THE GINGIN CHALK

The Gingin Chalk is of Cretaceous age, like its cousin the English Chalk which forms the White Cliffs of Dover. It is basically a soft crumbly limestone, made up of countless calcareous microfossils and (usually) larger fossil material. If you carefully break up a sample of chalk with your fingers in water, and pour off the fine-grained material which forms the bulk of the rock, you will usually see small shells of foraminifera even if there are no other apparent fossils in the rock. These can be used in exactly the same way as large fossils like ammonites or crinoids to date the rock, since they evolve in time they same way and can spread around the world in the oceans so that, for example, we can date rocks in Western Australia by comparison with the fossil forams in rocks from France, and vice versa! Foraminifera can also be used as indicators of things like the depth of the water, water temperatures, the latitude of the continent at the time of deposition, the composition of the atmosphere and so on.

The fine-grained material is also fossiliferous, on a really micro scale. It is largely composed of tiny plates called coccoliths, which you need an electron microscope to see properly: they are so tiny we call them "nannofossils". Despite their small size, they can also be used to date rocks, and varieties can be distinguished using a good polarising microscope. We simply smear some of the chalky water on to the slide and let it dry. Coccoliths are the remains of calcareous algae, which probably formed the food of small crustaceans and other animals: after passing through the animal's gut the plates were released in the droppings and accumulated on the sea floor.

The Gingin Chalk is of Late Cretaceous age and probably formed about 85 to 80 million years ago, when a shallow warm sea covered much of the Perth Basin up to the Darling Scarp which formed the shoreline. There are similar rocks elsewhere in WA: for example, just outside Kalbarri is Meanarra Hill on which you will see the same kinds of fossils as at Gingin. Sometimes the Chalk is a mass of burrows of various creatures such as worms and sea urchins, giving it a mottled appearance.

One of the main kinds of fossil fragments in the Chalk is part of the shell of a large **bivalve called *Inoceramus.*** There is a large, complete, example in the Geology Museum. The shell can be quite thick and has a fibrous cross-section, similar to a piece of wood. Other fossils to look out for:

- **Sponges** (conical and vase-shaped, or knobby)
- **Corals** (claw-shaped, single corallite)
- **Brachiopods** (may have smooth or ribbed shells)
- **Bivalves** (oysters, scallops etc.)
- **Echinoids** (sea urchins, ribbed spines or polygonal plates)
- **Gastropods** (snails, rare, very small, don't confuse with coiled worms)
- **Ammonites** (separate chambers have very frilly sutures or walls, whole ones are ribbed outside, can be large)
- **Worms** (coiled, look like snails)
- **Crustaceans** (barnacles, triangular ribbed plates)
- **Crinoids** (single polygonal plates common, do not find stems)

THE MOLECAP GREENSAND

Making up the largest part of the outcrop in Molecap Quarry at Gingin is the Molecap Greensand, the unit immediately below the Chalk. It is a sandstone, but unlike the usual sandstones we see, the grains are not all rounded bits of the mineral quartz but are mostly pellets of a soft, dark green mineral called glauconite which has a complicated formula but contains much potassium and iron. It generally forms off-shore in the sediment, and is mixed with detrital quartz sand. When it weathers, the glauconite may break down to give pellets of brown iron oxides, so that the Poison Hill Greensand, above the Chalk, is often actually brown!

There are fewer fossils in this deposit, either because they have not been preserved or because it was not a life-rich environment. Two main types which are present, however, are **shark teeth** and **reptile bones**!