FIRST RECORD OF THE BRIDLED (BROWN-WINGED) TERN (*Sterna anaethetus*) IN NEW ZEALAND

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On 25 November 1987, a beach-wrecked tern (*Sterna* sp.) was found by Peter Langlands on New Brighton Beach, North Canterbury, and brought to the Canterbury Museum for identification.

The tern was essentially intact (Figure 1D). The plumage was sparse on the head, mantle, neck and belly, most of the remiges and wing coverts of the left wing were present, and the tail was complete. The rhamphotheca on the upper mandible was loose. There was a hole in the belly, and the viscera and other internal organs, including the gonads, were missing. The tern, about the size of a Black-fronted Tern (*Sterna albostriata*) may have been dead for about a month.

A preliminary examination of literature indicated that the bird most resembled the Bridled Tern (*Sterna anaethetus*) and the Grey-backed Tern (*Sterna lunata*). An examination of study skins of both these terns confirmed that the corpse was a Bridled Tern. This is the first record of this species in the New Zealand region. Its identification was based largely on the colour and marking patterns on the wing and upper tail-coverts, along with other criteria, as discussed below. The bird has been deposited in the Canterbury Museum (AV 36659).

Description

Size: Body slightly bigger than that of a Black-fronted Tern but bill and tail longer.

Head and body: Forehead white (only one feather present); crown probably light brown with pale margins at tips but most feathers missing; nape feathers brown with white bases; mantle similar to nape; scapulars light brown distally, progressively getting lighter towards the base; back and rump similar to scapulars; chin, throat, neck, breast, belly, and flanks white.

Wings: Upper surface: coverts dark and light brown; remiges (on folded wing) brown; secondaries dark brown with white bases. Under surface: coverts white; tips and leading edges of primaries and secondaries silvery brown, becoming progressively paler towards the base, especially on the inside vane, which grades into white; marked similarly to upper surfaces but generally lighter, ranging from brown to greyish brown; axillaries silver grey with various amounts of white on the edges of the inner vane.

Tail: Upper tail-coverts light brown, under tail-coverts white. Terminal section of outer vanes and outer edges of outermost rectrices brown, paler towards base; inner vanes tipped brown, white at base. Central rectrices entirely brown or brown with inside vanes a lighter brown or white at base.

Bare surfaces: Upper and lower mandibles, legs, footpads, webs and claws black.

Moult: There was no evidence of moult in the little plumage remaining on the body. Feather sheaths at the base of the tail indicated that the central rectrices may still have been growing. There were no obvious differences in the lengths of the rectrices on each side of the tail. The remiges showed no evidence of replacement, except for some relict sheaths at their bases.

Condition of plumage: Of the nine primaries present (P1 and the remicle, P11, were missing), eight were fresh and P3 showed slight wear. The seven secondaries still attached were faded and more worn than the primaries. Except for the two central rectrices, which were fresh, the tail was heavily worn.

Measurements: See Table 1. The external measurements did not differ significantly from those taken from two study skins of *Sterna anaethetus*. The lengths of the body, tail and wing were, however, much smaller than those recorded in the literature (Table 2), but this may be a result of feather wear (on the tail) or uncompleted growth (of the primaries), or the bird may have been immature.

TABLE 1 — External body measurements (in mm) of *Sterna lunata* and *Sterna anaethetus*

Species	*S. lunata*		*S. anaethetus*		
Repository & Specimen Catalogue Number	AMNH 190847	AMNH 190841	AMNH 110875	AMNH 461569	CM AV 36659
Sex	F	M	F	M	?
Bill length	41.4	40.0	40.6	41	c. 40.3
Bill depth	9.3	9.5	10.3	9.5	8.4
Bill width (i)	9.6	9.4	9.3	9.0	9.4
Bill width (ii)	12.3	11.8	11.4	11.4	11.6
Posterior nares to bill tip	33.4	32.6	31.3	30.8	30.7
Nostril length	5.7	c. 5.7	5.4	c. 4.7	5.4
Tarsus	19.4	c. 20.2	20.3	19.8	20.2
Mid toe and claw	24.9	c. 25.4	29.5	28.5	27.9
Claw	7.8	9.3	8.0	7.0	7.8
Tail length	122	163.6(bt)	156 (w)	117.4(w)	116.6
Wing length	236	c. 261	254 (w)	247 (w)	242.
Total length	324	c. 354	337	311	c. 332

