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FIELD IDENTIFICATION AND SEX DETERMINATION OF THE ROYAL ALBATROSS

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The two large albatrosses, the Royal Albatross *(Diomedea epomophora)* and the Wandering Albatross *(Diomedea exulans)* can be distinguished from the other members of the genus *Diomedea* by the white back of the former two, while the smaller mollymawks have a black back. For field identification of the albatrosses and mollymawks of New Zealand waters, Moreland's guide (1957) is of much help and is recommended.

WANDERING AND ROYAL ALBATROSS

Royal Albatrosses are distinguished from Wandering Albatrosses by their bigger and more rounded, protruding nose-tubes and black eyelids (the Wanderer has a greenish-purple, or even white, bluish or pink eyelid). Adult female Wanderers and juvenile Wanderers of both sexes can easily be distinguished from the Royals by the dark plumages of the former (cf. plate 2). Adult Wanderers can look deceivingly like the Royal, but some specimens (very old birds?) have much more white on the wings than the Royals, especially males of the subspecies *chionoptera*. The dark and mottled large albatrosses are always Wanderers, but the very white birds with black wings and white olecranal patch are not necessarily Royals.

As first pointed out by Buller (1891: 231) the Royal differs "in having a broad black line along the cutting-edge of the upper mandible" (see plate 3). In the Wanderer the cutting edge of the upper mandible is clear horn colour. In the hand it is thus always easy without any difficulty to distinguish between the Royal and the Wandering Albatrosses. At sea it is quite different, but even there the combination of plumage characteristics, behaviour and present-known ranges makes it possible to narrow down the identification appreciably:

(1) Royal Albatrosses are found only in the New Zealand area (along the coasts of both main islands and south to the Auckland Islands and Campbell Island and Chatham Islands), east across the South Pacific and north along both the Pacific and Atlantic coasts of South America to about 30 degrees south latitude. The only known breeding places for the Royal Albatross are Chatham Islands, Taiaroa Heads (Otago), Campbell Island and Auckland Islands.

(2) Wandering Albatrosses share with the Royals most of the area described under (1) but are met, further, throughout the vast sea expanses of the southern hemisphere between 30 and 60 degrees south latitude. The Wanderer has been observed as far north as 25 degrees (following cold currents) and as far south as 68 degrees south latitude.

(3) The Royal Albatross is most often seen near land, along the coasts, in big harbours, bays and straits. The Wandering Albatross is a truly pelagic bird, found beating the wind over its 30 million square miles of roaring seas, but is also seen near land.

(4) Any big albatross with brown on head, neck, breast or back is a Wanderer which often also has a brown tip to the tail.

(5) A white albatross with white head, neck, breast, back and tail, wings black with or without white olecranal patch could be a Royal, but could also be a male Wanderer (which varies appreciably in plumage coloration, not only according to subspecies but with age).

(6) Finally, based on studies and photography, of Wandering Albatrosses in the Indian Ocean, Tasman Sea and New Zealand waters and of Royal Albatrosses on Campbell Island, Taiaroa Heads and in New Zealand waters, a distinct difference in flying pattern has been demonstrated which enables the observer in many cases to distinguish between these two large albatrosses. This difference will appear from plate 5 (a - f). It will be seen that while in the soaring Wandering Albatross the wings are almost fully stretched, forming a near-perfect T, in the Royal Albatross the outer hands with the primaries are bent slightly backwards, making the silhouette more drooping, umbrella-like or reminding one more of the bent wings of a swallow.

DESCRIPTION AND SIZE

In its nestling down, immature (on nest), sub-adult (during the years before breeding), and adult plumages the Royal Albatross is pure white with black wings. The tail is white, sometimes with a few black spots. The wings are black with a splashed-out, white, olecranal patch, particularly noticeable in males and possibly increasing in extent with age. The smaller Northern Royal Albatross *(sanfordi)* has black wings without the white olecranal patch.

