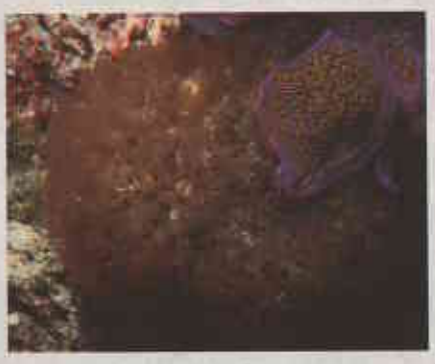
SEAWEEDS...

the good,



the bad &

the ugly?

SEAWEED! Who can explain its infinite variety?

Mention seaweeds to most people and the response is usually unfavourable. Unfortunately our exposure to seaweeds is usually confined to times when it lies rotting on the beach, or slithers around our ankles in the shallows, conjuring up thoughts of weird creatures from the deep.

But the term seaweeds (or algae, to be more precise) encompasses a large number of species with diverse forms and functions. Some species benefit humans, while others are harmful. Some are visually appealing, others downright unattractive. Most of the positive attributes of seaweeds are unknown to most Australians, who only notice them when they are causing problems.

Many seaweeds are edible, and in countries such as Japan and the Philippines they are used in a number of dishes. Several of our local seaweeds (including *Porphyra*, *Caulerpa*, *Gracilaria* and *Ulva*) would be delicacies in most Asian countries.

Certain species of red and brown algae are also harvested for extracts from their cell walls. These extracts, known as hydrocolloids, are used extensively for their emulsifying or gelling properties. Hundreds of every day products contain seaweed extracts, including ice-cream, chocolate milk, cosmetics, paints, explosives, the moulding for dental impressions, pharmaceutical tablets and welding rods! Many people would have eaten or used a product containing a seaweed extract without being aware of it.

STORY AND PHOTOS BY JOHN HUISMAN

They're edible, but the wrong ones can kill. They're useful to medical science, yet in profusion they're a pain. Many types can be beautiful, but others are an affront to the nose and an offence to the eye.

One of these hydrocolloids, agar, is also used extensively in microbiology as an inert agent for solidifying culture media. An alternative to agar has never been found, so it could be said that the modern scientific fields of microbiology, biotechnology and most medical research would not exist without algal extracts. Genetic engineering relies on a component of agar, agarose, for its DNA separation techniques. Several Western Australian seaweeds are potential hydrocolloid producers, but as yet none are being farmed. The early colonists probably used seaweeds more than today's Western Australians. The settlers used to collect "jelly weed" (*Eucheuma speciosum*) from the beach, dry it, grind it up and make jelly out of it.

Of course algae can cause problems, usually when human interference changes the environment in some way. When nutrients derived from agricultural fertilisers enter the system through run-off from farmland, the growth of algae can transform a picturesque area into a stinking quagmire. The periodic blooms of the green algae *Cladophora* and *Ulva*, or the blue-green alga *Nodularia*, turn parts of the Peel-Harvey estuary into a green soup that eventually decays and produces a nauseating stench (*LANDSCOPE*, Spring 1989).

Some algae can cause human illness and death. Blooms of some single-celled algae, particularly certain species of dinoflagellates, can cause major problems. These blooms are commonly called "red tides" (although they can also be yellow or brown), because they discolour the water with around 20 million cells per litre. The dinoflagellates produce minute amounts of a potent neurotoxin called saxitoxin, which is 100 000 times more powerful than cocaine. In itself this toxin does little damage; however, shellfish that eat the dinoflagellates can concentrate the toxin to lethal levels.

Human consumption of the shellfish leads to respiratory and cardiovascular

Many red algae, such as this *Liagora*, are calcified, giving them a chalky appearance.▲

Species of the red algal genus *Champia* are often iridescent underwater.◀

Opposite page:
Some red algae, such as *Sarcomenia delesserioides*, do not appear red at all (far left)!
Species of *Gloioderma* are common in Western Australia (top).
Coelarthrum cliftonii is a very rare red alga previously thought unique to Western Australia, but has recently been recorded from South Africa (centre).
Scinaia tsingalensis, originally described from China, has since been found to occur all around Australia (bottom).