Key: (m) moulting; (w) worn; (bt) broken at tips; AMNH American Museum of Natural History; CM Canterbury Museum

TABLE 2 — Measurements (mm) from the literature (means in parenthesis)

	S. lunata	*S. anaethetus*			
Source	Alexander (1955)	Ridgway(1919)*	Alexander (1955)	Pringle (1987)	AV 36659
Bill length	M - F - ? 43.2-48.3	41.5-44 (43) 36-40.5 (38.2)	35.6-45.7	40-44(43)	c 40.3
Tarsus	M - F - ? 20.3-22.3	20-21.5 (20.7) 20	17.8-22.9	20-23 (22)	20.2
Middle toe	M - F - ? -	23-25 (23.8) 23		22.3	20.1
Tail length	M - F - ? 127-170.2	163-178 (170) 169-170 (169.5)	147.3-190.5	70-74	116.6
Wing length	M - F - ? 241.3-266.7	260-274 (267.7) 260-270 (265)	279.4-292.2	265-288 (271)	242
Total length	M - F - ? 342.9-281			c. 410	c. 332

Note: Alexander's (1955) measurements converted from inches to mm: *Pacific Bridled Tern, *S. anaethetus nelsoni*

Unfortunately, the immature plumage of *Sterna anaethetus* is similar to that of adults and the areas that do differ were either absent or sparse. The standard and other external body measurements of *Sterna anaethetus* and *Sterna lunata* overlap and so were of little use in differentiating between these species.