When two species of birds are almost identical in size, it is very difficult — if not impossible — categorically to settle the question and declare one or the other the biggest. Especially in very large birds, such as albatrosses, a wide range in measurements will result from not only appreciable individual variation, but also from variation in age, sex, subspecies (which maybe are not yet finally worked out) and possible cline. And the human factor involved in such views will manifest itself in a leaning towards the personal favourite. Thus Rankin (1951: 142), who studied the Wandering Albatross in South Georgia, called it " the greatest of all sea-fowl " while Buller (1891: 231), happy about his new species, says: " *Diomedea regia* is appreciably larger than the common species, with a far more powerful bill."

Not many Royal Albatrosses have been measured in the flesh, most measurements published having been made from dried museum skins. I, therefore, welcomed the opportunity of measuring and weighing the ten specimens of nesting adult albatrosses which we collected for the Denver Museum of Natural History on Campbell Island in 1958. This material is presented in Table 1. Sex was determined by examination of the gonads and the sexed specimens were compared during and after the skinning for possible clues to sexual dimorphism in plumage and size.

Table 1 — Measurements (in mm.) and weights of 10 freshly killed Royal Albatrosses, Campbell Island; all except No. 10 collected on St. Col Ridge, 14th January, 1958; No. 10 collected Lyall Ridge on 13th February, 1958. All specimens in the Denver Museum collection.

No.	Sex	Wing	Tail	Tarsus	Culmen		Middle toe	Toe nail	Weight	
					Length	Depth			lbs.	kg
05[1]	♂	701	214	138	185.0	65.8	189	27.4	18	8.2
06	♂	702	211	134	184.0	67.8	186	24.0	20¼	9.2
08	♂	698	220	137	184.0	71.2	187	24.1	19½	8.9
10	♂	674	224	135	179.0	66.8	185	24.3	21	9.5
11	♂	707	218	137	188.0	69.3	192	24.1	19½	8.9
03	♀	647	210	123	163.0	62.3	165	20.7	14½	6.6
04	♀	686	196	125	174.0	64.0	180	21.8	17	7.7
09	♀	667	205	124	168.5	63.5	174	20.8	16½	7.5
12[1]	♀	686	208	126	177.0	63.0	171	21.2	20	9.1
14	♀	679	207	126	170.5	62.5	180	22.4	16	7.3

[1] These two birds were a pair, the female arriving for nest relief while being observed, a fact probably accounting for the weight difference: the male having been sitting for maybe a week or more had lost weight and had an empty stomach, whereas the arriving female was heavier with a full stomach.

The measurements presented show the following extremes and means (in brackets):

Adult males: Wing 674-707 (696) mm.; tail 211-224 (217) mm.; tarsus 134-138 (136) mm.; length of culmen 179-188 (184) mm.; depth of culmen at base 65.8-71.2 (68.2) mm.; middle toe 185-192 (188) mm.; middle toe nail 24.0-27.4 (24.8) mm.; weight 18-21 (19.6) lbs., equal to 8.2-9.5 (8.9) kg.

Adult females: Wing 647-686 (673) mm.; tail 196-210 (205) mm.; tarsus 123-126 (124) mm.; length of culmen 163-177 (171) mm.; depth of culmen 62.3-64.0 (63.1) mm.; middle toe 165-180 (174) mm.; middle toe nail 20.7-21.8 (21.3) mm.; weight 14½-20 (16.8) lbs., equal to 6.6-9.1 (7.6) kg.

