

Where the Shore Meets the Sea

by Dr Barry Wilson

Two vastly different ecosystems meet at the intertidal zone of any seashore. The environment of this zone is sometimes exposed to sunshine and drying winds and sometimes immersed in salt water. Creatures living there must be able to tolerate both conditions, or be only temporary invaders at times when the environment suits them.

PREDATORY and carnivorous fish from the sea invade the intertidal zone at high tide. Predatory, or simply curious, *Homo sapiens* can invade it from the land at low tide and enjoy one of the most fascinating places on the earth's surface.

Take the intertidal sand-flats of Shark Bay. In the early morning when the tide is out, the sea air is cool and crisp. In the periods of low spring tides, wide yellow sand-flats, gently rippled by retreating waves, are left bare as far out as the seagrass meadows and you can walk there with dry feet.

The seemingly inanimate sand-flat may contain vast quantities of living creatures. On a tidal sand-flat at the tip of Peron Peninsula one early morning in December, orange-red cliffs behind us, my friends and I came across a colony of the stromb shell (*Strombus campbelli*) during a mass spawning orgy. These odd little molluscs have two eyes on long, flexible stalks, one longer than the other. The edge of the shell lip has a notch in it so that the eye-stalks can be held aloft while the animal is face down in the sand. One wonders what strange perceptions of the air-world they must receive through these two visual organs which can see in two directions at once.

Mating pairs were scattered all over the sand, the male strombs with enormous muscular penises on the right side of their heads. Some time after mating, a few days most likely, the females lay their egg-masses: long strings of jelly, wound tightly back and forth into oblong blobs three or four centimetres long, left partly buried in the wet sand.

There are tens of thousands of tiny eggs embedded in each jelly string. They become multi-cellular and grow, turn into larvae within a few days, and eventually escape from the jelly and swim away to join the ocean plankton. Later, when they have grown a shell, they find another sand-flat and settle back to the bottom. How they find a suitable habitat after drifting about in the ocean for so long is unknown. How they find a mate is also a mystery, but that, at least, is probably a matter of chemistry.

Adult strombs on the sand-flats feed on the minute particles of organic matter derived from the seagrass meadows further out on the edge of the flats. They gather it up with stout snouts which function like vacuum cleaners. They crawl about in their hundreds, leaving jerky tracks where they dragged their shells across the sand.



Two local children, David and Richard Pollock, explore the Shark Bay sand-flats at low tide.
Photo - Barry Wilson ▲▲

Stromb shells (*Strombus campbelli*) with an egg mass.
Photo - Barry Wilson ▲

The proposed Shark Bay Marine Park and Peron National Park will protect the shoreline habitats of Peron Peninsula.
Photo - Jiri Lochman ▼

Previous page. Photo - Patrick Baker





The two snorkel-like siphons of this burrowing bivalve channel oxygen and food-bearing water through the gills.

Photo - Barry Wilson ▲

Spiny heart urchins (*Echinocardium* sp.) can give curious naturalists a painful surprise.

Photo - Barry Wilson ◀



The slender, pointed creeper shells (*Cerithium vertagus*) also crawl about on the sand gathering particles of decayed matter for food, but they protect themselves from drying out in the air by burrowing under the surface. As they move about they leave thick tracks that look as though someone has aimlessly drawn lines in the sand.

Tracks in the sand at low tide are fascinating. After a while you can recognise which animal has made them even though the maker is buried and invisible. Slender olive shells (*Oliva australis*), which prey on worms, crawl in straight or curved lines as if they have some direction in life, while the globose sand snails, (*Polinices conicus*) seem utterly confused about their mission and their trails criss-cross in a seemingly aimless tangle. These voracious gastropods eat bivalves, which they kill by drilling small holes in the shell. Like everywhere else, sand-flats are a world of struggle and savagery.

Another predatory mollusc on the Shark Bay flats is the volute (*Cymbiola*

nivosa). These creatures have a large patterned and coloured body and a beautiful shell. They crawl about on the surface of the sand when hunting but otherwise lie buried below the surface. At low tide they can be completely invisible, but begin to pop up just before the tide turns to cover the flats. First lumps and then tell-tale cracks appear.

But the inexperienced naturalist can make a terrible mistake if he or she digs into these lumps expecting to find a volute. The spiny heart-urchin, (*Echinocardium* sp.) makes a very similar lump as it emerges from the sand, and prying fingers can get a painful surprise.