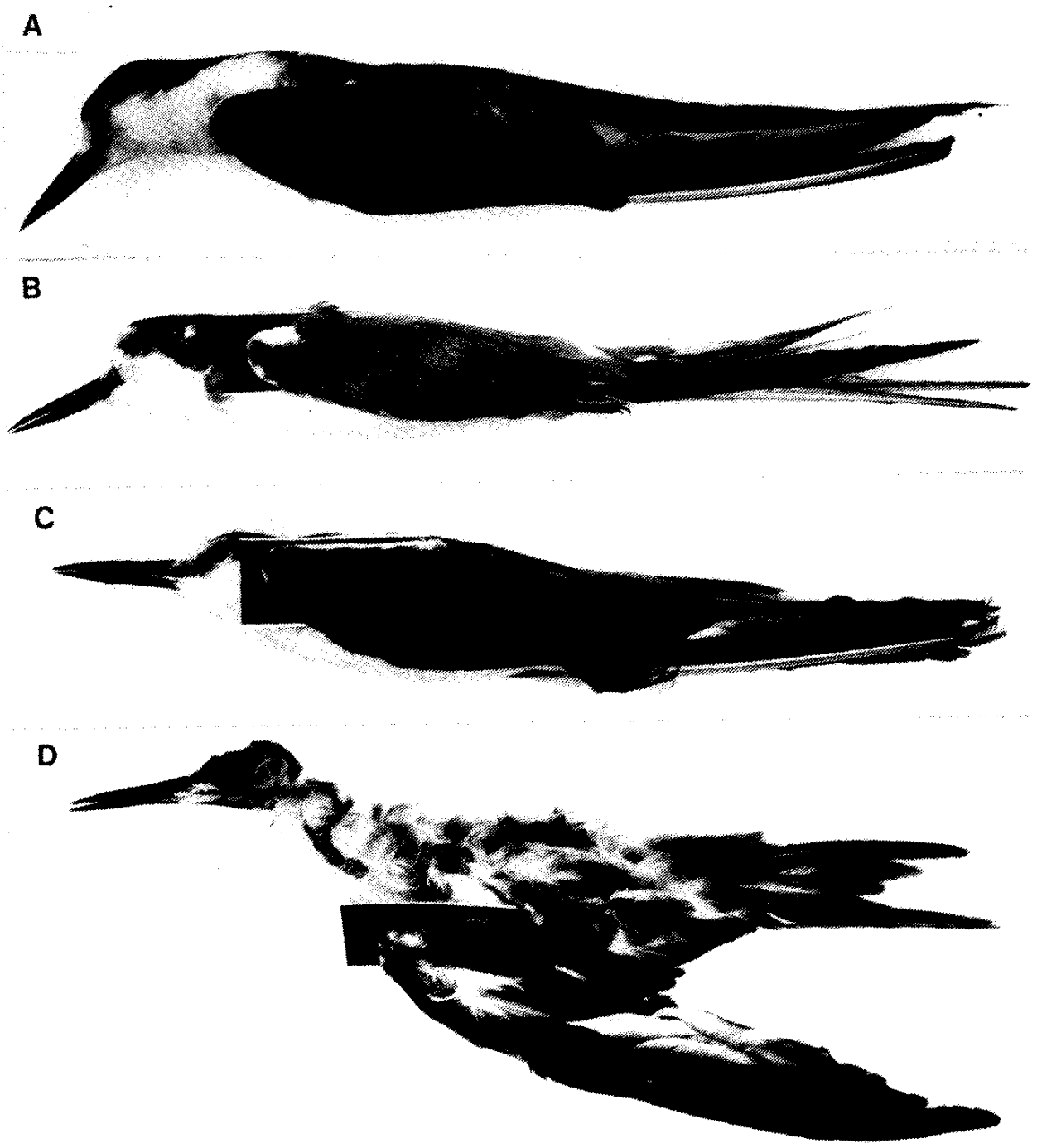

FIGURE 1 —Side views of (A) *Sterna fuscata* (AV 188), (B) *Sterna lunata* (AMNH 190841), (C) *Sterna anaethetus* (AMNH 461569), (D) *Sterna anaethetus* (AV 36659). Note the distribution of white on the outer marginal coverts on the forearm of (B) and (C). Black cards have been inserted behind the carpal flexure to accentuate the white marginal coverts. The dark primaries on (B) is a feature of the juvenile/immature plumage

