



▲ This site, near Duntroon in the Waitaki valley, has been the source of several fossil finds.

◀ Ewan Fordyce, left, and Masters student Craig Jones chiselling out a slab of limestone rock containing fossil penguin bones near Duntroon in the Waitaki valley. The fossils, too delicate to be isolated and removed on site, will be brought back to the university for extraction from the slab.

In the field his tools of trade include a compressed-air rock drill and saw, hammers, wedges and a sledge fashioned from an old car bonnet. Simple technology, he says – stone-age some of it.

The commonest bones found are the heaviest and more resistant single limb elements – humerus, femur and tarsometatarsus.

What Dr Fordyce longs to discover is more complete skeletons in the ancient penguin burial grounds of Otago and Canterbury.

“We will make the most progress in charting the evolution of penguins from finding bones together, articulated”, he says. “But you know, enough material has been collected in recent years to warrant a major review, and I believe that whoever undertakes it could well produce a quantum leap in our understanding of early penguin life and relationships with living species.”

“As things stand, we haven’t got a very clear picture of how the fossil penguins and the extant species relate.”

However, the limestone rocks are continually offering up new specimens, and from just about every field trip he returns with something new to analyse, to turn over in his hand and apply imaginary flesh to. ♦

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Scientists agree that penguins once flew, their wings evolving into flippers for underwater “flight”. But from which family of birds did penguins evolve? It is generally thought that their ancestors were among the tube-noses or petrels (Procellariiformes). The diving petrels, smallish birds breeding in burrows on many southern islands, may be the penguins’ closest flying relatives. Links with the grebes and loons (Gaviiformes) have also been made by some researchers.

Most New Zealand penguin fossils are from the eastern side of the South Island, in particular the Waitaki valley, which is rich in marine sedimentary deposits uplifted from the sea. This area offers fairly easy pickings for a palaeontologist interested in penguins. Most new localities for late Oligocene penguins are located 30 to 70 kilometres inland.

In ancient times, sea covered the area and as the penguins died their carcasses were imbedded in marine sediments that slowly turned to rock. Much later the

rocks were uplifted and eroded and the fossil bones exposed.

Often the bones are found exposed on weathered surfaces, although it takes a trained eye to distinguish between a single bone and a blemish in the rock.

The occurrence of such isolated bones may represent individuals whose carcasses were broken up in shallow active waters near shore.

Some fossil penguins are more complete. Because its remains were relatively intact, the Waihao bird, from an area just north of the Waitaki Valley, is thought to have been buried in relatively still waters some distance from land.

To Dr Fordyce, fossils are rather more than lifeless old bones embedded in rock. From handling the bones and inspecting every curve and cavity, he tries to imagine what the animal looked like, how it swam through the water and in what circumstances it might have died. “After all, the creature grew out of a fertilised egg and was once a living, breathing individual. I mean, it is possible to get some clay and model flesh back on the bones.”