only a hair more sophisticated than single-celled protozoans, sponges have a unique anatomical structure based on cells, not tissues. And these cells have one all-consuming purpose in life. *Eating.* The entire organism lives only for filtering food from the water. To give you an idea how diligently they work at it, a litre volume of sponge can filter between 36 and 125 litres of water every hour.

Contrary to what you might expect, that big hole, so prominent a feature of many sponges, isn't a mouth. Actually, it's an ex-current opening and functions at the end of the digestive cycle rather than the beginning. Water, the source of food and oxygen, is drawn into the sponge through lots of tiny pores riddling the surface (hence the phylum name *Porifera,* meaning 'pore bearing'). Because of the clever geometric design of these openings (ostia), it's a one-way trip. Once in the sponge's internal canal system, the water is





YOUR BASIC SPONGE

Gary Graf presents an informative study of the anatomy and social habits of this varied and often colourful group of animals.

moved right along through a central cavity by thousands of rapidly-beating, whip-like hairs (flagella) attached to collar cells (choanocytes) which line the walls.

The collar cells, so named because of a round, collarlike projection at one end, absorb oxygen and partially digest the plant and animal life they've filtered from the water. In a commendable display of sharing, left-overs are carried throughout the sponge to be divided among other hungry cells or stored within a group of cells called amebocytes.

The water, now divested of its nutritive cargo, continues through a series of ducts and cavities to that big hole (or holes) called the osculum (or oscula) where it's spurted out with a good deal of vehemence. Patooey! Since this water now contains waste products instead of food and oxygen, the sponge tries to exhale everything as far as possible so as not to accidentally re-ingest it. They're not as dumb as they look!

Because of their single-minded dedication to eating, few sponges are able to constrain themselves to the simple, baglike body they begin life with. As they grow, many fold their cell walls to add more internal surface area. Eventually their central cavities disappear altogether, replaced by a complex canal system of small oval or rounded, flagellated chambers connected to a series of additional oscula.

Incidentally, all this folding creates myriad nooks and crannies which fish and such commensal invertebrates as shrimp and crabs gratefully hide within. Sometimes it can get pretty crowded; over 16,000 shrimps were once removed from a single loggerhead sponge. Don't ask me who plucked and counted them all.

Besides their hearty appetite, several other factors govern the form a sponge may take as it grows. The type and depth of substrate they settle on, as well as the amount of light reaching them and water flowing by them all contribute to the amazing array of (mostly asymmetrical) shapes and sizes, colours and textures that sponges come in. Incredibly, the flow of water, as the sole means of providing food, can actually lead sponges of the same species to assume quite different appearances. When currents run strongly, the sponge tends to spread itself around in flattened sheets or shapeless clumps. When the exact same type of sponge sets up house in calm waters, it may well branch out into intricate treelike shapes. All the better to filter prey from passing water.

Their common names will give you some idea of the many forms sponges take: vase, honeycomb, organ-pipe, gourd, fan, tube, barrel, finger and corncob. But even with all these, I've yet to come across a name that does justice to a group of sponges that look for all the silent world like commodes.

As far as size goes, there's a huge, much-photographed barrel sponge off Sunset House on Grand Cayman that bears a striking resemblance to a cannibal's pot. It easily accommodates any diver who just can't resist trying it on for size.

Sponge colours run from one end of the spectrum to the other. Bright white. Fire-engine red. Flame orange. Mellow yellow. Forest green. Lovely lavender. Deep purple. And even a pure royal blue, a hue you don't often encounter in nature. Their textures also run the gamut, from coarse to slimy and brittle to leathery.

"I've yet to come across a name that does justice to a group of sponges that look for all the silent world like commodes."

Some are soft, giving under the slightest pressure; others feel firm, resisting squeezing as stolidly as a rock.

Because their physical characteristics seem more influenced by environment than heredity, even varying markedly within the same species, positively identifying sponges can be a real problem. Though not too practical for most, the surest way to figure out which of the known 10,000 species a particular sponge belongs to is to cut off a piece and examine its spicules under a microscope.