This specimen, from Rottnest Island, appears to be an unusual variety of the common *Caulerpa geminata*.▲

The extremely slippery *Trichogloea requienii* is commonly found on the Great Barrier Reef. This is the first record from Western Australia.▶

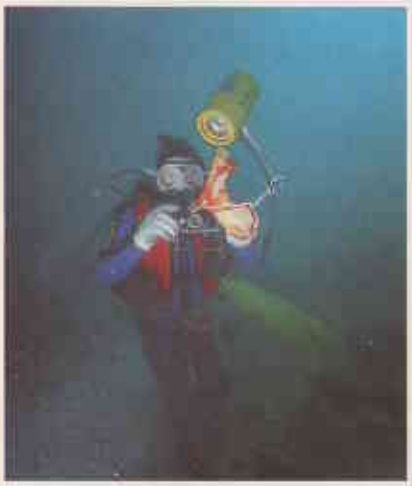
Asparagopsis taxiformis occurs in many parts of the world. This specimen was photographed at the Abrolhos Islands.▼

arrest within 12 hours. If red tides occur around shellfish farms they must be closed until at least four weeks after the bloom has subsided, to allow the toxin to dissipate from the shellfish flesh. Toxic phytoplankton can also cause wholesale fish mortality, as well as several other human illnesses. Needless to say, the costs of blooms can run to millions of dollars. A red tide in Florida in 1971 caused an estimated loss of US $20 million to the tourist industry alone. Total losses are difficult to calculate, but include tourism, real estate sales, export markets, hospitalisation of victims, shellfish monitoring programs, clean-up activities, and unharvested resources. A severe bloom of *Chrysochromulina polylepis* in northern Europe in 1988 caused widespread mortality of fish, invertebrates, and even other algae. The economic loss due to this bloom is not yet known, but must amount to tens of millions of dollars.

Toxic phytoplankton appear to be spreading worldwide, and the ballast water of ships has been implicated in the carrying of water from infected areas. Once transported, they produce a bloom which is likely to be a periodic event. The dinoflagellates produce resting cysts which can survive for long periods in the sediment, arising again when conditions are right. WA has not yet experienced toxic algal blooms but, given current shipping practices, it only seems a matter of time. Red tides are now common in Tasmania and New South Wales and have recently started in Victoria.

The vast majority of seaweeds, however, are totally innocuous. Most are rarely noticed, even by divers, who generally pay more attention to fish and corals. Yet seaweeds display an incredible diversity of colour and form. Unlike land plants, most do not need to support themselves or transport nutrients from the soil - the surrounding water takes care of both functions. As a result, the seaweeds have responded with an array of forms that can only keep us guessing about the evolutionary pressures that produced them. They can be as colourful and unusual as anything found on land, and will certainly provide a novel experience to any plant watchers who dare to get their feet wet!◘

John Huisman is an expert in seaweed taxonomy from Murdoch University. He helped to identify and monitor a recent toxic phytoplankton bloom in Victoria and is presently working towards a seaweed flora for the South-West of WA.



Each weekend, hundreds of novice scuba divers take the plunge. Get the most out of your diving on page 10.

A very different landscape replaces what was once a thriving timber industry. Rediscover Cannington in the 1850s. See page 42.

Seaweed! Delicate and beautiful, or slimy and smelly? Decide for yourself on page 20.

LANDSCOPE

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How do birds fly? How do some reach speeds of over 80 kilometres per hour? Learn about avian aerodynamics on page 28.

Western Australia grows some rare and stunning native spider orchids. Their alluring nature will delight the reader on page 34.

FEATURES

REGULARS

COVER

*Back in the early 1970s, Western Australia proclaimed the numbat (*Myrmecobius fasciatus*) as its State emblem which may have saved its life. With the help of scientists and new techniques, these delightful creatures are now fighting back against extinction. See page 15.*

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