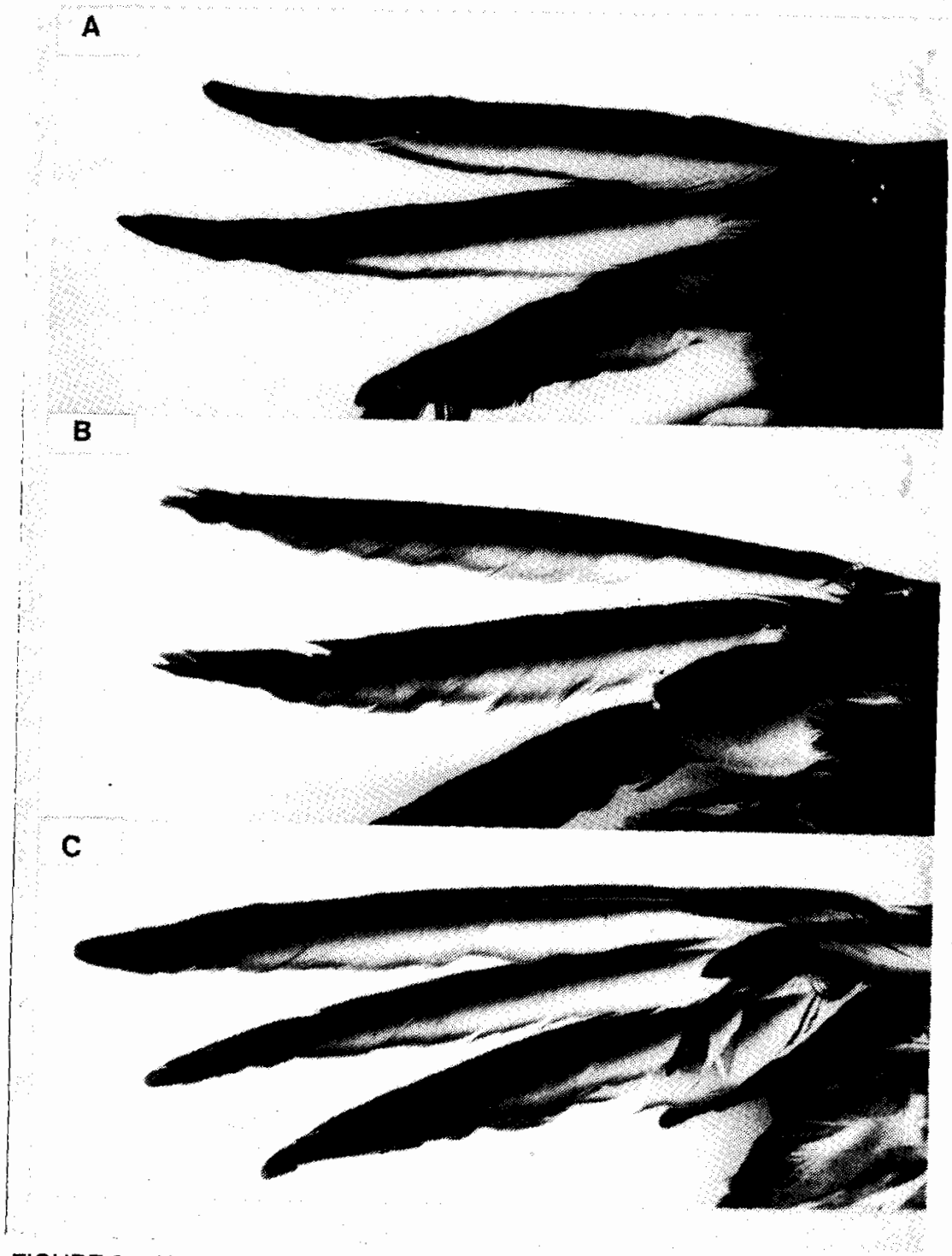

FIGURE 2 —Upper surfaces of outer primaries of (A) *Sterna lunata* (AMNH 190847, (B) *Sterna anaethetus* (AMNH 461569), (C) *Sterna anaethetus* AV 36659. Note the abrupt boundaries separating the light and dark zones on the primaries on (A) compared with the diffuse boundaries separating these two zones on (B) and (C).

Identification - criteria used

Alexander (1955) used the body size and the colour of the bill, feet, upperparts and underparts as characters to identify the various tern species.

The size, black feet and bill, *dusky upperparts*, and *white underparts* would make the present bird, by Alexander (1955), a Sooty Tern (*Sterna fuscata*), a Bridled Tern, or Grey-backed Tern (Figure 1).

The Sooty Tern was easily eliminated because it is larger and has an entirely dark vane between the shaft and trailing edge of the primaries. *Sterna anaethetus* and *Sterna lunata* have an extensive wedge-shaped lighter zone extending subterminally along much of the vane trailing the rachis on the upper surface of the outer primaries (Figure 2). On immature and adult *Sterna lunata*, the boundaries between these darker and lighter zones on the outer three primaries are abrupt, whereas on *Sterna anaethetus*, although the pattern is similar, the lines separating the lighter and darker markings are more diffuse and the shape of the wedge is not nearly so well defined (Figure 2). The upper surfaces of the outer primaries of AV 36659 were identical with the markings on *Sterna anaethetus* skins. The colour of the primaries was also close to that of *Sterna anaethetus*. On the specimen and on the study skins of *Sterna anaethetus*, lighter zones on the primaries were washed with a light brown; on *Sterna lunata* they are white. Furthermore. on AV 36659 and the *Sterna anaethetus* skins, the leading edges of the primaries and vane adjoining the trailing edges of the primary shafts are dark brown, whereas on *Sterna lunata* these are grey. AV 36659 also agreed with the Bridled Tern in having brown coverts on the outer wing, brown upperparts, and brown upper tail-coverts. These areas on *Sterna lunata* are light or dark grey.