All sponges have a soft organic skeleton made up of strands of a special protein called spongin, which is secreted by specialised cells. To give them a stand-up-straight posture, most also have a mineral skeleton made up of splinters of either calcite or silica, secretions formed by sponge cells from mineral carbonates extracted from the water. These splinters are the spicules and they come in a great many combinations of lengths and designs.

Some eighty per cent of all sponges, including the larger, more colourful ones you're no doubt familar with, as well as the once-common bath sponges and a few freshwater varieties, have silica spicules with either one ray or four. They all belong to class *Demospongia* and have a firmish skeleton with the spongin acting as a kind of cement to bond interwoven spicules into some pretty elaborate shapes. However, this class also encompasses a few with no skeletons at all who just sort of 'hang loose'.

A small group of mostly dull-coloured sponges reaching only 15cm in height have calcite spicules of one, three or four rays. Found mainly in shallow water along the North Atlantic coast these sponges are grouped in class *Calcarea*.

The usually small, sometimes exquisitely-patterned glass sponges make up class *Hexactinellida*. Occurring in depths which range from 90 metres to nearly five kilometres, glass sponges have silica spicules. It's not a good idea to go squeezing these sponges. You're likely to find your hand filled with a mess of hard-to-remove splinters.

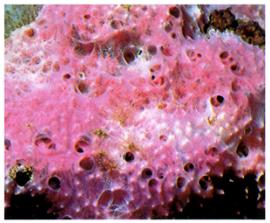
A tiny number of species are in a class by themselves *(Sclerospongea)* because their spicules are composed of both calcite and silica.

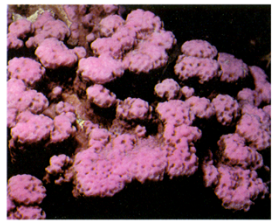
Before leaving the area of identification, there is one sponge type that you'd be hard-pressed to mistake for any other. The garlic sponge. It gives off a revolting stink even when alive and healthy.

Thanks to their simplified approach to anatomy and their low level of specialisation, sponges possess remarkable regenerative powers. Not only can one small piece of sponge grow into a complete animal, but separated cells squeezed from the skeleton will reaggregate into small clumps and eventually become new, perfectly functional sponges.

This talent for regenerating so efficiently, combined with their proclivity to take on so many forms and, of course, to eat so voraciously, suggests that sponges may well have provided the inspiration for a whole host of malevolent blobs intent on ingesting all of mankind in those late-night TV horror movies.

In real life, this very large, very successful group multiplies at a little less frightening rate. Most sponges are hermaphroditic, containing both male and female amebocyte cells. So far, only a few species have had their most intimate secrets studied in detail. Voyeuristic biologists have





discovered that the egg becomes fertilized inside the parent body, where it remains until a small, flagellated larva develops. Once it's ready to strike out on its own, the larva departs through a handy osculum. After a short swim or creep it settles down to begin feeding in earnest. If conditions are favourable, the young sponge can grow pretty fast. Some have been observed to double their weight in two days.

In those instances where a sponge species produces only one sex cell, it must rely on the current to bring sperm from a male sponge to a female of the same persuasion. Sounds a bit haphazard, but it must work. They're still doing it.

It's not uncommon for sponges either replacing lost or damaged parts or enlarging the colony to forego any hanky-panky and to reproduce asexually by budding (splitting into smaller parts). Some of these species form reproductive spores called gemmules, which are collections of cells and spicules within a thick wall. These gemmules are tough. Once their parents turn them out on their own to develop into new individuals, they're capable of withstanding both freezing and drying. This ability to handle such adverse conditions means we should be seeing sponges for a lot of years to come.

In line with their indiscriminate natures, sponges live in all seas. In both brackish and very salty water. From inter-tidal zones to depths of 8,500 metres. On mud, sand or gravel bottoms. Attached to rocks, wharf pilings, seaweed, other invertebrates and ascidians. One rather contrary species insists on clinging to limestone outcroppings and nothing but. Another sponge of note, the boring species *Cliona*, has long been a serious economic threat in some countries because of their fatal attraction to oyster shells.

