

SHORT COMMUNICATIONS

SOME ASPECTS OF THE MORPHOLOGY OF WANDERING ALBATROSSES ON MACQUARIE ISLAND

There is little published information to substantiate the inclusion of the Wandering Albatrosses on Macquarie Island in the subspecies *Diomedea exulans chionoptera* (Serventy *et al.* 1971). This paper provides data about the Macquarie Island population that will assist assessment of its current taxonomic grouping. J. Warham, C.J.R. Robertson and J.D. Gibson are preparing a review of the Wandering Albatrosses of the New Zealand and Australian region, thus no comparisons with other subspecies will be made in this paper.

Intensive observations of the birds at Caroline Cove, Macquarie Island were made between 25 November 1976 and 7 March 1977. All non-breeding birds seen were caught, banded, measured, their plumage scored using Gibson's (1967) plumage guide (which allocates scores to the variable plumage on head, back, wing and tail) and photographed. Bands on birds banded in previous years (Australian Bird Banding Scheme, CSIRO, Canberra) were noted and actual or minimum ages were ascertained. The bill depth measurement was made at the shallowest part, which was usually two to three centimetres behind the maxillary nail. Bill length was measured as being the maximum distance from the junction of the skin and upper mandible on the forehead to the most distant part of the unguis, i.e. the curve, not the tip (see Conroy 1972). The junction-to-curve measurement is longer than the junction-to-tip measurement. The former is the more constant of the two, as tips of albatrosses (and other members of the order Procellariiformes) are subject to abrasion and shedding which reduces their lengths. On live birds the length from junction to curve is also easier (and therefore more likely to be accurate) to measure than junction-to-tip. The lengths of exposed culmens of twelve Wandering Albatross skins of mixed sexes and age, held by the National Museum of Victoria, were measured using both methods. The average of the difference of measurements, expressed as a percentage of the junction-to-tip measurement, was 1.3% (range 0.5% to 2.1%). Wing chord measurements were taken. All bird measurements were made by me, usually working alone. To minimise disturbance some breeding birds were not measured. Eggs were measured by K.N.G. Simpson, P. Oram, and E. Jones in earlier years, and by myself. I weighed eggs on a 0 - 1000 g Pesola scale within 12 hours of laying.

RESULTS

In Table I, (+) in column 3 indicates minimum known

age of that bird. Where a bird was never seen to copulate, (?) is indicated in the second column as sex was not proven. Assessment of the sex of Great Albatrosses by observation in the field can be very accurate, and Richdale (1950) and Tickell (1968) discuss their methods at length. Briefly, the main criteria used for estimating sex were a bird's behaviour with birds of known sex, its age and plumage, and observation on a breeding pair. The statistical level of acceptance or rejection in all analyses was 0.01.

Plumage

Plumage scores using intermediate quarter categories are shown in Table I. There was no significant difference ($p > 0.01$, $df = 17$) in the five plumage characters scored of birds estimated to be males and those known to be males. There was no significant difference ($p > 0.01$, $df = 11$) in four of the five plumage characters scored for four birds thought to be females compared with those of nine known females so all birds thought to be females have been included as females in calculations in Table I. Males were significantly lighter in colour than females ($p < 0.01$, $df = 30$ for all characters scored).

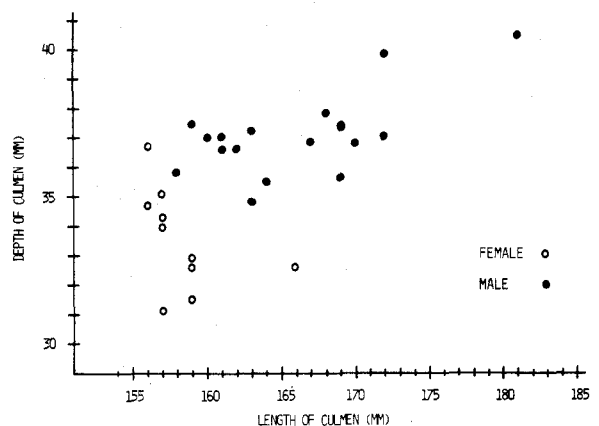


Figure 1. Comparison of lengths and depths of exposed culmens of male and female Wandering Albatrosses on Macquarie Island. The culmen length measurement taken was the longest possible i.e. from the forehead to the furthestmost extent of the curved unguis, not the more usual measurement which is from the forehead to tip. The bill depth measurement was made at the shallowest part which was usually two to three centimetres behind the maxillary nail.

Morphology

Measurements of live birds are shown in Table I. There was no significant difference ($p > 0.01$, $df = 15$) in the six morphological characters measured between birds known and estimated to be males (Table I). Therefore it is assumed all birds estimated to be males were actually males, and they were included with known males when calculating means of morphological characters in Table I. Only one bird was estimated to be female and since its measurements for the six morphological characters were well within the range for known females, it was included with known females in calculations in Table I. Males were significantly larger than females ($p < 0.01$, for most characters, $df = 25$). Figure 1 shows the non-overlapping groups when bill lengths and depths of males and females are compared. Photographs taken by me and Nigel Brothers during measurement suggest the culmen of 30081 was unusually short for a male, and that of 30132 unusually long for a female, thus confirming their measurements in Table I. One bird (30438) was not sexed, but its measurements are included at the bottom of Table I.

Eggs

The lengths and breadths (means 129 mm and 81.5 mm respectively) of 16 eggs, and fresh weights of four eggs from Macquarie Island are given in Table II.

