

# COOKILARIA PETRELS IN THE EASTERN PACIFIC OCEAN

## *Part II of a Two-Part Series*

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### SPECIES ACCOUNTS

#### COOK'S PETREL (*Pterodroma cookii*)

**IDENTIFICATION:** Cook's Petrel is a medium-sized *Cookilaria*. It has perhaps the most distinctive shape of the group, exceptionally long-winged and short-tailed, as befits the most migratory species. The tail is gradually wedge-shaped, rounded when spread, and looks short under all conditions. The observer in the eastern Pacific should learn the shape of Cook's Petrel as a standard against which to compare other species. It tends to fly in quick arcs under all conditions except near calm, when it flaps and glides.

Cook's Petrel is very pale. In fresh plumage, the head and back show no contrast and a dark gray "M" is apparent across the pale gray mantle (Fig. 3). The head in fresh plumage is pale with a dark eyepatch, which varies among individuals and with wear. Separation of the gray cap from the white lower face is not well-

defined, and no definite cheek patch or "half collar" is present. The dorsal color is such a pale gray that the white forecrown may be overlooked. This pale color extends to the uppertail coverts, although the tertials often overlap the rump in a black "V" (the center of the dorsal "M"). The overall pale look is emphasized by extensive white in the tail, often visible at long distances.

Wear may give a bird a dusker appearance, especially around the head and nape (Fig. 4). Worn Cook's in April-July may look quite dusky-headed; at a distance the impression may be of a "shadow hood," especially if the back feathers are fresh, giving a slight contrast suggestive of Stejneger's Petrel. There is actually no overlap in the head/back contrast between the darkest-naped Cook's and the least contrasty Stejneger's, even on the most worn birds. We scored 84 Cook's and 21 Stejneger's specimens, in a complete range of molt, on a scale from 0 (no contrast between nape and back) to 3

(extreme contrast). Cook's averaged a score of 0.4, while Stejneger's averaged a score of 2.8. The most worn and contrasty Cook's was scored at 1.5 on this scale, while the least contrasting Stejneger's was rated at 2.0. However, when birds are worn or molting, the tail pattern, face pattern, size, and shape are more useful in identification.

The tail of Cook's Petrel is distinctly patterned. The gray central rectrices have a definite dark tip (difficult to see except under good conditions), and the outer rectrices are white to varying degrees (see Fig. 3). All *cookii* have some white in the outer rectrices, mainly on the inner webs, usually extending to the outer webs of the outermost 2-3 feathers. A few have extensive white to the four outermost rectrices (6 of 78 tails scored). In the field, these birds look as if they have a white tail with a dark central stripe (Fig. 5). The pattern on each rectrix can be highly variable, but in general Cook's has much more white than other species. A typical Cook's tail is shown in Figure 6. Table 1 illustrates variation within species. Newly growing tails may appear atypical, looking as if they have a complete white fringe around a dark tail, probably when the dark central rectrices are briefly shorter than the white outers.

The underwing surface is entirely white, except for narrow dark margins and a thin, short carpal bar (Part I, Fig. 2). This carpal bar is usually not visible at distances beyond 200 m. The bill is rather thin and long.

**DISTRIBUTION:** Cook's Petrels breed from October to April in two locations, nearly a thousand miles apart, off New Zealand: at Codfish Island in Foveaux Strait off South Island, and at Little Barrier and Great Barrier islands off North Island (Map 1). Eggs are laid in early November on Little Barrier Island, but a month later on Codfish Island (Falla *et al* 1970). By the end of March nesting

is normally finished (Falla 1934).

There appear to be three general areas where Cook's Petrels molt and spend the northern summer:

Numerous *Cookilaria* are in the north Pacific convergence zone at about 35° to 45°N and from about 160°E to 160°W (Gould 1983, Wahl *et al.* 1989, R. Rowlett in litt.), with an occasional bird as far north as 52°59'N (July 16, 1981; T. Wahl). Specific identity of some of these is not yet settled; however, it was a *cookii* that came aboard a ship south of Adak Island, Aleutians, about 50°N (Anthony 1934). Cook's is the only species documented in the high north Pacific, and most of the birds appear to be of this species (R. Rowlett, T. Wahl, pers. comm.).

