THE LOCATION OF ADELIE PENGUIN COLONIES, WINDMILL ISLANDS, ANTARCTICA

During the 1976 winter, measurements were made of the elevation above sea level and orientation of raised-beach formations on several islands in the Windmill Group (100°30'E, 66°20'S), Antarctica. The aim of this work was to gain an overall picture of glacial retreat in the region and the isostatic response of the land.

In the raised beach survey, elevation a.s.l. for each definable raised shoreline and the size and 'roundness' of boulders at each formation were measured, and the orientation of raised beaches was recorded to determine the relative contributions of sea fetch and sea ice in beach formation.

When, in October, Adelie Penguins *(Pygoscelis adeliae)* returned to their nesting sites, strong correlations were found between location and size of colonies and the occurrence, composition and extent of raised-beach formations. The following correlations were observed.

1. All major penguin colonies were on raised-beach formations composed of well-sorted angular rock debris ranging from 2 to 6 cm long. This relationship also held for old deserted nesting sites, identified by discoloured patches of rock fragments and set in concretous guano. In younger deserted sites, bone and feather remains were also apparent.
2. Present-day colonies, with one exception, were on raised-beach formations. The preference to colonise beach formations, most of which are fully exposed to the prevailing weather, illustrates how important the availability of nest-building material is to colony location. In the exception to this relationship, on Nelly Island, the birds used a combination of moraine and solufluction debris for nest building.
3. Colony size and nest density appeared to be directly related to the availability of stones. This was most apparent on Clark Peninsula and the islands to the north, where numbers in colonies increased with distance from the ice cap. The more distant and larger colonies were on much larger and better-sorted beach formations — a result of a greater contribution of sea and wave action to transport, deposit and sort glacial rock debris on land outcrops downwind.

The maps and photographs given by Penny (1968) in a comprehensive study of the territorial and social behaviour of Adelie Penguins show the locations and variations in colony topography in the Windmill Islands. In particular, the occupied and relict colonies mapped in Figure 3 are on raised-beach formations, showing how much marine-worked marine-deposited glacial debris determines the location, distribution and elongated shape of colonies.

Although other factors undoubtedly influence the location of Adelie Penguin breeding sites, the availability of nest-building material, at least in the Windmill Island group, seems to be a major factor.

I am grateful to Dr G. W. Johnstone, Antarctic Division, for advice on this note.

REFERENCE

PENNY, R. L. 1968. Territorial and social behaviour in Adelie Penguins. Ant. Bird Studies, Ant. Res. Ser. 12: 83-131. O. L. Austin (ed.) Am. Geophys. Union Pub. 1686.

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OYSTERCATCHER'S BREAST IMPALED BY BILL

On 11 April 1982 on the beach at Miranda, Firth of Thames, I saw a South Island Pied Oystercatcher *(Haematopus ostralegus finschi)* flying in an awkward way. Something was wrong with its neck. On closer inspection I discovered that the unfortunate bird had impaled itself through the breast with its bill. The bill entered high up on the bird's breast and emerged at the bottom of the breast. Altogether about 4-5 cm of the bill was hidden from sight.

Although I tried to catch the bird, it was able to fly. I tried again the next day but, although the bird was weaker, it could still fly. I could not find it on the fourth day.

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REVIEW

C. McGowan 1982: *The wing musculature of the Brown Kiwi* Apteryx australis mantelli *and its bearing on ratite affinities. J. Zool.* Lond. 97: 173-219, 18 figs.

Most previous accounts have dealt only with the proximal muscles. The kiwi's wing musculature resembles that of other ratites but is markedly dissimilar to that of carinates. In fore-limb musculature the ratite condition is closer to that of reptiles than carinates. The present skeleto-muscular data, with other evidence, suggests that ratites are primitive birds that evolved from a primitive flying ancestor. Some of the discrepancies in the published descriptions of ratite muscles may be due to individual variation and there is obvious need for more dissections. McGowan, who works in the Royal Ontario Museum and University of Toronto, used two adult female kiwis provided, in a fresh-frozen condition, by the National Museum, Wellington. McGowan summarises the arguments of Furbringer, Beddard, Parker and Owen, last century, P. R. Lowe's (1935) forceful argument that ratites evolved from a non-volant ancestor, and the later contributions of Tucker, De Beer and Ostrom. He concludes that his results are consistent with a hypothesis that derives ratites from a primitive volant ancestor that had not evolved the advanced flight mechanism of carinates.

— C. A. Fleming

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