Additional characters

We are confident of our identification of AV36659, but other features also justify our interpretation. These warrant inclusion because they may assist field observers or beach patrollers who find incomplete corpses of these two terns.

Tail: The patterns on the outermost rectrices of the two species are generally similar but the colours of these feathers are different enough to be useful in separating them. One of the most obvious and consistent differences was the mostly or entirely brown outer vane on R6 on *Sterna anaethetus* and AV 36659. On *Sterna lunata* it is grey or grey and white. Table 3 gives other differences in marking patterns and colour of the rectrices between the Bridled Tern and the Grey-backed Tern.

Distribution of white on the carpal flexure: On *Sterna lunata* and *Sterna anaethetus* the marginal coverts on the upper outer edge of the wing are white. On *Sterna anaethetus* the white extends as a narrow well-defined band of even width, whereas on *Sterna lunata* the marginal coverts are more extensively marked with white, producing a broad patch rather than a band (Figure 3). These differences are clearly visible on illustrations 693 and 695 of the Grey-backed Tern and Bridled Tern in Harrison (1987). On AV36659, only two-thirds of the proximal section of the leading outer edge of the wing was feathered, but the white on these formed a narrow band identical with this section of the wing on both *Sterna anaethetus* skins (Figure 3).

TABLE 3 — Distribution and marking patterns

	Outermost Rectrices	
	Outside Vane	**Inside Vane**
Terminal portion		
Sterna anaethetus		
AMNH 110875	Entire web dark brown	Terminally brown progressing into light brown subterminally
AMNH 461569	Entire web brown	Terminally brown progressing into light brown subterminally
AV 36659	Entire web dark brown	Light brown
Sterna lunata		
AMNH 190841	Alongside shaft grey; outer edge white, subterminally light grey	Alongside shaft grey; trailing edge and tip white
AMNH 190847	Tip grey; subterminally light grey	Grey
Sub-terminal section and base		
Sterna anaethetus		
AMNH 110875	Entire web dark brown	Dark brown passing into light brown; white at base
AMNH 461509	Entire web brown	Light brown getting whiter towards base
AV 36659	Light brown progressing to white at base; trailing edge dark brown	Light brown progressing into and becoming entirely white at base
Sterna lunata		
AMNH 190841	White	Light grey progressing into and becoming entirely white at base
AMNH 190847	Mostly light grey but white at base	Light grey subterminally progressing into and becoming entirely white at base
	Inner Rectrices	
	Outside Vane	**Inside Vane**
Sterna anaethetus		
AMNH 110875 and 461569	Light brown	Inner edges light brown, paler at base
AV 36659	Light brown	Inner edges light brown, paler at base.
Sterna lunata		
AMNH 190841 and 190847	Predominantly grey	Predominantly grey