Unfortunately no measurements of live or freshly killed specimens of *sanfordi* are available; I am attempting to obtain this information and such measurements will be published in due course. It is well-known that museum specimens shrink as they dry and comparisons between fresh and dried specimens are therefore of little value except to show major differences. For what they are worth the mean measure-

ments (in mm.) for the 10 fresh specimens of *epomophora* are given below, together with Murphy's measurements (1936, vol. 1: 585) of dried museum specimens of *sanfordi* (5 males and 12 females) from the Chatham Islands:

	Chatham Islands		Campbell Island	
	Males	Females	Males	Females
Wing	615	616	696	673
Tail	191	189	217	205
Culmen	163	161	184	171
Tarsus	117	114	136	124
Middle Toe	157	151	184	174

The Campbell Island form is without doubt the bigger of the two known subspecies of the Royal Albatross, although the difference may not be so pronounced, as will appear from the figures given.

In addition to the difference in size the two subspecies of Royal Albatross can be distinguished by the black wings of the northern and smaller subspecies *(sanfordi)* while the larger southern bird *(epomophora)* has a pronounced white splash on the wing, biggest in the male (cf. plate 7).

SEX DETERMINATION

Richdale (1950: 12) states: "In the Royal Albatross, the sexes are alike and morphologically indistinguishable with certainty in the field." His observations refer to the subspecies *sanfordi* only, the bird breeding on Taiaroa Heads.

Sorensen (1950: 12), on the other hand, found it possible to distinguish between the sexes of *epomophora,* nesting on Campbell Island. In addition to "a decided difference in the size of males and females," Sorenson noted the white coloration on the wing in males. This difference was earlier reported upon by Waite (1909, vol. 2: 573) who quoted Mr. G. R. Marriner (one of the Campbell Island party on the 1907 expedition) as follows: "The following sexual differences were noticed several times during copulation: In the female the dark coloration of the wing-coverts is denser and more pronounced . . ."

The sexual dimorphism in Southern Royal Albatrosses can be seen plainly in plate 7. The bigger splashing of white on the back and the wing-coverts of the male can be contrasted with the more black back and wings of the smaller female.

This secondary sexual characteristic is not fully reliable, however, for field identification purposes. I paid particular attention to this aspect while banding albatrosses on their nests and watching others during a stay on Campbell Island, January-February, 1958. For the casual observer, for example examining a bird washed up on a New Zealand beach, this sexing technique is unsatisfactory as there is appreciable overlap. Some males have fairly dark wings and some females show much white on their wings. Probably age comes into this matter, also.

As we were killing the specimens for the Denver Museum, I had a good opportunity of sexing by this external, plumage method, and then comparing the findings with the result of examination of the gonads. The first specimen we killed, on 13th January, I studied carefully while on its nest, and decided that it was a male, as there was appreciable white colouring on back and wings. All birds were tagged when killed. When I later dissected this specimen, gonadal examination showed it to be a female. Furthermore, when individual albatrosses were observed, it was sometimes impossible to decide whether the extent of white back and wing colouring indicated a male or a female. When a pair was seen together — which did not happen often at the time of year when we visited Campbell Island — I could usually recognize male and female, based on size and plumage coloration; but of course, in most cases I did not have the opportunity of examining the gonads and verifying the external sex determination.

Body weight, in conjunction with plumage coloration, is a valuable criterion, but even weight can be deceiving. Thus, on one occasion we observed a bird walking up to its incubating mate; after greeting ceremony and intial billing were over, we approached the two albatrosses, sitting next to one another. They were both killed, and the female arriving for nest relief weighed 20 lbs. while the sitting bird — which might have been sitting for one or two weeks — and which turned out to be the male weighed only 18 lbs. The returning bird had a full stomach, while the sitting bird's stomach was empty.

While banding 79 Royal Albatrosses — 76 of which were banded on nests — I had a good opportunity to study birds held. Particularly, I wanted to record the sex of each banded bird; but I soon found this impossible on known distinguishing characters. I therefore examined carefully the specimens collected and compared the 5 males and 5 females. My findings as a result of this examination of birds in the flesh and of skinned specimens are as follows:

(1) Size, weight: unreliable as sex criterion as a female, newly arrived from the sea with full stomach, weighed 20 lbs., while its starved mate weighed only 18 lbs. Females averaged 17 lbs., males 19½ lbs.