The largest concentrations appear April-November off central California to the tip of Baja California, Mexico, particularly west of the continental slope 60-300 miles offshore. The California range is probably only the northern fringe of a concentration zone between about 40°N and 20°N. Highest numbers are in the southern

portion of this zone. Loomis (1918) reported 19 specimens taken by Rollo Beck in July 1905 at 22°25'N, 112°40'W, southwest of the tip of Baja California, and others were taken in this general vicinity in July 1967. Pitman (1986) mapped major concentrations here. Roberson and Rowlett estimated 3000-4000 birds over a 10-mile stretch off southern Baja California on July 31, 1989 at about 26°31'N, 116°40'W.

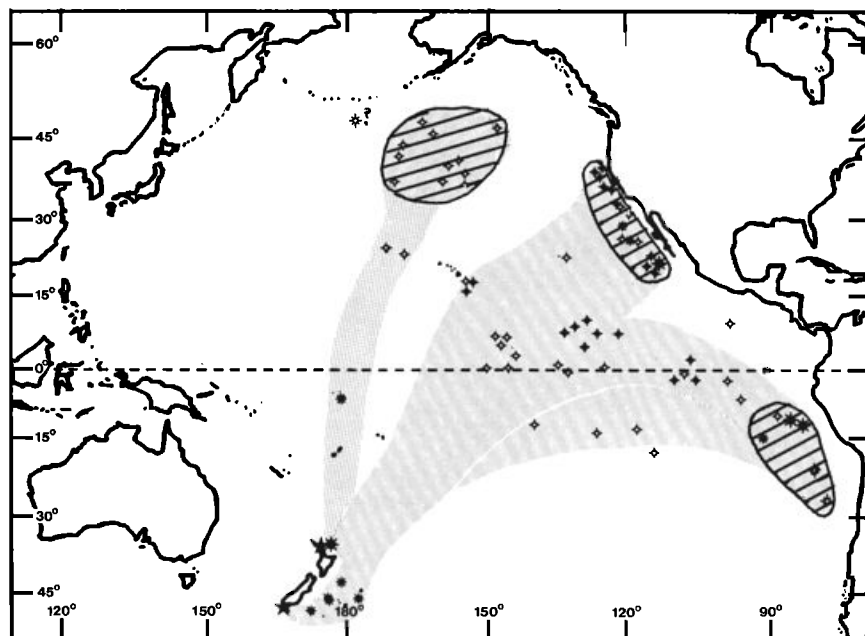
The third concentration area is west of the Peru Current off Peru and Chile. Rollo Beck was able to collect numerous birds from 80-200 miles offshore and from 5°S to 26°S. The latter birds were found in association with *P. defilippiana*, which is at its nesting islands August-December (Murphy 1936). Pitman (1986) found concentrations in this area exceeding four birds/hour. Thus the number of birds present April-October at all three widely separated areas is substantial.

Between these areas are apparent migration corridors through the tropical eastern Pacific, east of

Hawaii and west of about 120°W, with a longer corridor along the equator dipping down into the Peru Current (Map 1). The north Pacific concentration areas may be reached *via* migration corridors in the central and western Pacific. Pyle and Eilerts (1986) report five birds flying south in November through northwestern Hawaiian waters.

**MOLT:** Birds from Alaska to Peru are in heavy molt late April through July. These birds are often ragged and patchy, but retain the species' characteristic shape (Fig. 4, Part I Figs. 1 and 2). Body molt appears completed by mid-August to mid-September, and by October birds are in fresh plumage (though one nesting bird from December was still growing rectrices; A.I.M. specimen). A minority may be in molt at any date. It is thus possible, though rare, to have a worn bird among the many crisp birds from October-December. Birds in their first year may molt later than adults (as in Leach's Storm-Petrel; Ainley *et al.* 1976).