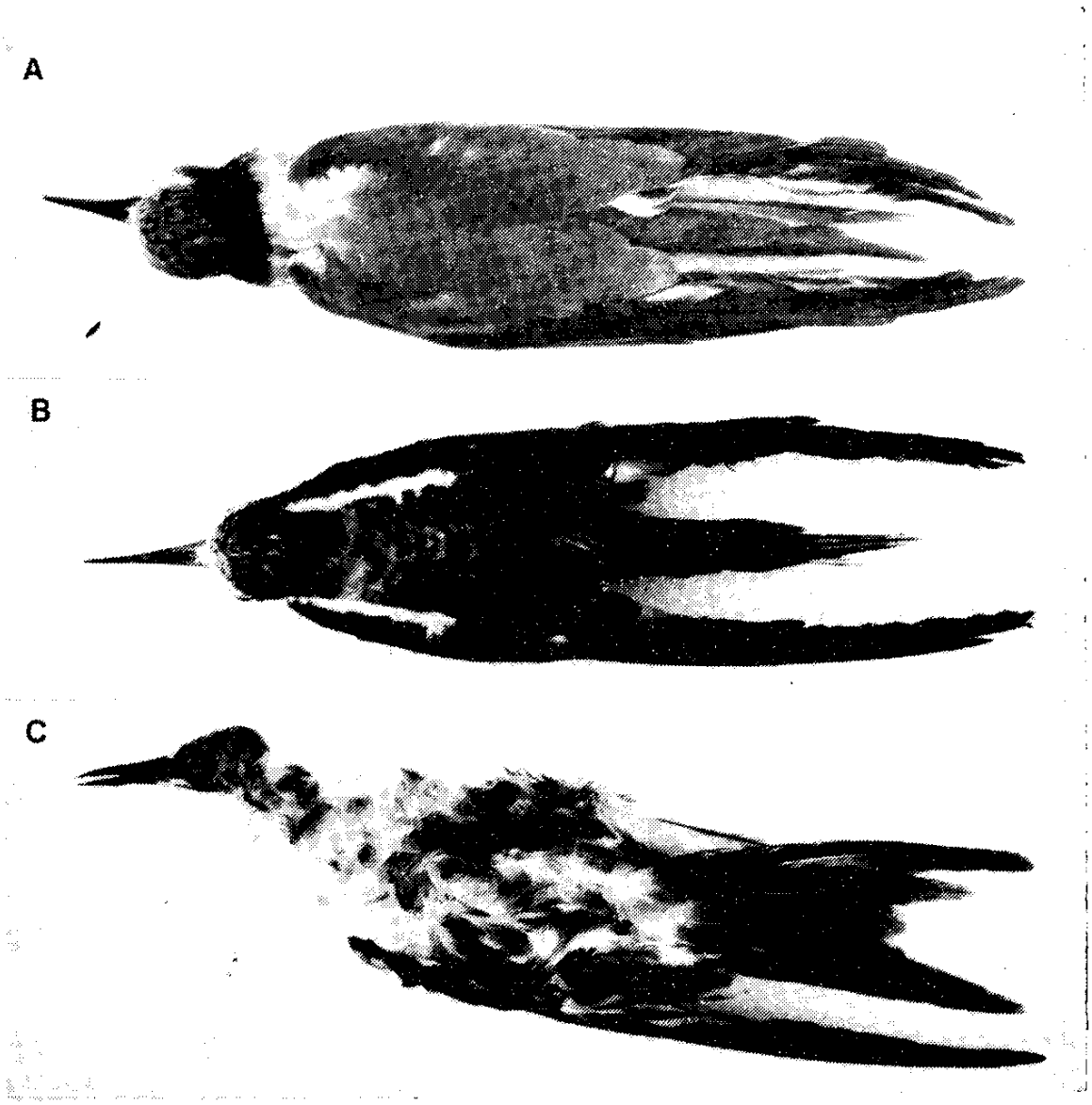

FIGURE 3 — Dorsal views of (A) *Sterna lunata* (AMNH 190847, (B) *Sterna anaethetus* (AMNH 461569), (C) *Sterna anaethetus* (AV 36659). Note how the upper tail-coverts and primaries on (A) are lighter than those on (B) and (C)

TABLE 4 — Length of forearm (mm)

	Left Wing	Right Wing
Sterna lunata		
AMNH 190841	18.9	18.0
AMNH 190847	18.0	15.2
Sterna anaethetus		
AMNH 110875	49.3	47.5
AMNH 461569	47.3	49.2
AV 36659	50.0	43.3

The data in Table 4 may eventually be reinforced by measurements of the humerus, but skeletal material was not available for this study.

