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MIOCENE PENGUINS FROM VICTORIA, AUSTRALIA, AND CHUBUT, ARGENTINA

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Summary

Pseudaptenodytes, new genus, its type-species *P. macraei,* new, and questionably referred species ? *P. minor,* new, are described from the Cheltenhamian, late Miocene, of Victoria, Australia. *Chubutodyptes,* new genus, and its type-species *C. biloculata,* new, are described from the Patagonian, early Miocene, of Chubut, Argentina. All are referred to the extant penguin family Spheniscidae. They increase knowledge of the Miocene expansion of the family but cast no new light on its origin or on ancestry of the living species.

Introduction

Only six fossil penguin bones have hitherto been described from Australia (Simpson 1957, 1959, 1965), and only one of those, unidentifiable to genus, was from the late Miocene. Recent curating of the collections of the National Museum of Victoria by Mr H. E. Wilkinson brought to light ten more specimens, all from the late Miocene, acquired at intervals since about 1888 from the following collectors: A. N. Carter, F. A. Cudmore, W. B. Jennings, and G. B. Pritchard. Nine further specimens from his personal collection were added by Mr Colin Macrae, and another was submitted by Mr W. Ridland as this study was being completed. It was at first hoped that Professor B. J. Marples, formerly of Otago University, Dunedin, New Zealand, well known for his studies of Tertiary penguins from New Zealand and Seymour Island, would undertake the study. Unfortunately his retirement and departure from New Zealand made that impractical. Mr Wilkinson then very kindly offered the collection to me for study and forwarded it to me in the first instance at the Otago Museum, Dunedin, for first-hand comparison with most of Professor Marples' New Zealand specimens. The identifiable Australian specimens were found to be quite distinct from known New Zealand species, and study was continued and completed in the United States.

In the course of comparison with fossil penguins from Patagonia preserved in the American Museum of Natural History, attention was particularly drawn to two conspecific specimens previously recognized as distinctive but left unnamed (Simpson 1946). These seem clearly to represent an otherwise unknown genus and species, and no further, better specimens having turned up it was decided that convenience requires their being named at this time. They are therefore included in this paper, in connection with which they were again brought under study.

In the following, AMNH stands for the American Museum of Natural History, CM for the collection of Colin Macrae, and NMV for the National Museum of Victoria.

Australian Specimens

Materials, Sites and Age: Twenty specimens are at hand, ten from older NMV collections, nine from CM, and one from W. Ridland. Eight of these, although spheniscid, are not more exactly identifiable and do not seem to provide information of any particular interest. The other twelve specimens are the subjects of this study. Most, including the unidentified specimens, are similarly preserved. With one exception they are broken bones, badly abraded so that some and in certain of them most of the surface detail has been ground or polished away.

With another exception, all, including those not identifiable, were found at or near Beaumaris, Victoria. Only one was definitely found *in situ*, but it is probable that all of those from Beaumaris were originally buried in the type Cheltenhamian. This stage is near the Miocene-Pliocene boundary. On evidence reviewed by Wilkins (1963) most students now refer it to the late Miocene (for example, Brown, Campbell, and Crook 1968), although there is some disagreement (for example, Stirton, Tedford, and Woodburne 1968).

The single but important exception as to place of origin is NMV P26668, made the holotype of a type species in this paper. Its original label, written in 1916, gives the source as 'Formation Tertiary (Kalimnan). Locality Spring Creek nr Minhamite'. The Kalimnan is now generally referred to the Pliocene. However, it now appears that the exposures at the Spring Creek locality (about 25 miles SE. of Hamilton, Victoria) from which the penguin came are not of that age. Mr Thomas A. Darragh, Curator of Fossils in the National Museum of Victoria, has kindly supplied the following comments (letter of 2 July 1969): 'The actual locality is a small outcrop in Spring Creek, Spring Creek Station, about ½ mile NE. of the homestead. The grid reference is Hawkesdale 368 129 on the 1:63,630 military sheet. The age of the deposit is still in some doubt. Mr Gill [Gill 1964, p. 332, see references at end of this paper] has published . . . an Upper Cheltenham age which I gave him in 1963 when I first looked at this fauna. Since then I have looked at more material and also have a better idea of our molluscan faunas so that I am not certain that this is correct. There is no evidence that it should be Upper Cheltenhamian, in fact I doubt if one could distinguish an upper or lower Cheltenhamian anywhere. I am still inclined to think that because of the presence of *Aturia australis* at Minhamite it should be correlated with the Beaumaris fauna and placed in the Upper Miocene but new evidence recently to hand from New Zealand suggests that perhaps we should not place too much emphasis on the presence of *Aturia*. The forams at Beaumaris tend to give a latest Miocene age but could possibly be earliest Pliocene. The foraminiferal fauna from Spring Creek has not yet been examined. There is a possibility that the Spring Creek molluse fauna is a shallow water assemblage of late Middle Miocene or early Upper Miocene age, i.e., late Bairnsdalian to Mitchellian on the Victorian scale but until we know more about the molluses I think my original determination of Cheltenhamian can stand. Certainly it is not younger than Cheltenhamian on our present state of knowledge.'