(2) Wing length: some overlap although wing of male usually about 20 mm. longer than in female; males 674-707 mm., females 647-686 mm.

(3) Length of culmen: bigger in male than female and overlap in measurements — if any — would be slight. Length of culmen in males 179-188 mm., in females 163-177 mm. For field identification on live birds this criterion is of little use as this measurement is difficult (and dangerous) to take.

(4) Depth of culmen at base: bigger in male (65.8-71.2 mm.) than in female (62.3-64.0 mm.), but difficult measurement on live bird in field.

(5) Middle toe: longer in male than female, but difficult measurement to take.

(6) Middle toe nail: This I found the best, most consistent and most easily taken measurement. In the 5 males the middle toe nail measured 24.0-27.4 (24.8) mm., in the 5 females 20.7-22.1 (21.3) mm. To test this criterion I examined carefully 8 albatrosses while banding them on Mt. Lyall on 13th February. Based on body size, length of culmen, plumage coloration *and* length of middle toe nail. 2 of these birds were males (with middle toe nails measuring 24.0 and 26.2

respectively), while 6 were females (with middle toe nails measuring 20.7, 21.5, 22.1, 22.8, 23.2 and 23.6, respectively). From this is seen that middle toe length above 24 mm. is characteristic of males, below 24 mm. of females. This applies to freshly killed and live birds only and has not been tested for dried museum specimens. The nail is best measured with a Vernier caliper.

Summarising this section, I can do no better than to quote my notebook entry for 13th February, 1958, after having paid special attention to distinguishing sex criteria in Royal Albatrosses: "By now I feel I am able to tell the sex of the majority of sitting birds by:

1) general body size, the male being the bigger.
2) bigger head and stronger, longer bill in male.
3) more white on wings in males, but unreliable criterion as females may have much white on wings also.
4) length of middle toe nail, below 24 mm. in females, above 24 mm. in males."

SUMMARY

Royal Albatrosses have black eyelids, white body plumage in all ages, longer bill and more rounded, protruding nose-tubes than the Wandering Albatross, which has pale greenish, bluish, pink or white eyelids. In flight, Royal Albatrosses often have the outer hands bent slightly backwards while Wanderers usually form a near-perfect cross.

The Southern Royal Albatross *(Diomedea epomophora epomophora)* of Campbell Island is the larger and characterised by its white wing-patch; the smaller northern form *(Diomedea epomophora sanfordi)* has pure black wings.

In the Southern Royal Albatross males have usually appreciably more white on the wings than females; they are also a little bigger, with longer bills; length of middle toe nail in females is less than 24 mm., in males 24 mm. or more.

REFERENCES

Buller, Walter (1891) — On the Wandering Albatros ; with an exhibition of specimens, and the determination of a new species (Diomedea regia). Trans. N.Z. Inst., 23: 230-235.

Moreland, J. (1957) — A guide to the larger oceanic birds (albatrosses and giant petrel) of New Zealand waters. Tuatara, 6 (3): 99-107. (Reprints available from Dominion Museum, Wellington, at 6d. each).

Murphy, R. C. (1936) — Oceanic Birds of South America. Amer. Mus. Nat. Hist., New York. I:xx+640 pp., 6 col. pls., 38 pls., 61 figs. II:vii+ pp. 641-1245, 10 col. pls., pls. 39-72, figs. 62-80.

Rankin, Niall (1951) — Antarctic Isle: Wild Life in South Georgia. Collins, London. 383 pp., 137 pls., 12 figs.

Richdale, L. E. (1950) — The Pre-egg Stage in the Albatross Family. Biol. Monog. No. 3. Otago Daily Times and Witness Newspapers Co., Dunedin. 92 pp., 13 figs.

Sorensen, J. H. (1950) — The Royal Albatross. Dept. Sci. Ind. Res., Wellington. Cape Exp. Ser., Bull. No. 2. 39 pp., 10 figs.