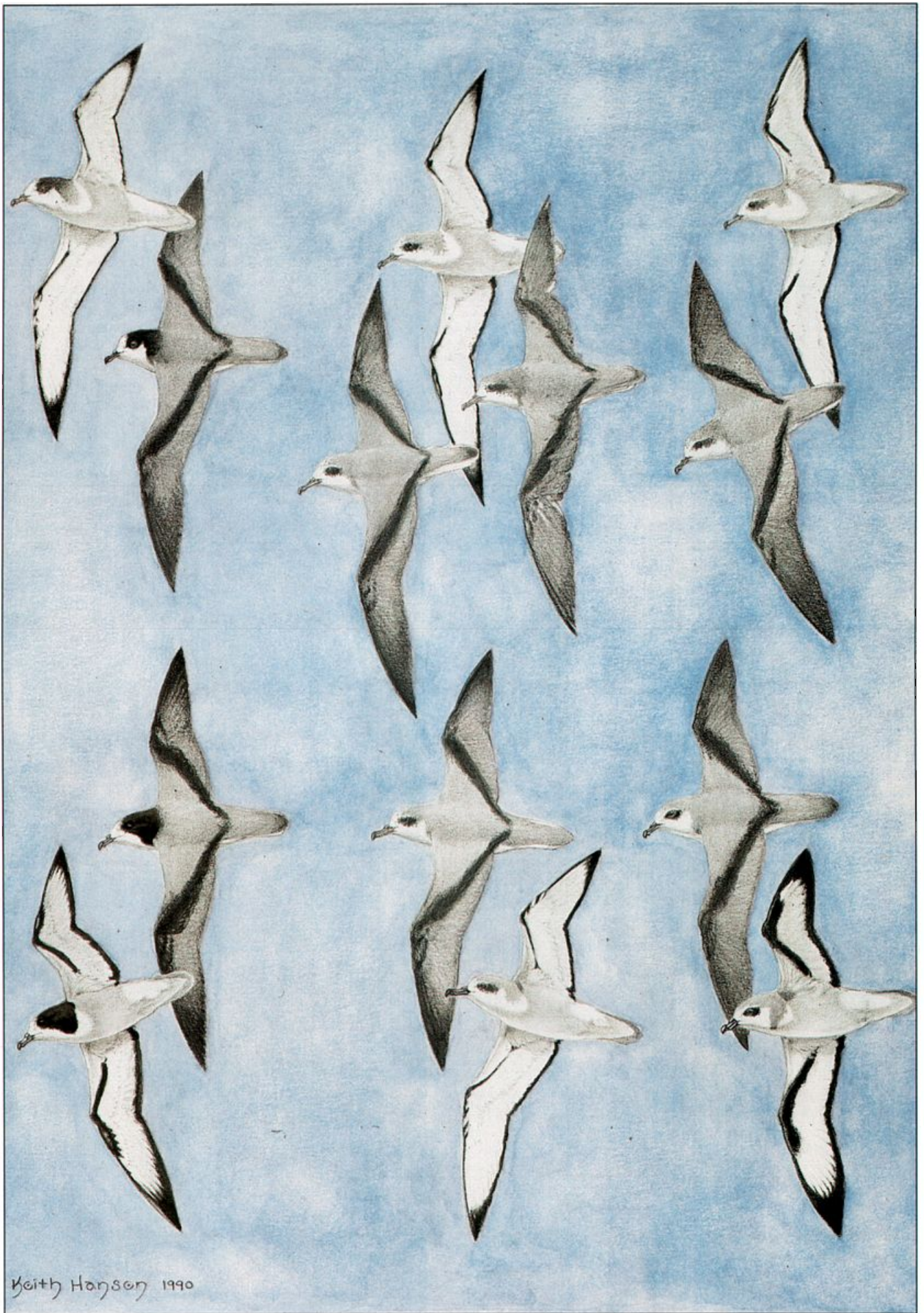
**POPULATION:** The apparent huge numbers of Cook's Petrels spending the austral winter in the northern and eastern Pacific elicit wonderment: these numbers seem higher than current estimates of total breeding pairs. Robertson and Bell (1984) conservatively estimated the population on Little Barrier Island at 10,000-50,000 breeding pairs, but other observers consider the population much lower (P. Harper in litt.). Severe predation by cats and rats has severely impacted birds on Great Barrier Island. About 200 pairs were pre-