Aside from some not terribly discerning molluscs, sponges don't appeal to many predators. However, one particularly soft sort has had its ranks seriously depleted because of the strange proclivities of an alien visitor to its world. For thousands of years this two-legged predator has gained great pleasure from rubbing its soapy body and, more lately, the body of its favourite means of transport with these sponges. Fortunately, this alien in recent years has shown a preference for cheap synthetic versions.

And that's the story on sponges. Basically. ○

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THE SCUBA DIVER

SPECIAL FEATURES:

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By Ben Cropp

Diving Into The Past
By Walt Deas

IN THIS ISSUE:

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Sea Anemones:
The Flowers that Eat Fish

GARY GRAF

They certainly don't **sound** particularly attractive. Ever-hungry carnivores, they stick themselves to rocks with powerful suckers and wave poisonous tentacles around. When some unsuspecting prey drifts too close, they sting it and then shovel the paralyzed animal into their slitlike mouths with all the mannered refinement of the Cookie Monster.

Yet these ghoulish-sounding creatures happen to be some of the most beautiful animals found underwater. The sea anemones.

A horticulturist would be quick to point out that only a few sea anemones actually resemble their flower namesakes. Most look more like dahlias or chrysanthemums. Whomever they take after, sea anemones are every bit as attractive-looking as any of those popular garden blooms. Their rich colours and intricate designs, the result of pigmentation rather than commensal organisms, make them stand out wherever they're found.

And they're found most everywhere. In all seas, in both deep water and tidal zones. The biggest species and most numerous populations occur in temperate and warm waters. And although most prefer shallow water, a few anemones have been trawled from 10,000 meters, making them among the deepest-living sea creatures.

Probably the best known of anemones are the **Stoichactidae** family. These huge species, with diameters often stretching more than 1.5 meters, thrive on tropical reefs throughout the South Pacific. Their size aside, **Stoichactidae** also intrigue observers because of their relationship with the variety of clownfishes. These colourful little fish dart in and out of the anemones' stinging tentacles with impunity. And immunity. Any other fish of a like size trying the same trick would quickly find itself made a meal of. One recent theory suggests this special relationship is not parasitic (one-sided), but symbiotic (mutual). In other words, the clownfish pay for their protection. The extortionate fee being the food they don't eat at one sitting and store within the anemones' tentacles for future munching. Such munching being gratefully undertaken by the **Stoichactidae.**

Micro close-ups of different Southern jewel anemones. The Valient, Palm Beach, NSW.

While there are also anemones as tiny as a few millimeters across, the average size seems to be about 70mm in diameter and 100mm in height. And while their bodies may be short and thick or long and slender, the typical sea anemone possesses a stout, mainly cylindrical body topped by a broad, flat disk. The combination mouth/anus sits in the centre of this disk surrounded by whorls of simple hollow tentacles. At the base is another disk called, coincidentally enough, the basal disk. Or, because it also serves as the most common form of locomotion, the pedal disk.

Thanks to a circular-longitudinal arrangement of muscles, the anemone's bodywalls and the tentacles that grow from them can easily expand and contract. So when the animal feels threatened or just wants to get away from it all for a while, it simply closes its opening and folds its tentacles within its bodywall. What's left is an uninteresting, unappetising blob.

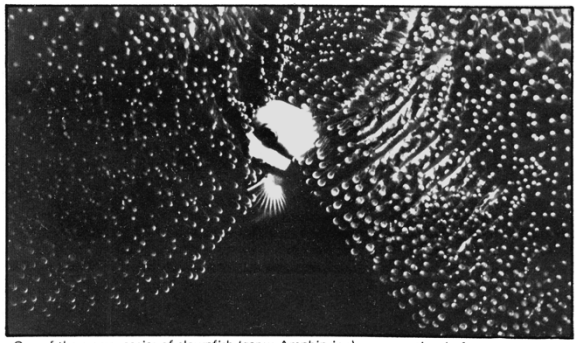
When the tentacles unfold in all their glory, the delicate colours and designs making them resemble flower petals, they belie their main purpose. Each contains strings of tiny stinging cells called nematocysts, which are capable of paralyzing small fish and crustaceans. Some, like the common White-striped Anemone, can even cause ulcerous sores in unwary humans.