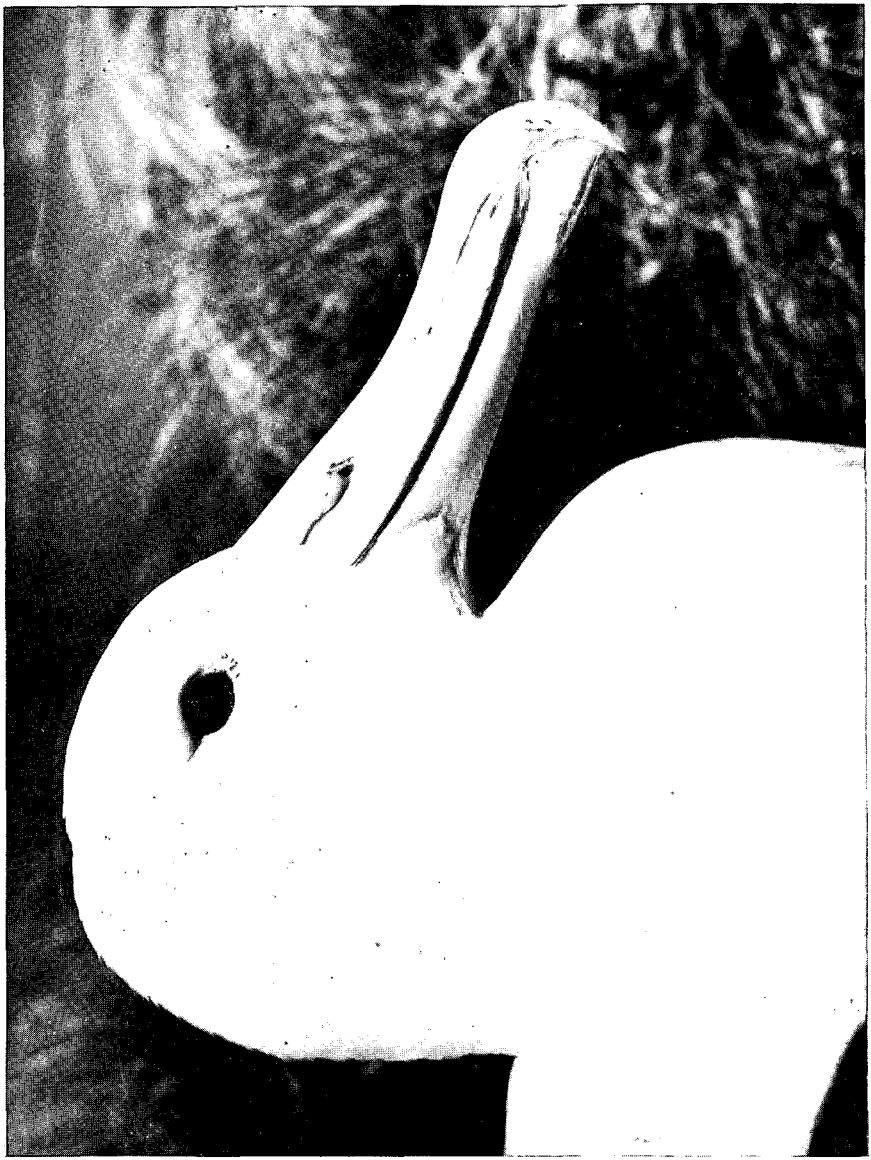
Waite, Edgar R. (1907) — The vertebrates of the subantarctic islands of New Zealand. Aves. pp. 551-584 in Charles Chilton (ed.): The Subantarctic Islands of New Zealand. Phil. Inst. Cantab. II: pp. 389-849, illus.

[Photo by Kaj Westerskov

I — Female Royal Albatross of type form **(Diomedea epomophora epomophora)** on nest, Campbell Island.

[Photo. by Kaj Westerskov

II — Female Wandering Albatross, distinguished by mottled plumage, near nest, Campbell Island.