It thus appears that the original labelling of the Spring Creek specimen as Kalimnan was incorrect and that it is probably Cheltenhamian but possibly somewhat older. Unless and until contradictory evidence appears, it may be considered as of approximately the same age as the Beaumaris specimens.

The condition of the specimens does not permit taking consistent standard measurements, as, for instance, in Simpson (1946) or Marples (1952), but the approximate sizes are indicated by comparison with Recent species, and non-standard dimensions can be taken from the illustrations.

Family Spheniscidae

Genus **Pseudaptenodytes,** new

Etymology: *Pseud-*, false, *Aptenodytes*, a Recent genus of penguins with a humerus that seems at first sight like that of the fossil but is seen on closer study to be distinct.

Type Species: *Pseudaptenodytes macraei, infra.*

Known Distribution: Cheltenhamian Stage of Victoria, Australia.

DIAGNOSIS: Humerus with large bicipital fossa, strongly double, inner or accessory subdivision much smaller than outer or main part, with restricted, oval aperture, but very deep. Shaft stout, sigmoid, expanding distally, preaxial angulation probably present but rounded.

DESCRIPTION: The type species, and hence essentially the genus, is based on the most clearly distinctive of the specimens available, all of which are poorly preserved. Most of the available specimens are referred with greater probability to a second species, which is only doubtfully congeneric with the type species. If not congeneric, the species do appear to be closely related, and brief generic description involves both. Undue confusion cannot arise as the specimens involved are specified.

NMV P26668, a partial humerus, type of *P. macraei,* is close to the Recent species *Aptenodytes patagonicus* in size and similar in general structure, but on detailed comparison differences other than in size are found to be greater than between any two Recent genera of Spheniscidae. Most striking is the fact that the internal division of the tricipital fossa, similar in distinctness and depth, is notably smaller in volume in *Pseudaptenodytes* and has a likewise smaller and more simply oval aperture. This is, indeed, a marked difference from any other penguin, fossil or Recent, known to me with the probable exception of the other species, ? *P. minor,* tentatively referred to *Pseudaptenodytes.* NMV P26671, referred to the latter species and the only other Cheltenhamian specimen in hand that preserves this feature, shows it imperfectly. It is strongly abraded in this part, but does clearly show that the inner fossa was small, deep, with an oval aperture, quite as in NMV P26668. In view of the poor preservation, it is not certain that NMV P26671 is not in fact referable to *P. macraei,* but it seems to have the more slender shaft of ? *P. minor.*

Aside from the tricipital fossa, the whole proximal part of NMV P26668 is almost identical with that of *A. patagonicus.* The shaft, however, is distinctly wider and more sigmoid, and it broadens more distinctly distally. Although the region of the preaxial angulation is abraded, it appears that the angulation was slight, probably no more than in *A. patagonicus* and perhaps even less. NMV P26669, type humerus of ? *P. minor,* is less abraded in this region and the angulation as preserved is slight, distinctly less than in *Aptenodytes* or any other Recent penguin compared. The shaft is considerably more slender than in NMV P26668, less sigmoid, and less, but somewhat, expanded distally. I take these to be probable specific characters. The distal end (not preserved in NMV P26668) is more compressed, or less expanded, laterally than in Recent penguins. As preserved, this specimen is closely similar to early Miocene humeri from Patagonia referred to *Palaeospheniscus robustus,* for example, AMNH 3361, both in size and in structure, although the preaxial angulation is less marked and the shaft is somewhat longer. However, on NMV P26671, as previously described, the tricipital fossa is quite different from that of *Palaeospheniscus robustus.* If, as is reasonably probable, NMV P26669 is congeneric or, *a fortiori,* conspecific with NMV P26671, neither one can belong to *Palaeospheniscus.*

As far as they go, other partial humeri referred to ? *P. minor* agree closely with NMV P26669 and P26671, without adding further information.

