



Western Australia is blessed with an enormous range of underwater habitats. The tropical waters around Rowley Shoals Marine Park and islands further north protect some of the world's most pristine coral reefs. Warm and cool waters mix in the Ningaloo and Jurien Bay marine parks and allow an amazing overlap of marine creatures from both climates. The temperate, plankton-rich waters of our south-west and southern oceans support an enormous range of colourful, vibrant cool water plants and animals. Marine parks are essential to protect these delicate ecosystems, and the plants and animals themselves have evolved many complex and interesting ways to survive.

Corals and their cryptic collaborators

story and photos by Ann Storrie

Corals flourish in tropical and temperate waters and occur in every habitat along WA's coast. Hard, reef-building corals in our warmer waters contain single-celled algae in their tissues called zooxanthellae. These are the first of the cryptic collaborators in the complex world of corals. The algae, which obtain energy from sunlight, leach nutrients that the coral polyps can utilise. This enables the polyps to grow relatively quickly, and layer upon layer of corals build up to form the massive coral reefs of the tropics. Hard corals in the temperate zones don't form reefs, but some grow very large and may dominate areas of rocky reefs.

Soft corals and sea fans grow in all habitats and are often the most colourful creatures on coral and rocky reefs. Unlike hard corals, these animals don't have a solid skeleton. Instead,

small, calcareous structures (sclerites) in their tissues support the colony (along with water pressure). Sea fans are often called gorgonians, as a horn-like material called gorgonin gives them more rigidity. These impressive corals can grow very large, often jutting out from sheer walls of coral or rock.

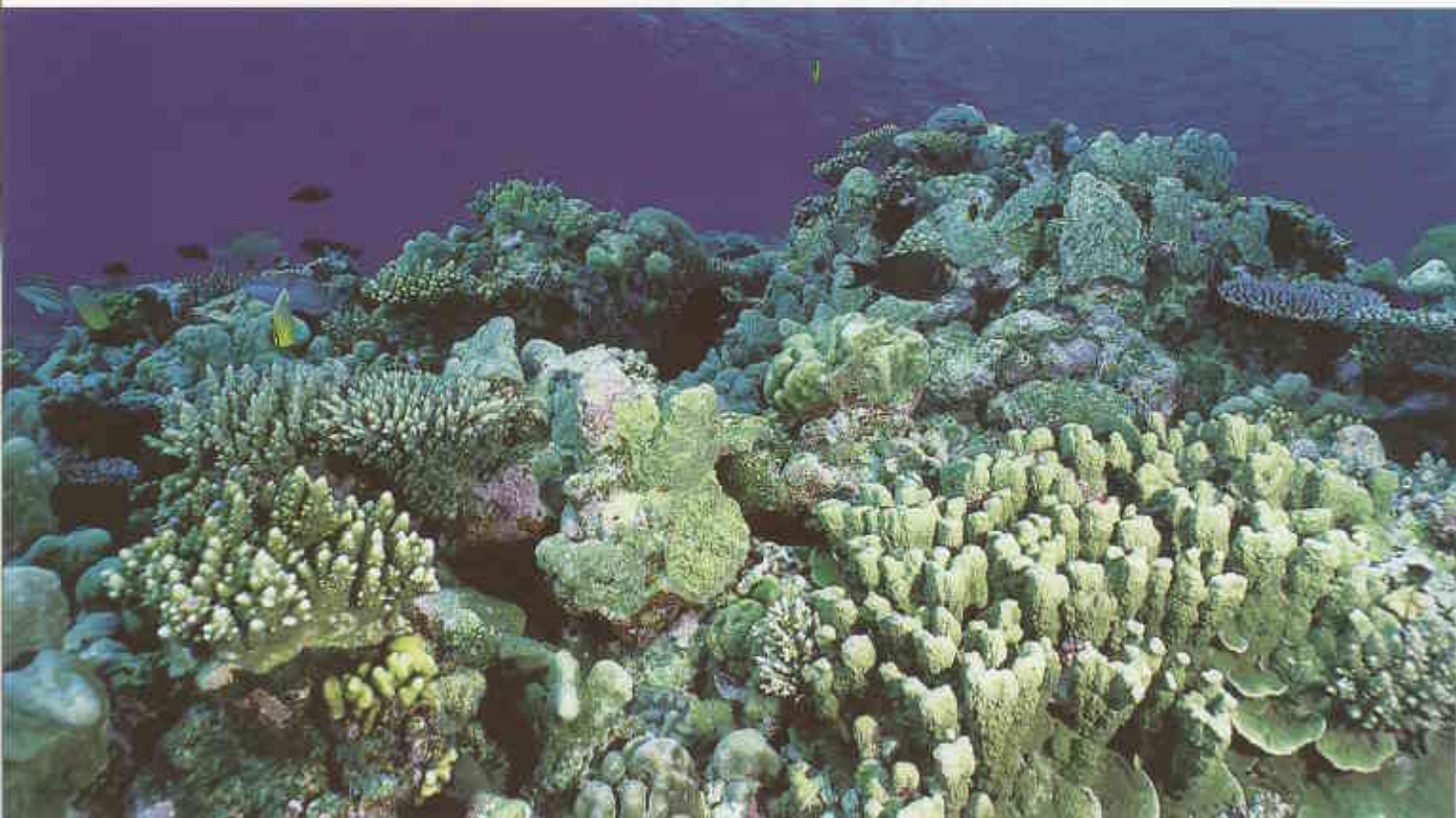
Corals belong to the animal group that also includes sea whips, sea pens, anemones, jellyfish and hydroids. All