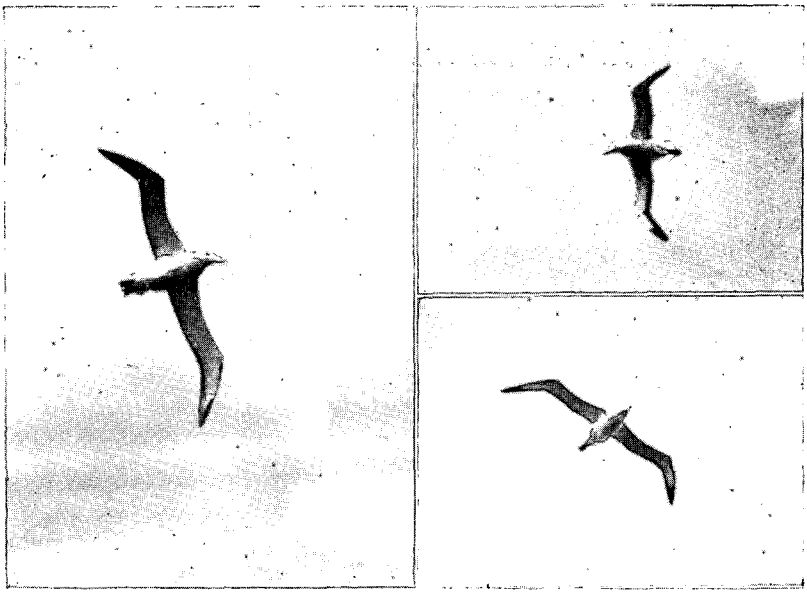


[Photo by Kaj Westerskov

III — Head of Royal Albatross showing distinguishing features; protruding nose-tubes, black eyelid and black line along cutting edge of upper mandible. Campbell Island.

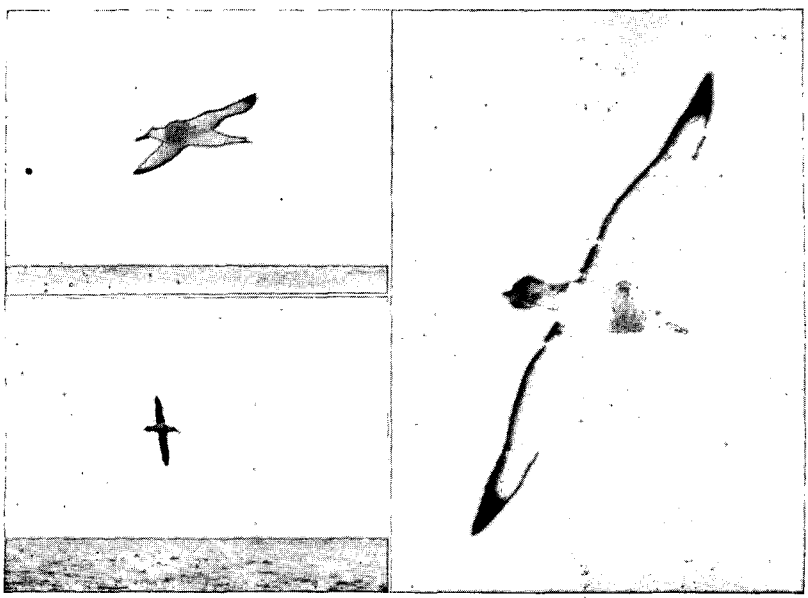
[Photo by Kaj Westerskov

IV — Royal Albatrosses rarely have any black on head — as in this bird of the northern subspecies, photographed at Taiaroa Heads.



[Photos by Kaj Westerskov

V — a, b, c — Soaring and flying Royal Albatrosses usually have wing-tips bent slightly backwards. Campbell Island.