Because of their microscopic armament, anemones, along with hydroids, jellyfish and corals, belong to phylum **Cnidaria** (a.k.a. **Coelenterata).** (Just in case you're ever on Sale of the Century: corals and anemones share class **Anthozoa,** with anemones having order **Actiniaria** all to themselves).

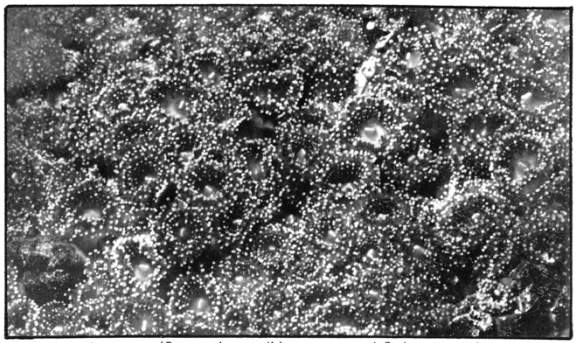
When it comes to eating, many anemones can capture and digest prey a good deal larger than the planktonic food of their coral cousins. They're also capable of growing quite rapidly. By the same token, anemones can go without food for some time, in which case they shrink into shadows of their former selves.

When it comes to being eaten, anemones number among their enemies sea slugs, certain starfish, eels, flounders and codfish. They do possess one unusual defence mechanism. When they sense danger, anemones withdraw their tentacles and spit out long white threads. And some species, like the Speckled Anemone common across southern Australia, secrete a sticky substance along their columns and

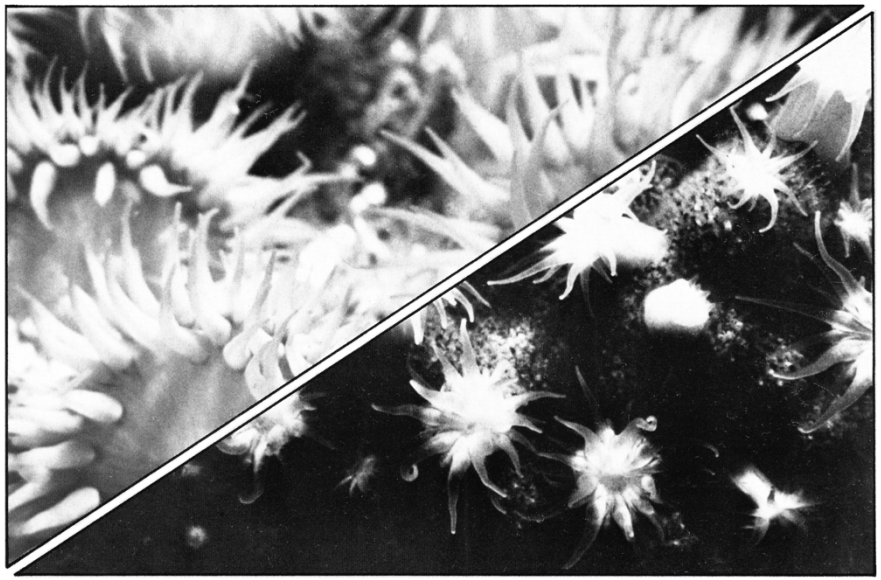
A solitary White-striped anemone with its column illuminated from within by a downward-angled strobe. Sponge Gardens, Palm Beach, NSW.



One of the many species of clownfish (genus Amphiprion) peers cautiously from the protective tentacles of one of the many species of Giant anemone (family Stoichactidae). This relationship is now believed to be symbiotic or mutually advantageous. Ponape, Micronesia.



Southern jewel anemones (Corynactis australis) are well-named. So intense are their colours, which range from white through red and orange to mauve, that each polyp seems to sparkle like an individual facet of some gigantic jewel. Jervis Bay. ▶



So-called White-striped anemones **(Anthothoe albocincta)** come in a variety of colours including white, orange and pale olive. They're not what you'd call uncommon in the south eastern part of this country. Careful, they sting. Barrenjoey Head, Palm Beach, NSW.

end up covered with grains of sand, bits of shell or whatever else is handy. It's questionable how much either of these steps actually deter the keen anemone enemy, but they probably make the animal feel better.