P27055 (CM 11) and P27056 (CM 12) are metacarpi of most the same size as in *Aptenodytes patagonicus* and similar in structure as far as preserved. This comparison makes reference to *Pseudaptenodytes macraei* plausible, even though these specimens are not from the same locality as the holotype and may not be of exactly the same age within the Cheltenhamian. NMV P26903 and CM 15 resemble a metacarpus referred to *Palaeospheniscus robustus* (Simpson

1946, Fig. 17B) in size and are referred to ? *P. minor* on similar grounds. In this case the locality and horizon are almost exactly as for the holotype. NMV P26903 is most nearly complete of the known Beaumaris metacarpi, and it alone has the distal end of the third metacarpal preserved, although it, too, has been abraded and has lost surface detail. Although of almost exactly the same length as the Patagonian specimen referred to *Palaeospheniscus robustus* it is somewhat smaller in both transverse dimensions, and the projection of the third metacarpal is more pronounced, about as great as an any Recent Spheniscinae. The latter characteristic is a distinction from the larger Seymour Island and New Zealand Miocene and earlier fossil species (see Simpson 1946, pp. 55-56, Marples 1952, pp. 19-20, and figures and references in those works).

Affinities: The imperfect material does not permit any close determination or extended discussion of the affinities of this genus. Its almost distinctive character, the morphology of the tricipital fossa, seems to be aberrant and does not link it with any other known group. In the Miocene most larger species have simple fossae and most smaller species bipartite fossae. *Pseudaptenodytes* has a double fossa, even though unusual in detail, and is near the size range of Miocene penguins with simple fossae, but also within the size range of Recent species, all of which have more or less distinctly double fossae.

I (Simpson 1946) proposed a division of Spheniscidae into four subfamilies. Some possibly diagnostic characters are unknown in *Pseudaptenodytes,* and on what little is known it could enter into either Palaeospheniscinae or Spheniscinae as I defined them. Marples (1952) found defects in my classification and proposed division of the family into Palaeeudyptinae and Spheniscinae, only. In that system, *Pseudaptenodytes* would belong in the Spheniscinae. I later (Simpson 1959) pointed out that Marples' system is also inacceptable. At present I see no way to make a plausible and workable subfamily classification. Brodkorb (1963), however, has adopted my previous division into four subfamilies.

It is a curious fact that no known pre-Pleistocene penguin is definitely or even probably ancestral to any Recent taxon. That is also true of *Pseudaptenodytes.*

Pseudaptenodytes macraei, new species

Etymology: For Mr Colin Macrae, an assiduous collector at Beaumaris.

Holotype: NMV P26668, left humerus, abraded and lacking distal end. From Spring Creek, Minhamite, Victoria. Presented 26 October 1916 by Mr J. Milligan.

Hypodigm: For taxonomic purposes, the type only. The following are referred with some doubt: P27055 (CM 11) partial metacarpus, from shore platform south of Keefer's boatshed, Beaumaris, Victoria; P27056 (CM 12) partial metacarpus, as P27055 (CM 11).

Known Distribution: Cheltenhamian Stage, Victoria, Australia.

Diagnosis: Humerus larger and its shaft stouter than in ? *P. minor.*

? **Pseudaptenodytes minor,** new species

Etymology: *Minor,* smaller.

Holotype: NMV P26669, right humerus, abraded and lacking proximal end. From Beaumaris, Victoria. Presented in 1888 (?) by Mr W. B. Jennings.

Hypodigm: The type and the following: NMV P26677, abraded distal end of right humerus, from shingle at Beaumaris, collected *circa* 1955 by Mr A. N.

Carter; NMV P26671, abraded proximal end of left humerus, in shingle at Beaumaris, F. A. Cudmore Collection (no date); NMV P26676, severely abraded proximal part of left humerus, from shingle at Beaumaris, collected *circa* 1955 by Mr A. N. Carter; NMV P26670, much abraded right humerus, from shingle at Beaumaris, F. A. Cudmore Collection (no date); P27057 (CM 16), much abraded right humerus, shore platform south of Keefer's boatshed, Beaumaris. Although not technically included in the hypodigm, the following are tentatively referred: P27058 (CM 15), incomplete metacarpus, as CM 16; NMV P26903, complete, moderately abraded metacarpus, collected by Mr W. Ridland, April 1969, *in situ* in nodule bed of Sandringham Sands at low tide level about 12 feet from shore opposite Dog Tooth Beacon, at point about half way between Hutchinson St. and Deauville Ave., Beaumaris—this is the only Beaumaris specimen definitely recorded as *in situ* and it is the only really complete penguin bone yet found there, but it is noteworthy that some rolling and abrasion had evidently occurred before burial.