Bivalves are perhaps the most abundant burrowing molluscs on the Shark Bay sand-flats. There are many kinds, some present in vast numbers. Walking over the flat you may hardly be aware of their presence, as they close shop at low tide and most show no visible sign on the surface of the sand. But when the tidal waters cover the flats the bivalves move close to the surface, spread their

valves apart a little and extend their siphon tubes. One siphon sucks water into the body cavity and through the gills; the other is the exhaust chimney through which water and wastes are ejected.

Most bivalves feed on plankton, bacteria or organic particles floating in the water. The gills extract oxygen and minute food particles from the water as it passes through, turning ocean energy into flesh and blood.

While the molluscs are the most obvious creatures of the sand-flat, micro-organisms, minute worms, crustaceans and bacteria are also present in uncountable billions. The sand is alive!

This, of course, is the reason for the predatory invaders. We were not the only air-breathers present during our low-tide venture onto the Peron flats. Several kinds of sea-birds were also there for the pickings. They pecked about for their preferred prey, leaving tell-tale marks on the sand - evidence of the tastes and behaviour peculiar to each bird.



And I must mention those vicious clowns of the shoreline, the ghost crabs (*Ocypode convexa*). In the midday heat these ungainly animals live in deep burrows on the upper part of the beach. They block the entrance with sand and seaweed to prevent themselves drying out. At night they come out and scuttle about, clicking and clacking, all 10 legs more or less working in synchrony, and scavenge far up into the dunes. Many a camper in these parts has woken in terror at the strange noises made by ghost crabs. On the early morning low tide the crabs scavenge out onto the sand-flats, sometimes dragging edible debris home to their burrows.

When the tide turns and the sea again floods over the flats, ocean invaders come to harvest the rich resources of the intertidal zone. We watched schools of mullet and whiting swimming along the edge of the advancing water, snuffling in the sand for their breakfast.

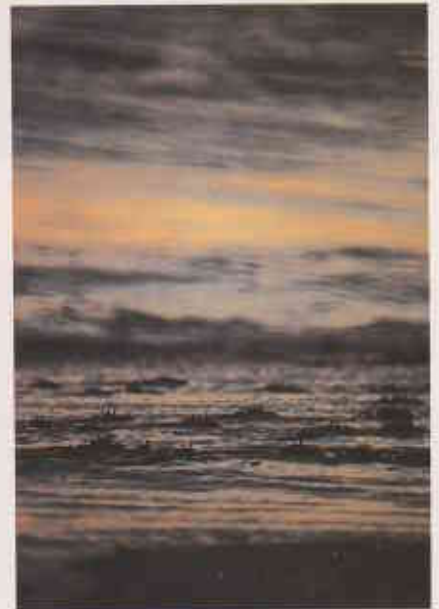
Later, with masks and snorkels, we swam over the flats where we had walked, and were thrilled by a school of great trevally, 20 and 30 pounders, which had rushed in to see what was new. Perhaps the greatest thrill while we snorkelled was to meet a two-metre-long shovel-nosed shark quietly gliding into the



shallows. These creatures use their long noses to shovel in the sand and dig out the bivalves, which they crush with thick bony jaw-plates. At low tide, impressions of these monstrous predators' bodies, where they have lain in the sand making their meal, can be seen on the flats.

The fish, sharks and other sea invaders have the best of the intertidal flats. Curious human visitors have only an hour or so to explore at low tide, before the sea returns and closes another daily chapter in the book of natural history. □

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Bar-tailed Godwits are migratory waders which feed on the tiny sand-flat creatures at low tide.

Photo - Michael Morcombe ▲▲

The naturalist retreats from the advancing tide.

Photo - Barry Wilson ◀

Ghost crabs scuttle to safety in the rising water.

Photo - Patrick Baker ▲

LANDSCOPE

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Rock-wallabies threw down the gauntlet to scientists trying to trap them for research. Who ended up winning the catch-me-if-you-can contest? See page 35.



Scientists will use modern technology to restore two rare and endangered mammals to an area in the Gibson Desert from which they have become extinct. See page 10.



Shells, tiny crabs and sundry other creatures are sure to please the curious naturalist who invades the intertidal zone at low tide. Explore the place where the shore meets the sea on page 23.



Waterbirds flock to the Vasse-Wonnerup wetlands in their tens of thousands, some travelling over 10 000 kilometres from summer breedings grounds in northern China and Siberia. Turn to page 17.



It's the burning question! Is prescribed burning in spring or autumn better for the jarrah forest? Or is there another alternative? See page 28.

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The designs of desert artist Benny Tjapaltjarri show events associated with the Pakuru or golden bandicoot dreaming in the Gibson Desert. The three central roundels depict rockholes and the others represent hills. The background dots show the vegetation of the area.



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