Generally, sea anemones don't move around much, and the basal disk with its sucker is used mainly to affix the animal to rocks, pilings, weeds, floating debris and hermit crab shells. In the case of the genus **Cerianthus,** the disk has been modified for burrowing into sand or mud. These anemones secrete a mucus to form a tube which they call home. A few daring anemones let themselves go completely and swim for brief spells with lashing movements of their tentacles. Strangely, those actually known as Swimming anemones don't swim. They roll themselves into balls and let the undertoe do the work. Some species are truly parasitic and live within jellyfish. Members of the genus **Minyas** can be found floating near the surface with their mouths and tentacles hanging hungrily downward. Another species climbs sea whips, no doubt to gain a better vantage point from which to snare passing food.

Whatever their variations in size, shape and habitants, sea anemones all share the same radially symmetrical body plan. But for their larger size and lack of a calcium exoskeleton, they look very much like their closest relatives, the stony corals. You could think of them as big, naked coral polyps.

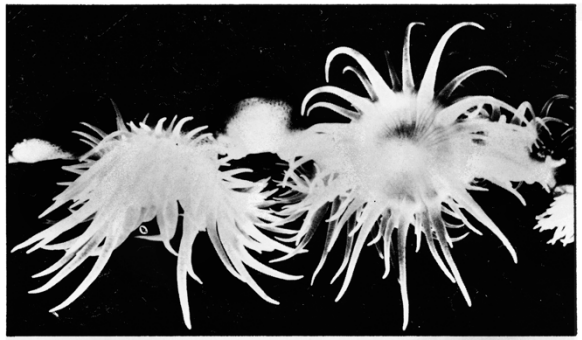
Inside the anemone, a short, tubular gullet, or oesophagus, runs from the anemone's mouth to the stomach cavity, which is divided into chambers by partitions. One or more grooves covered with hairlike cilia extend along the gullet to carry water in an out. In with food and oxygen, out with waste matter.

In the area of reproduction, sea anemones seem a bit divided over the best method. Most species, understandably enough, prefer the sexual approach, where one individual supplies the eggs and a second the spermatozoa. At this point there again seems a difference of opinion. Some species opt to fertilize their eggs in the water, producing

Bryozoan anemones are usually found on rock walls hosted by a clump of bryozoa. As can be seen, these anemones are capable of really stretching their columns to gather passing plankton. Jervis Bay, NSW.

Swimming anemones **(Phyctenactis tuberculosa)** are most often found with their tentacles fully retracted, folded into a flacid, knobby ball and attached to kelp or rocks. They may be solid-coloured or two-toned, most commonly red, green and grey. They do their feeding and moving about at night. Bangalley Head, Whale Beach, NSW.

planktonic larvae which develop directly into young polyps. Other anemones fertilize their eggs while still in the gastric cavity, which makes them among the first lower animals to provide parental care. Here, the larvae stay inside until they're ready to metamorphose into free-swimming planulae, whereupon they freestyle their way out their parent's mouth and ▶

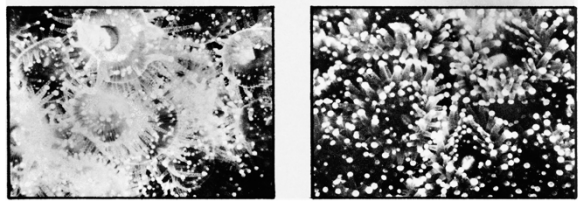


◁ Sea-whip anemones are, oddly enough, a type of anemone that clings to sea whips. They've been observed to invert themselves into a saucer shape and drift from whip to whip. To see a field of these beautiful anemones gently waving back and forth in the swell is to see something very special. Jervis Bay, NSW.

settle nearby to develop tentacles. Then they move off to brave their new world.

The balance of anemones are hermaphrodites. Some indulge in longitudinal fission, where the animal splits lengthwise into two equal halves. Each then replaces its missing part, sort of like cloning. Still other anemones prefer budding, where they break off part of their pedal disk before sliding on. The fragment left behind regenerates into an exact replica of its parent. More cloning.