KNOWN DISTRIBUTION: Cheltenhamian Stage, Beaumaris, Victoria, Australia.

DIAGNOSIS: Humerus smaller than that of *P. macraei,* shaft relatively and absolutely more slender, probably less sigmoid.

Spheniscidae Gen. et Sp. Indet.

P27059 (CM 14) from the shore platform south of Keefer's boatshed, Beaumaris, is the distal end and shaft of the left humerus of a penguin. These parts, rarely quite distinctive in any case, are here so heavily abraded that any identification beyond reference to the Spheniscidae seems unwarranted. The interest of the bone is its size, extraordinarily small among fossil penguins. Almost all other known fossil penguins range from about medium size for living forms (such as *Pygoscelis adeliae* or *Spheniscus humboldti*) through the size of the largest living species *(Aptenodytes forsteri)* and even well beyond that, for example in the huge *Pachydyptes ponderosus* of New Zealand. (See Simpson 1946, pp. 74-76.) P27059 (CM 14), on the other hand, is about the size of *Spheniscus mendiculus,* the smallest *Spheniscus* and the smallest living penguin except *Eudyptula minor* and the possibly synonymous *E. albosignata.* There is some suggestion, perhaps misleading, that the shaft of P27059 (CM 14) was slender and rather straight and that the distal end was somewhat more compressed, or less expanded, laterally than in *S. mendiculus.*

Argentine Specimens

Family SPHENISCIDAE

Genus **Chubutodyptes,** new

ETYMOLOGY: Chubut, the territory in Argentina where the specimens were found, and Greek *dyptes,* diver, commonly compounded in names of penguin genera.

TYPE SPECIES: *Chubutodyptes biloculata, infra.*

KNOWN DISTRIBUTION: Patagonian Stage of Chubut, Argentina.

DIAGNOSIS: Humerus generally palaeospheniscine in aspect but with proximal end widely expanded (lateromedially), with large but relative shallow tricipital fossa, bipartite with the two parts subequal in size and depth and almost directly medial and lateral with respect to each other.

DISCUSSION: This genus is now based on two specimens that I mentioned in 1946 (p. 51) as of an unnamed species and possibly new genus close to *Palaeo-*

spheniscus, one of which (AMNH 3341) was then figured (Fig. 13B). Hopes for more complete specimens have not been realized. The type species is larger than any referred to *Palaeospheniscus* and it is of special interest that no other known humeri of comparable size and age have such a distinctly bipartite tricipital fossa, a point to which students of fossil penguins have often directed attention, although its significance is highly doubtful. Details of the fossa are unique among those, Recent and fossil, known to me.

As in *Palaeospheniscus*, the width of the shaft of the humerus is decidedly greater distally than proximally and there is a well-marked preaxial angulation. Comparison is perhaps closest with humeri referred to *Palaeospheniscus robustus*, and the advisability of generic separation may be considered strengthened by the fact that there is some doubt whether those specimens are correctly placed in *Palaeospheniscus*.

Chubutodyptes biloculata, new species

ETYMOLOGY: Biloculata, two-chambered, in reference to the subequal division of the tricipital fossa.

HOLOTYPE: AMNH 3346 (Bird Catalogue of the Department of Vertebrate Palaeontology), right humerus, lacking approximately distal third and proximal end slightly broken. From Cerro Castillo, Chubut River Valley, Chubut, Argentina. Collected in 1933 by G. G. Simpson and party.

HYPODIGM: The holotype and AMNH 3341, somewhat broken proximal half of left humerus, from opposite Gaiman, Chubut River Valley, Chubut, Argentina. Collected in 1933 by G. G. Simpson and party.

KNOWN DISTRIBUTION: Basal beds of the Patagonian Stage, Chubut, Argentina.

DIAGNOSIS: The only known species of the genus as diagnosed *supra*.

REMARKS: The geology of the region from which these specimens come was discussed by Simpson (1935). Cerro Castillo, a large exposure of the lower Patagonian marine beds south of Trelew, is shown in that publication in Fig. 7. The complex section opposite Gaiman is shown in Fig. 1. AMNH 3341 and many other penguin bones came from bed g, shown in Fig. 1 and on page 7. There is still some uncertainty about the age of the lower part of the Patagonian formation and a corresponding early part of a marine stage and age (sometimes designated Juliense), but the consensus continues to place it in the early Miocene.