Length of forearm: The length of the forearm (ulna) in the closed wing of the *Sterna anaethetus* skins and in AV36659 was at least twice that in the *Sterna lunata* skins (Table 4). This measurement was taken by inserting a card between the side of the body and under the closed wing (Figure 1B,C,D), pushing the card proximally until it was against the leading edge of the folded patagium, and marking the card immediately below the leading edge of the carpal flexure.

The measurement was the distance between this mark and the inserted edge. This measurement may vary on dried skins because the patagium may dry in different positions. The large differences in the forearm length between the two species seems a useful criterion for separating them.

The data in Table 4 may eventually be reinforced by measurements of the humerus, but skeletal material was not available for this study.

DISCUSSION

Frequent reference is made in the literature to the similarity of the Grey-backed, Sooty (*Sterna fuscata*), and Bridled Terns (e.g. Alexander 1955, Harrison 1987, Pratt *et al.* 1987). Because Sooty Terns occasionally straggle to the New Zealand mainland, it may be pertinent to mention other characters not already referred to which will help differentiate *Sterna fuscata* and *Sterna anaethetus*. Adult Sooty Terns are bigger (length 430 mm, wing span c.900 mm) and have darker upperparts than Bridled Terns (length 360 mm, wing span c.760 mm). The Sooty Tern lacks the pale hind collar of the Bridled Tern, and its white forehead does not extend behind the eye.

In eastern and south-western Australia, Bridled Terns breed in spring, whereas in north-western Australia and the Northern Territory they breed in autumn (Serventy *et al.* 1971). Harrison (1987) has also reported that egg laying dates vary with location, and so both juveniles and adults are likely to be found for most of the year. Immature Bridled Terns are similar to adults, except that the feathers of the upperparts have pale tips and are more buff brown. Immatures also have a darker forehead. The darker primaries of immature *Sterna lunata* (a character that was present on AMNH 19084) closely resemble those of the Bridled Tern, but this was not mentioned in most field guides we consulted.

The longer forearm of *Sterna anaethetus* is in keeping with its wandering oceanic behaviour, whereas the shorter inner wing of *Sterna lunata* is consistent with its apparently more sedentary habits.

The wide range in body measurements of the Bridled Tern and variation in colour reported by Ridgway (1919) might be expected in a species which breeds on islands and in geographical areas that are well apart. Note that the tail length (Table 2) given by Pringle (1987) is far too small and was presumably a mistake or taken from a bird whose rectrices were immature, damaged or being replaced.

If the "greenhouse effect" does take place, the Grey-backed Tern is one warmer latitude species which, although believed to be sedentary and confined to the central tropical Pacific, might expand its range and reach New Zealand, together with more frequent records of Bridled and Sooty Terns.

To the best of our knowledge, this first record of Bridled Tern in New Zealand (which has been accepted by the OSNZ's Rare Birds Committee) is the most southerly record to date.

Details of material examined: *Sterna anaethetus*, AMNH, 461569, male, Trisel Edam, Java, 1 October 1915; AMNH, 110875, female, near coast of British North Borneo, 31 December 1909; *Sterna lunata*, AMNH, 190841, male, Raiatea, Society Islands, 11 January 1922, iris brown, bill black, feet black, gonads small; AMNH, 190847, female, Raiatea, Society Islands, 11 January 1922, iris brown, bill black, feet black, ovary with distinct eggs; Canterbury Museum, Christchurch, New Zealand: AV 36659, New Brighton, Christchurch (beach-wrecked specimen), 25 November 1987.

Author's Footnote: *Sterna lunata*, AMNH 190841, outer surfaces of primaries dark; AMNH 190847, outer surfaces of primaries grey.

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