With so many choices of ways to make new sea anemones, it's no wonder they're to be found all over the underwater world. And with such an efficient feeding technique, it's no wonder sea anemones do so well wherever they're found. ■



Micro close-ups of different Southern jewel anemones.
The Valient, Palm Beach, NSW.
Long Reef, Dee Why, NSW.

About the author – *GARY GRAF*

1952: Cape Cod, Massachusetts - don first mask, fins and snorkle ... begin lifelong affinity with diving and the underwater world.

1955: Borrow father's camera to record train trip to western part of Massachusetts - don't do badly, considering ...

1956 & 57: During two trips across the States in the back of a truck start getting serious about taking photographs rather than snapshots ... still show some of these early efforts without apology.

1961: University of Massachusetts - make fateful decision to forego art career and channel graphic creativity into photography.

1963-66: Join US Navy and attend Journalism School, graduating top Navyman - take surprisingly thorough photo course and master the heavy and awkward Speed Graphic (with battery pack) ... serve aboard USS MIDWAY and on staff of Commander, US Naval Forces, Japan, as photo-journalist doing feature stories for 'Stars & Stripes', Navy-wide media and Japanese newspapers - convince non-too-receptive powers-that-be that my handy, dandy Nikon F makes much more sense than bulky, antiquated Speed Graphic ... purchase Nikonos and check it out in a swimming pool before venturing into ocean - seems a minor miracle.

1968-69: While gaining a B.S. degree in advertising at Boston University's School of Public Communication, manage to take courses usually reserved for majors in much-vaunted Photography sequence - graduates comprise some of world's busiest photographers, including NATIONAL GEOGRAPHIC's superb u/w contributor David Doubilet.

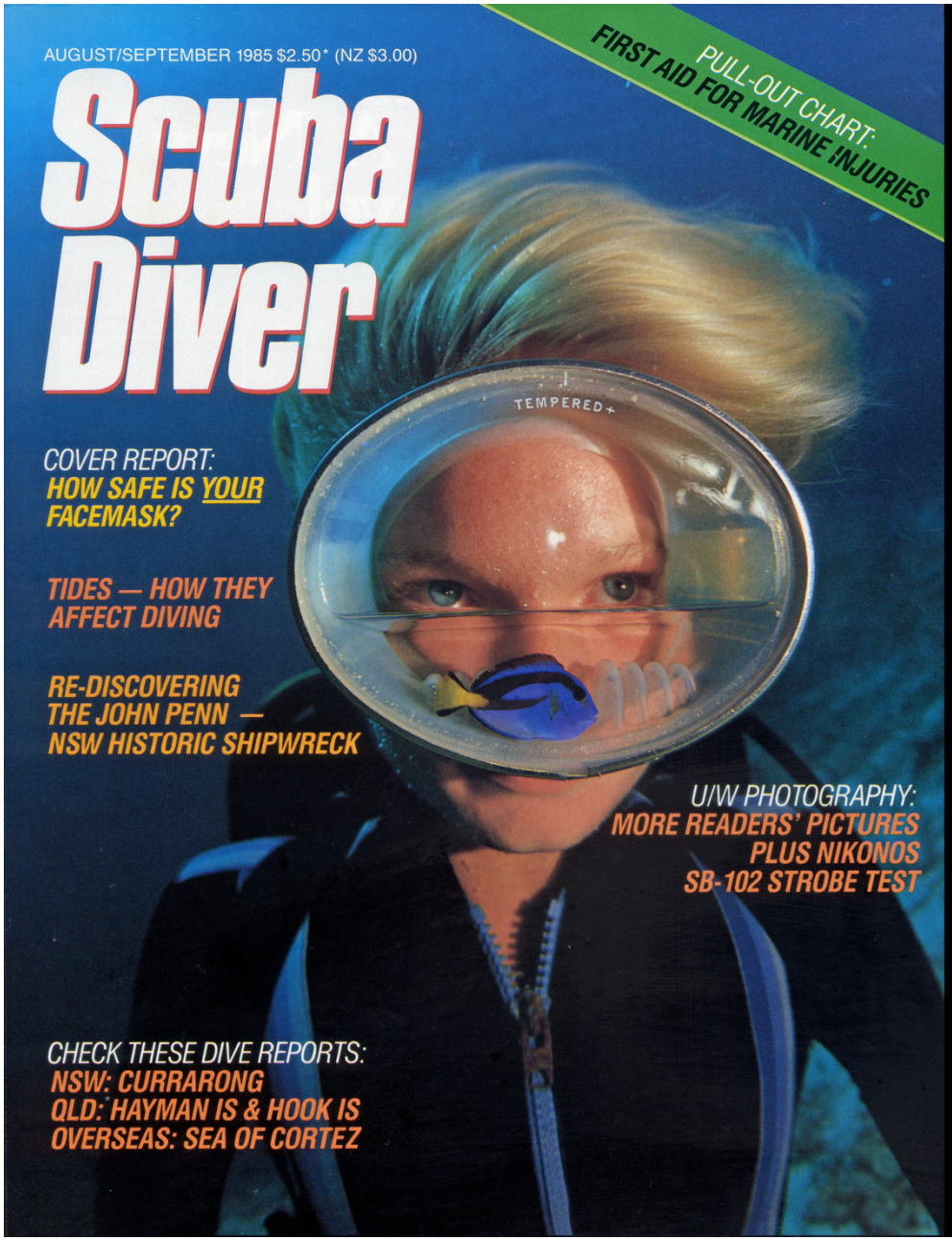
1969: Enter New York advertising scene and get opportunity to observe first-hand a few of the finest commercial photographers in the business.