[Photos by Kaj Westerskov

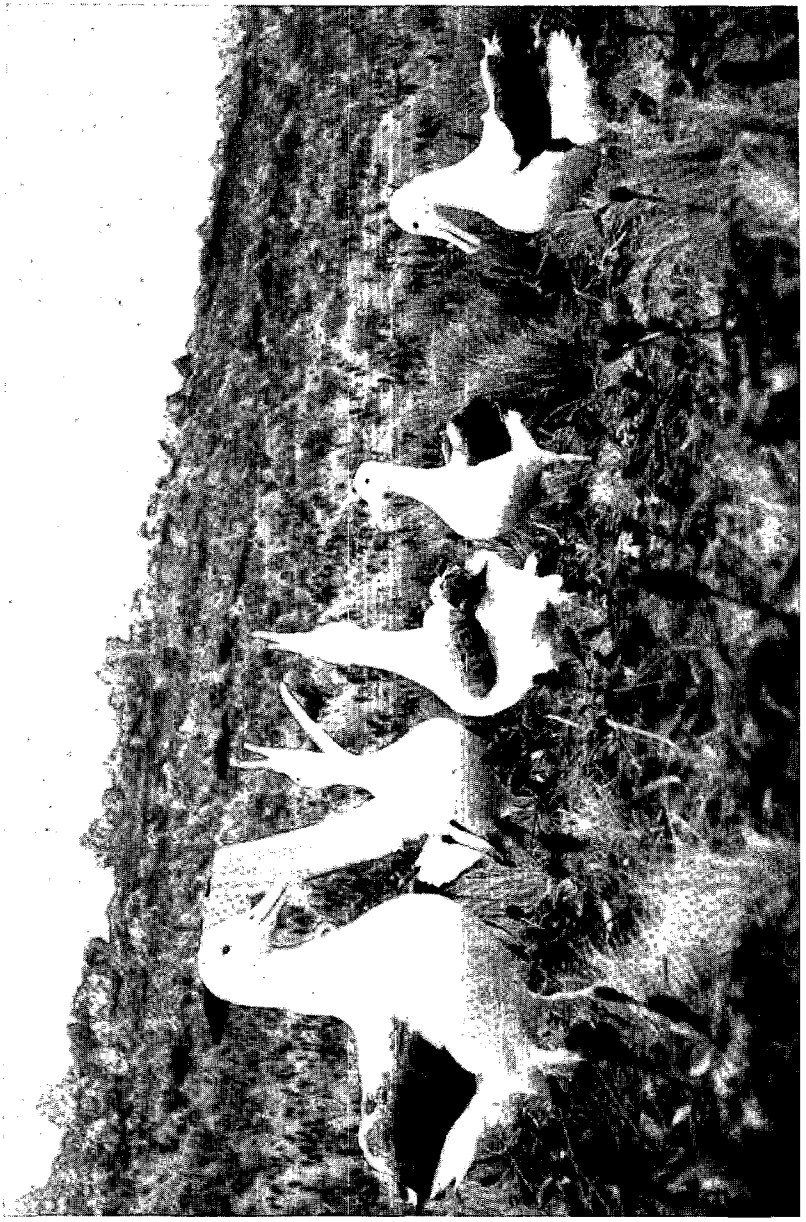
V — d, e, f — Soaring and flying Wandering Albatrosses usually have wings fully stretched. Indian Ocean.

[Photo by Kaj Westerskov

VI — The Northern Royal Albatross **(Diomedea epomophora sanfordi)** has all-black wings with no white olecranal patch. (cf. Plate VII.) Taiaroa Heads.

[Photo by Kaj Westerskov

VII — Pair of Southern Royal Albatrosses, female on nest; male, with much more white on wings, has come in to take over incubation. Campbell Island.



[Photo by Kaj Westerskov

VIII — Young Royal Albatrosses in a gam — the term used for a school of whales — now also used for a group of not-yet-breeding albatrosses sham-displaying and fighting, as a forerunner for the actual courtship display. Campbell Island.