have a similar cup-shaped body with tentacles around the rim and a central opening that functions as a mouth and anus. The tentacles contain stinging cells, each of which contains a harpoon-like structure lying coiled like a spring. When touched, the harpoon shoots out of the cell and injects venom into the prey. Most hard and soft corals form colonies made up of hundreds or thousands of individual animals—

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Turret corals (*Tubastrea* and *Dendrophyllia*), non reef-building hard corals that often line cave roofs.

Right Christmas tree worm.

Below A 'garden' of hard corals.



coral polyps—all of which contain many stinging cells. If you were a tiny creature only a few millimetres long, and were immune to the stinging cell venom, you could therefore live in relative safety among a large colony of coral polyps.

Hard corals, crabs and Christmas tree worms

Many species of hard corals host large numbers of tenants. Colonies of Christmas tree worms (*Spirobranchus giganteus*), for example, inhabit large coral outcrops, especially the lumpy massive corals (*Porites* species) of the tropics. Anyone visiting Rowley Shoals Marine Park will be mesmerised by the fantastic, colourful array of worm tentacles protruding from the coral. Young worms settle on the coral and secrete a tube that kills the underlying polyps. The corals don't appear to be compromised by the worm's presence, for new coral growth quickly surrounds the tube. The worm continues to secrete additional tube material to keep pace with the coral's growth. The worm breathes, eats and excretes through the top of its tube and its feathery tentacles extend to trap plankton. The tentacles can be withdrawn in a split second if disturbed and a little cap, or operculum, seals the top of the tube for protection.

Several other species of worms, coral barnacles and molluscs bore into coral bombies. The worm snail (*Serpulorbis grandis*)—so called because divers often mistake it for a worm—cements its irregularly-coiled, tube-like shell to the hard surface. This mollusc has a beautifully mottled body. It secretes long, sticky strands of mucous to trap plankton, which are then pulled up by the snail and eaten, along with the plankton. Some animals, such as tiny coral hermit crabs and small blennies, take up residence in the empty tubes left when these animals die.

Clams and scallops also inhabit hard corals. A brightly coloured scallop, *Pedum spondyloideum*, lives encased in hard coral with its mantle visible. It has hair-like strands that are sensitive to touch and rows of red eyespots that perceive changes in light intensity, causing the valves to snap shut at the slightest movement or shadow. Coral

clams also have sense organs on the edges of their colourful mantles. No two clams are exactly the same colour.

Cracks and crevices in, or branches of, hard corals provide homes for mobile animals, such as crinoids (feather stars), brittle stars, shrimps and crabs. Many *Pocillopora* corals with upright branches shelter a pair of little coral crabs, or trapeze crabs (*Trapezia wardi*), the male being the smaller of the two. This crab is unmistakable, with red spots on a white body.

Many blennies and gobies—little fish with attitude—perch on hard coral outcrops to gain a good vantage point from which to pounce on small crustaceans and other prey. Some shelter in crevices, empty mollusc shells

Top Coral crab.

Above False Tasmanian blenny.

or worm tubes in the coral. One group, the sabretooth blennies, are often seen poking their heads out of disused worm tubes. These blennies have two large, curved, canine teeth in the front of their lower jaws used for defence and sometimes to sever flesh from the fins of passing fish for food. Luckily, sabretooth blennies are only a few centimetres long!