Acknowledgements

Mr H. E. Wilkinson, formerly in charge of fossil vertebrates at the National Museum of Victoria, made most of the Australian specimens available for this study. Included are numerous specimens collected by Mr Colin Macrae and one from Mr W. Ridland. Mr Edmund D. Gill, Deputy Director of the National Museum of Victoria, facilitated the project and provided some data on horizons and localities, further supplemented by Mr Thomas A. Darragh of that Museum. Dr R. R. Forster, Director of the Otago Museum, Dunedin, New Zealand, facilitated comparisons with fossil penguin specimens there. Dr Bobb Schaeffer, Chairman of the Department of Vertebrate Paleontology in the American Museum of Natural History, New York, facilitated comparisons with fossil penguins in that Department, with the assistance of Mr George O. Whitaker, and lent the Patagonian specimens here described. Dr Dean Amadon, Chairman of the Department of Ornithology in that Museum, facilitated comparisons with Recent penguins in that Department, with the assistance of Mr Charles E. O'Brien. Mr Vincent Maglio,

graduate student at Harvard University, took the photographs of the specimens. Except for comparisons made at other institutions, as noted above, this work was carried out at the Simroe Foundation, Tucson, Arizona, U.S.A. Throughout this research I was employed jointly by the Museum of Comparative Zoology, Harvard University, and the Department of Geology, University of Arizona.

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Plate 1

Fig. 1a, b—*Pseudaptenodytes maeraei,* new genus and species. Partial left humerus, medial view. Holotype, NMV P26668. Stereo pair.

Fig. 2a, b—Same specimen as Fig. 1, slightly oblique posterior view of proximal end to show tricipital fossa. Stereo pair.

Fig. 3—? *Pseudaptenodytes minor,* new species. Broken and abraded proximal end of left humerus, posterior view for comparison with Fig. 2. NMV P 26671.

All figures natural size.

Plate 2

Fig. 1—Incomplete metacarpus doubtfully referred to ? *Pseudaptenodytes minor* P27058 (CM 15).

Fig. 2a, b—*Pseudaptenodytes maeraei,* new genus and species. Partial left humerus, posterior view. Holotype, NMV P26668. Stereo pair.

Fig. 3a, b—? *Pseudaptenodytes minor,* new species. Partial right humerus, medial view. Holotype, NMV P26669.

Fig. 4—Incomplete metacarpus doubtfully referred to *Pseudaptenodytes macraei* P27055 (CM 11).

All figures natural size.

Plate 3

Fig. 1a, b—*Pseudaptenodytes macraei,* new genus and species. Partial left humerus, lateral view. Holotype, NMV P26668. Stereo pair.

Fig. 2—*Palaeospheniscus robustus.* Left humerus, medial view. Patagonian formation, Chubut, Argentina. For comparison with Plate I, Fig. 1.

Fig. 3a, b—Same specimen as Fig. 2. Lateral view. For comparison with Fig. 1 and Plate IV, Figs 2 and 4. Stereo pair.

All figures natural size.

Plate 4

Chubutodyptes biloculata, new genus and species.

Fig. 1a, b—Incomplete right humerus, posterior view. Holotype, AMNH 3346. Stereo pair.

Fig. 2—Same specimen as Fig. 1. Lateral view.

Fig. 3a, b—Incomplete left humerus, posterior view. AMNH 3341. Stereo pair.

Fig. 4—Same specimen as Fig. 3. Lateral view.

All figures natural size.

1a

1b

2a

2b

3

1

2a

2b

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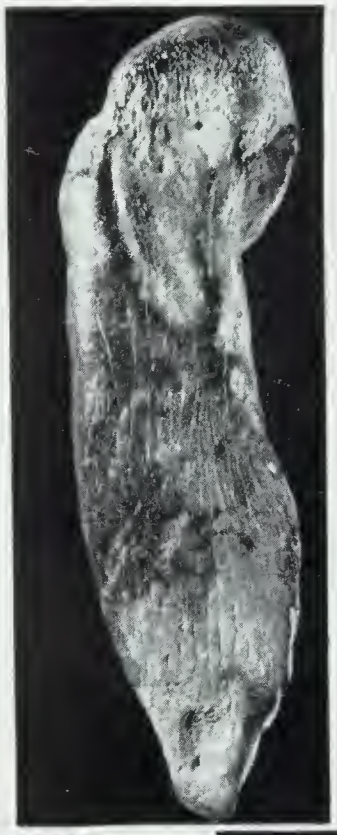
3b

4

1a



1b

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