1-1-1961

Fossils and farmers. 2. The ice age

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What did the giant Australian marsupials of the "Ice Age" look like? Fossil remains found by farmers could help reconstruct them, as well as giving some idea of conditions on the Australian continent at that time, says D. Merrilees, B.Sc., acting Curator of Palaeontology at the West Australian Museum.

A previous article entitled "Fossils and Farmers" was in effect a plea to farmers to search for the remains of Ice Age or Pleistocene marsupials. The purpose of the present article is to convey a thumbnail sketch of Australia in Pleistocene time in order to suggest why and where such marsupial fossils may be found.

One must not imagine the "Ice Age" as a great mass of ice covering practically the whole land surface.

In northern Eurasia and the northern part of North America, ice sheets and permanently frozen ground seem to have been more extensive, and the Antarctic ice cap may have been thicker and more extensive than it is now.

In high mountains throughout the world, the snow line was much lower, valley glaciers were much bigger and survived lower down their valleys than the equivalent glaciers do now, and some may have joined up to form relatively small ice caps.

But there was plenty of room left for plants and animals to flourish, and one of the perennially interesting and controversial facets of Ice Age history is that this was the time when man appears to have become man in the sense of developing full humanity from some previous sub-human condition. This did not happen on top of a sheet of ice!

Neither must one imagine the "Ice Age" as a single episode. There seem to have been several major and many minor fluctuations in climate.

On several occasions there was a great deal more ice on land than there is now, with climate generally colder and probably much wetter than now. On several other occasions, there may have been very much less ice than now, with warmer conditions prevailing. Ice leaves its mark so plainly upon the land it occupies that there is little doubt of the truth of these rather generalised claims.
But there was never very much ice in Australia. Here we are concerned mainly with the indirect effects of the formation and melting of ice sheets elsewhere, not (as in England) with direct and more obvious effects.

It is generally believed that Australia was very much wetter during much of the Ice Age than it is now. Our long dry furrows in the outback were then really rivers, our salty depressions really lakes, in some cases rising to the proportions of the inland seas which some of our earlier explorers sought so earnestly.

At such times, vegetation would probably have been much thicker on the ground than at present, and animals consequently more abundant.

Unfortunately, these statements can only be considered as probabilities; there is not enough positive evidence to make them certainties. It is largely because of the climatic inferences to be drawn from fossils that we are anxious to learn of new fossil localities. Any response to the appeals we make for new information and new specimens could help answer some important questions about Australian climate in the Ice Age.

One interesting aspect of what we do know about Australian Pleistocene mammals may help to make this point; it is the "giantism" illustrated by Figs. 1 and 2. Figure 1 compares the lower jaw and teeth of the largest modern kangaroo in the Museum collection with a lower jaw fragment (containing two molar teeth) of an extinct kangaroo from Balladonia. Figure 2 compares the thigh-bone (femur) of an average-sized modern echidna with the thigh-bone of an extinct echidna from Mammoth Cave. Notice how very much larger are the extinct forms. The Mammoth Cave echidna for certain, and the Balladonia kangaroo very likely, lived in the Ice Age; there were giants in those days.

One view relates gigantic size with lushness in vegetation and therefore with higher rainfall. On this view, the occurrence of considerable numbers of individuals or species of exceptionally large size could be used to make the inference of a higher rainfall. On the other hand, the appearance of gigantic forms in the fossil record is common in times extending far back beyond the Pleistocene, and in many different groups of animals, vertebrate and invertebrate, and not only land-dwelling but also marine. To relate giantism directly to high rainfall may be altogether too simple.

At all events, it is a reasonable inference from purely physiographical evidence that Australia received a much higher or a much more evenly distributed rainfall than now on some occasions in the past.
and it may have been even drier than now on other occasions during the Ice Age. Then, as now, populations of animals in a time of general drying up may have been tied to exceptionally favoured localities such as the soaks at the foot of granite outcrops. This appears to have been the case at Balladonia, as noted many years ago by C. G. Gibson of the Geological Survey of Western Australia. He wrote the following paragraph in his report in 1909 on routes proposed for the transcontinental railway:

An interesting fact in connection with these granite rocks has been the discovery of diprotodon bones (Diprotodon Australis) buried in the sand and silt beside them. Discoveries of these bones have been made at Balladonia, at Cook's Rocks, 20 miles north and at Womberna Rocks, 12 miles south. At Balladonia, bones in a good state of preservation were discovered at depths of from four to 12 feet whilst excavating a dam beside the rocks, while at Cook's and at Womberna fragments of bones were found at from four to eight feet from the surface also whilst excavating dam sites close to the rocks. It is evident that the rocks formerly formed watering places for these animals, as they still do for the present-day fauna, and that the bones are the remains of animals that have either been bogged while at the waters or that have perished as the result of the supply giving out after a bad season, as it still does. It is quite likely therefore that a search round any or all of these rocks would result in the further discovery of many of these remains.

Common sense and an awareness that past climatic conditions may have been very different from the present thus suggest the likely sites for Ice Age marsupial fossils.

Wherever animals may have been overwhelmed and buried—in swamps, in flooded rivers, in caves and so on—are the places to look for their fossilised remains. And it is not whole animals that will have survived, but fragments like that in Fig 1. Of these fragments, jaws containing teeth are the most informative.

For those living near the coast, it may be interesting to know of another set of facts about the Ice Age. Ice sheets formed at the expense of water in the sea, so that water was in effect transferred from sea to land, resulting in a relative fall in sea level. Conversely, melting of ice sheets would have raised the level of the sea relative to the land. The present shoreline therefore is only one of a number of shorelines in any one area, and apparently is about a middling level.

Submerged shorelines may be seen by skindivers, but emerged shorelines may be visible to all in the shape of beaches or benches or cliffs or marine fossils well above the present sea level.

Figure 3. — Reconstruction, based on bones and teeth only, of possible appearance of Nototherium, the extinct animal whose jawbone was illustrated in last month's issue of this journal. Drawn by the museum artist, Miss R. Hunt.
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