1970: Make first of four trips to Grand Cayman, gradually accumulating all manner of top-quality (and top price) photo gear, to say nothing of some pretty decent photographs ... one published in Cayman Islands Tourist Guide.

From 1973: Presently diving several times a week around Northern Beaches headlands, usually finishing a roll each time ... numerous trips to Jervis Bay, also Coffs Harbour, Lord Howe Island, Heron Island (several photos used in brochure), and aboard CORALITA (including Marion Reef), Truk Lagoon, Ponape, Belize.

A word of explanation: Not only did *Scuba Diver* Magazine choose to run the photos in my first article for them in black & white, the reproductive quality was decidedly substandard. The lack of detail is especially evident in the shot below, which is essentially black & white. That it also appears in a landscape format is just plain ridiculous. And for the record, the opening shot (top, right) has been positioned upside down.

When I told the editor of my disappointment, he put it down to budgetary contraints and assured me it would never happen again. And it didn't. Over the next several years I contributed a fair few illustrated articles to *Scuba Diver*, and all photos appeared in full colour and of a quality as good as one could expect from such magazines in those days.



YOUR OWN POINT OF VIEW

by Gary Graf

One of the basic tenets they teach you in good photo courses is to *cover* your subject. The idea being if you take enough shots, you're bound to get one right. Not just the right mix of exposure, composition, lighting and impact, but the right reflection of your own personal point of view.

A useful exercise to demonstrate this 'point of view' aspect involves shooting an entire roll of someone you know well. As he or she simply stands there, you focus on the face and try to catch fleeting changes of expression, however subtle. Once you place the results together, it should be an easy matter to pick out the one shot that comes closest to showing how you feel about your subject. Chances are, it won't be the same one chosen by the subject's mother, best friend, boss or ex-teacher.

When you continually dive the same area, you tend to run across the same regular residents on each subventure. And after a while you start to feel you actually understand them a little, their habits, even their personalities.

However, most underwater photographers seem content with a shot or two of each, just to make sure the animal is included in their photo libraries. Then they move on to something new. Generally, the most these divers end up with is an uninspired record of the existence of some invertebrate or fish species.

But if you want something more; a well-considered photograph, with impact, that accurately expresses your point of view, you'll have to do a lot of looking; followed, in most cases, by a lot of clicking.