Solitary corals, such as mushroom corals, are single coral polyps that grow relatively large (over 20 centimetres) and usually have an oval, or round disc-like





Above A shrimp (*Periclimenes holthuisi*) on bubble coral.



Left Mushroom coral pipefish are often mistaken for eels.

Below left Brittle stars take refuge in coral polyps during the day and extend their tentacles at night to feed.



skeleton. One such coral, *Heliopora actiniformis*, can host a number of tiny shrimps, and an unusual fish. At first glance, the long, white, slender, worm-like fish looks like an eel. It is actually the mushroom coral pipefish (*Siakunichthys nigrolineatus*). Several of these fish may be camouflaged among the coral's long tentacles. An unusual shrimp, *Periclimenes kororensis*, with a white spiny head and eyes that blend well with the white tips of the coral's tentacles, is also found in this coral. Watch out for its extremely long, transparent legs, which are often mistakenly chopped off in photographs. Many other *Periclimenes* shrimps are also found in this coral and are equally hard to see.

Bubble corals are hard corals with clusters of large, inflated, grape-like vesicles that are extended during the day. The vesicles contain symbiotic algae that take advantage of the light. At night, the vesicles deflate and the polyps and tentacles are extended to feed on plankton. Both the vesicles and

Right *Dendronephthya* soft corals are havens for many types of shrimps and crabs, such as the colourful candy crab.

tentacles can deliver a nasty sting to divers, yet several commensal shrimps and crabs live on them. The orang-utan spider crab (*Archaeus japonicus*) has long, hairy legs upon which it can attach particles for camouflage. It particularly likes bubble corals, but is also found in several species of soft corals. The very cute, transparent little bubble anemone shrimp (*Vir philippinensis*) lives exclusively in bubble corals (*Plerogyra sinuosa*) throughout the Indo-Pacific. A relatively recent discovery was the invisible shrimp (*Plerogyra singosa*), which has tiny, exquisite, pinpoint purple dots all over its legs and tail. Both of these shrimps share their bubble world with other *Peridimenes* shrimps, especially *P. holthuisi*, another almost-transparent shrimp with purple spots.

The vesicles of bubble coral attract acoel flatworms that are like small discs, often coloured green due to algae in the tissues. It is thought that the worms graze on minute crustaceans, such as copepods, and detritus that collect in the mucous on the surface of their vesicles. They add attractive patterns to the bubble coral.

Tubastrea and *Dendrophyllia* corals form clusters of tubular polyps that make a flamboyant show of yellow tentacles at night. Only their pink tubes are visible during the day, hanging under ledges or on cave walls. The two types of corals are very similar, only distinguishable by their internal skeletal structure. These corals may host acoel flatworms, a nudibranch, *Phestilla melanobranchia*, and wentletrap snails (*Epitonium bilineatum*). Both the nudibranch and the snail feed on the polyps.

Soft coral shelters

Soft corals are also known as octocorals, as each polyp has eight feathery tentacles around its mouth. Octocorals include soft corals, sea fans, sea whips, blue corals, black corals, leather corals and sea pens. They are



as colourful as they are diverse, as are the creatures that live on them. Some of the most colourful are in the genus *Dendronephthya*, which has more than 250 described species. Also known as tree corals, they are usually profusely branched and their sclerites are often visible within the tissues. The sclerites are spindle shaped and give the coral its spiky look and feel, plus its brilliant colours of red, purple, orange, yellow, pink or white. They are a haven for small creatures.

The dendronephthya crab or candy crab (*Hoplophrys oatesii*), a small, superbly camouflaged crab, lives exclusively on this coral. Large, sharp spines on its body and legs look exactly like the polyps, and the colourful patterns on its translucent body perfectly mimic the

colour of the spicules. Tiny porcelain crabs also found on this coral are yet to be named. Less than 10 millimetres long, they are beautifully camouflaged with red to violet patterns on their white bodies. They move quickly, zooming around their host if disturbed. To photograph one often involves more luck than skill—the photographer may not even have known they were there!

Many spider crabs, coral crabs, shrimps, molluscs and echinoderms live on all species of soft corals. A beautiful, soft, white telesto coral that grows profusely on the piles of the Busselton Jetty (described in a book entitled *Beneath Busselton Jetty*) is home to decorator spider crabs that plant polyps on their bodies and legs. They are usually only seen at night when



you suddenly spot a clump of polyps 'walking' across the timber. The tiny telesto nudibranch (*Titotia* sp.) is thought to feed exclusively on this coral. It has the ultimate camouflage with rows of feathery cerata, or protrusions over its body, that look similar to the coral polyps. The only flaw is that the number of 'tentacles' per cerata differs. The nudibranch has not yet learnt to count to eight!