DISCUSSION

Plumage

Only one male had reached the 'pure white' stage ('chionoptera' - see Tickell 1968), i.e. 21 points, but seven (37%) scored 19 or more (Table I). No female recorded 21 - the highest score reached was 16.50; and the oldest female documented (17+) scored only 11.25. Although strongly suggestive, especially in females, there were not enough data in 1976/77 to support Tickell's (1968) comment that birds get whiter with age.

Morphology

The measurements of three chicks suggest they fledged at similar body proportions to small adults. Although it was probable that an individual continued to grow a little after it fledged, the oldest birds were not always the biggest e.g. 14 year old male 30011 was larger than 21+ year old male 30106. Great individual variation within each sex exists, and some birds less than nine years old were larger than birds between 9 and 17 years old. The means of measurements of males were significantly larger than those of females, although overlap between sexes occurred in all characters. On the ground most males were visibly bigger and bulkier than most females,

TABLE II

Wandering Albatross egg measurements from Macquarie Island. All eggs are from single egg clutches.

Date measured	Length (mm)	Breadth (mm)	Weight (g)
Dec 1976*	130.5	79.5	500
Dec 1976	121.3	79.6	475
Dec 1976	136.8	81.9	520
Dec 1976	124.9	78.3	-
Dec 1976	135.4	78.7	-
Dec 1976	122.9	79.0	-
Jan 1977	121.6	78.1	415
Jan 1974	128.8	84.2	-
Jan 1974	125.8	81.7	-
Jan 1974	134.0	82.2	-
Jan 1974	125.6	87.2	-
Jan 1974*	127.6	84.7	-
Jan 1974	122.7	80.5	-
Jan 1964	133.0	84.0	-
Jan 1964	135.0	85.0	-
Jan 1964	139.0	80.0	-
N	16	16	4
\bar{x}	129.1	81.5	476.7
SD	5.9	2.8	46.9
Range	121.3 to 139.0	78.1 to 87.2	415 to 520

* eggs laid by the same female

and females appeared to have a smaller head to body size ratio compared with males. When flying, the ratio of wing span to body size appeared to be much larger for males than for females.

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MIGRATION OF WHITE-FACED STORM-PETRELS *PELAGODROMA MARINA* IN THE SOUTH PACIFIC AND THE STATUS OF THE KERMADEC SUBSPECIES

SOUTH PACIFIC SUBSPECIES

Three subspecies of the White-faced Storm-Petrel *Pelagodroma marina* are presently accepted as living in the South Pacific Ocean (Murphy & Irving 1951). Others breed in the Atlantic Ocean.

The Australian race *P.m. dulciae* breeds on many islands from Abrolhos Islands, Western Australia at 28°S, anti-clockwise to Broughton Island, New South Wales at 32°S (Serventy *et al.* 1971). After breeding many migrate north-west to winter near the tropical convergences in the Arabian Sea and Indian Ocean (Bourne 1953). As Serventy *et al.* (1971) point out, the destination of birds from eastern colonies is unknown. They may head north or north-east rather than westward, in the same way that Flesh-footed Shearwaters *Puffinus carneipes* from Western Australia and Lord Howe Island migrate differently (Serventy *et al.* 1971).

The New Zealand race *P.m. maoriana* breeds on many islands from the far north at 34°S to Auckland Islands at 50°S, and is especially abundant at Chatham Islands, 44°S, the type locality (Oliver 1955). Like *P.m. dulciae* its breeding season extends from late August to mid-March, but south of 42°S breeding is a month later (Falla 1934; Richdale 1943). Although absent from colonies and adjacent seas for almost five months (Falla 1934; Richdale 1943; Oliver 1955; Kinsky *et al.* 1970; Falla *et al.* 1979) only Falla (1934) tentatively, and Jouanin & Mougin (1979) recorded it as migratory.

There are numerous records of *P. marina* from the eastern tropical Pacific (Loomis 1918; Beebe 1926; Murphy 1936; Murphy & Irving 1951; Leveque *et al.* 1966; Harris & de Vries 1968; Crossin 1974). Few specimens have been obtained there but one was identified as

P.m. maoriana by Murphy & Irving, who implied that New Zealand was the likely provenance of all birds. Crossin considered Australasia to be the most probable place of origin but he seemed unaware of the distinctiveness of *dulciae* and *maoriana*. He reported several hundred sightings concentrating in a triangular zone west of Galapagos Islands (5°N, 112°W to 8°S, 112°W to 3°S, 100°W), particularly in August - September, and that the condition of specimens was consistent with that of petrels before pre-breeding migration.

The Kermadec (White-faced) Storm-Petrel *P.m. albiclunis* was named by Murphy & Irving (1951) from fifteen specimens collected at sea close to the Kermadec Islands between 18-20 November 1925. Since then a further fifteen birds have been attributed to this race (Table I), all within sight of the Kermadec Islands until Jenkins (1982) saw four near Australia. It has never been found breeding despite numerous searches (Oliver 1955; Sorensen 1964; Merton 1970; Crockett 1975; B.D. Bell pers. comm.; T.G. Lovegrove pers. comm.).

P.m. dulciae and *P.m. albiclunis* are distinguishable only by the whitish rump of the latter, *dulciae* and *maoriana* having pale grey rumps. Dimensions of *albiclunis* are slightly smaller than those of *dulciae* (Table II) but both have almost square tails and more white on the face and sides of the breast than *maoriana* (Murphy & Irving 1951). In contrast, *maoriana* is a fork-tailed race, with dark patches on the sides of the breast, and with shorter culmen, tarsus and mid-toe plus claw than in *dulciae* and *albiclunis*, but with longer tail dimensions (Table II).

NEW DATA ON TRANS-PACIFIC MIGRATION

On 10 February 1980, Brian D. Bell and I banded 265 adult White-faced Storm-Petrels on South East Island,