Naturally, fish and non-sedentary invertebrates make the most obvious subject choices. Creatures ranging in character from brazen damselfish who fearlessly swim up and challenge you to lethargic scorpionfish who are loathe to stir even when prodded. In between you can focus on a host of interesting animals with a variety of distinct personalities: curious maori wrasses, bemused giant cuttlefish, menacing morays, whimsical weedy sea dragons, frolicsome seals, elegant butterflyfish or, of course, the occasional happy-go-lucky white pointer.

This isn't to say you can't lend your interpretive powers to sedentary animals as well. You just have to be more inventive with something that doesn't move much, or look at you, or probably even know you're there. Or care. Incidentally, no one says you can't experiment and stage-manage if it suits you, or if it might get a laugh. After all, what you're trying to do is see things in an original way. (Just be careful and put everything back the way you found it.)

When you do select a subject to portray, either moving or just sitting there, choose one you find particularly attractive and/or intriguing, one you've already developed a point of view about. Then, don't be afraid to shoot, shoot, shoot.

After studying the initial results, you'll probably find yourself less than totally satisfied. So back you should go to take some more shots. Again, and again, if need be. For instance, that shot of mine entitled 'NASA Photo'. Once I had the idea of turning a firebrick sea star into some strange planet way out in black-hole country, it took quite a few dives with a whole bunch of different individual subjects to achieve the effect I wanted. I counted more than 50 rejects exposed over the course of a year or so on a long series of rolls of film.

But that's an extreme example. Normally, as you continue you'll eventually start taking fewer shots and wasting less film, because you'll have learned to interpret what you see. And you'll find yourself looking at *every* potential subject with an eye to handling it in a way that will most accurately express your own personal point of view.

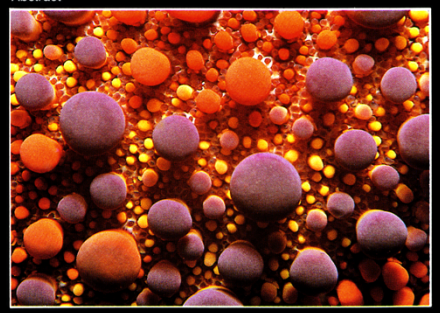
'Sea Star'

'Lie About'

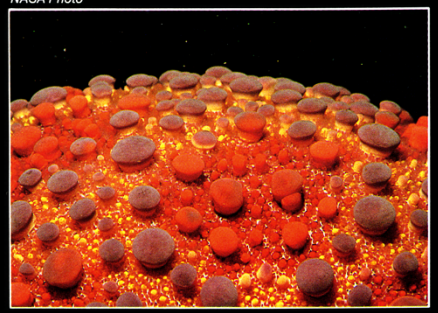
'Best Foot Forward'

'Perspective'

'Abstract'

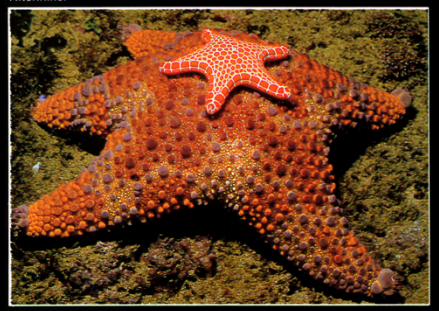


'NASA Photo'

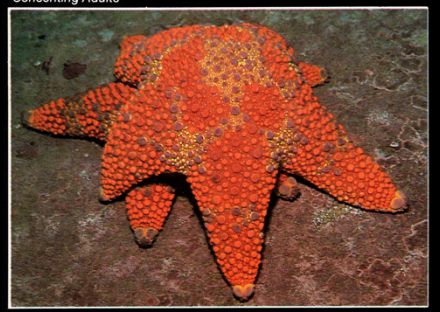


'Extruded Stomach'

'Hitchhiker'



'Consenting Adults'



NOTE: The subject I'm attempting to cover here is the Firebrick sea star *(Asterodiscides truncatus)*, a common denizen of the waters around Bangalley Head, south of Whale Beach, NSW. As you can see from the photos, these echinoderms come with both colour and design variations. It was these brilliant colours and unusual designs, along with the strange poses they adopt, that helped me form *my* own personal point of view. To me, the Firebrick looks like something of a clown.

'Kinky'

'Myopic Firebrick'