Small cowries and allied cowries are amazing inhabitants of soft corals of the tropics. The colours and patterns of the shells are exquisite, and the mantle may be even closer in colour to the coral on which it lives. The mantle of the

mollusc is an outgrowth from the body wall that secretes and repairs the shell. It can completely cover the shell and may have a textured mantle that mimics the appearance of the coral polyps, adding to its incredible camouflage.

Sometimes, large numbers of brittle stars live on soft corals. Related to sea stars, brittle stars have five, very long, often fragile arms that can wrap around the branches of soft corals. Unlike most of their relatives, which hide under corals and rocks during the day, brittle stars rely on camouflage and a tight grip on the soft corals for protection. Brittle stars move around in search of prey at night. Basket stars may also wrap



themselves around soft corals, using the corals as a vantage point from which to extend their network of branched arms to trap passing plankton.

Sea fan cities and pygmies in polyps

Sea fans or gorgonians are gorgeous corals. Their breathtaking colours and sizes, in both tropical and temperate waters, never fail to attract divers, yet the myriad of small animal life within their branches goes largely unnoticed. Hundreds of species of fans can house tiny creatures from shrimps to sea-whip gobies to spindle cowries. Most fans grow in a flat plane, but are often very densely branched, with many branchlets fusing to form an intricate net-like structure. Finding tiny inhabitants among these enormous nets can be like looking for the proverbial needle in a haystack. Night is the best time to view these cryptic creatures, when the torch beam concentrates the search and the animals are actively looking for food.

Skeleton shrimps are among the smallest inhabitants of sea fans. They look like tiny strands of rubbish or



Above left The tiny telesto nudibranch is well camouflaged against telesto soft coral.

Above Pygmy seahorse attached to gorgonian coral.

Left A beautifully patterned worm snail sets a mucous net used to trap plankton.



Above Soft corals and sea fans at the Rowley Shoals Marine Park.

sticks caught among the branches. These shrimps are actually amphipods with large pincers or claws on their thoracic limbs. They are the stick insects of the ocean. Other small amphipods, such as ladybug amphipods (*Cypridea* species), sometimes swarm over the surface of soft corals to feed on detritus among the polyps. They are approximately three millimetres long, but with striking orange to red spots and black stripes.

The gorgonian crab (*Xenocaridius conicus*)—a long, triangular-bodied spider crab—blends in well with its environment, despite a distinctive white stripe down the centre of its carapace. Many other spider crabs and shrimps inhabit sea fans and are usually seen at night when they hunt for food.

Ovulids are related to cowries, but are in a family whose members feed on coral polyps. They are also known as allied cowries, egg cowries or spindle cowries. More than 200 species have been described. Spindle cowries are long and thin and lie flat along the branches of sea fans. Many have papillae ornamenting their mantles that mimic the polyps of their host, while the colours of the shell and mantle blend in perfectly. They are often the hardest animals to find among the gorgonian network.

Many fish live around and on the

Right A brain coral at the Rowley Shoals.

sea fans. Juvenile fish, cardinalfish and damselfish swim among the network, while gobies and other small fish live on the branches. The amazing pygmy seahorses were only discovered in recent years. One species, *Hippocampus bargibanti*, grows to two centimetres and is usually found on *Muricea* gorgonians. They have two common colour variations—pink and yellow—depending on the colour of the sea fan they inhabit. Coloured nodules all over the bodies of these exquisite little fish look exactly like the withdrawn polyps of their host. They can live in areas of strong currents, tightly gripping the fan's branches while they feed on passing plankton. They occur in Indonesia, Papua New Guinea and northern Australia.

These amazing associations between host animals and their inhabitants occur everywhere you turn underwater. Understanding some of the complexity of life on our planet aids in appreciating the necessity to conserve our fragile environment.



Ann Storrle, a freelance writer and photographer, has coauthored the full colour books *The Turquoise Coast*, *The Marine Life of Ningaloo Marine Park and Coral Bay*, *Wonders of Western Waters* and *Beneath Busselton Jetty*. She is a regular contributor to *LANDSCOPE* and can be contacted on (08) 9385 9355.

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