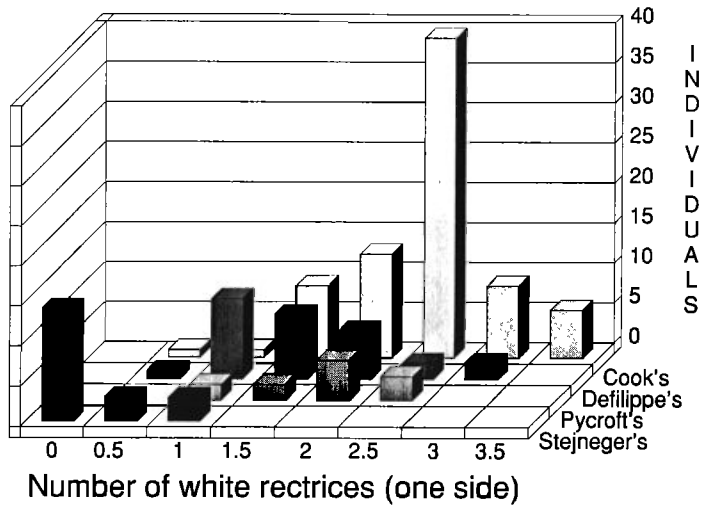
**Map 1.** Range of Cook's Petrel (shaded). Areas of concentrations in non-breeding season are cross-hatched.

**Key to symbols:** Breeding islands (stars); specimens examined (solid sunbursts; larger sizes indicate multiple specimens); other specimens cited in the literature (open sunbursts); sight and photographic records by the authors (solid diamonds); other acceptable site and photographic records (open diamonds). A question mark indicates that the exact location is not precisely known, and the location shown is approximate only.

**Plate:** (Right) Six species of *Cookilaria*, all in fresh plumage except as noted. Top row, left to right: Stejneger's Petrel (ventral and dorsal view); Cook's Petrel, (ventral and center left dorsal view, fresh plumage; central right dorsal view, worn plumage); Pycroft's Petrel (ventral and dorsal view). Bottom row, left to right (dorsal and ventral view each species): White-winged Petrel; Defilippe's Petrel; Black-winged Petrel.



**Table 1. Variation in white rectrices (one side) among selected *Cookilaria* petrels**



**Table 2. Selected biometrics (in mm.)**

	n <sup>1</sup>	Culmen		Bill depth		Wing <sup>2</sup>		Tail	
		Range	Avg.	Range	Avg.	Range	Avg.	Range	Avg.
Cook's	20	25.1-30.0	27.3	6.3-7.1	6.7	227-250	235	89.7-96	94
Defilippe's	30	27.1-30.5	28.2	7.1-8.9	7.9	220-241	231	95-113	102
Stejneger's	24	20.5-25.2	24.0	5.8-7.0	6.7	207-230	219	89-106	98
Pycroft's	23	22.6-27.2	24.3	5.5-7.0	6.3	210-226	217	88-103	94
White-winged	39	23.5-27.5	25.4	not available		201-238	**	89-102	96
Black-winged <sup>2</sup>	35	23.5-25.0	24.2	not available		217-237	221	92-102	98

<sup>1</sup> Number of specimens examined varies; n=maximum number examined for any parameter.

<sup>2</sup> Wing lengths and Black-winged Petrel biometrics are taken from the literature and are subject to greater variation than other biometrics given.

\*\* Average wing lengths of White-winged Petrel vary substantially with race; nominate birds average 225mm, *caledonica* averages 227mm, and *brevipes* averages 215mm.

sent in 1976 (P. Harper in litt.), but fewer than 20 pairs were found in the early 1980s (Robertson 1985), with none found during 1987-1989 (Scofield 1990). Some 35,000 were estimated to nest on Codfish Island in 1935, but the population there has severely declined (Ellis 1975). Recently only 100 pairs have been thought present (Robertson 1985, Collar and Andrew 1988).

**DEFILIPPE'S PETREL (*Pterodroma defilippiana*)**

**IDENTIFICATION:** Defilippe's Petrel is a robust version of Cook's Petrel. It is proportionately shorter-winged than Cook's, and its thick bill lends to the overall chunky impression. The tail is

long and more wedge-shaped than Cook's. Given a shape more like that of White-winged Petrel, we would expect it to appear more languid and "horizontal" in flight than is Cook's in similar conditions. Some observers describe the flight as "fluttery" (W.R.P. Bourne in litt.).

The plumage is quite similar to Cook's. Just as with Cook's Petrel, wear causes the plumage to darken, and birds in May have looked rather darkish on the head and back. Harrison (1987) suggested that this species might have more extensive black eye-patches than Cook's, but our review of specimens revealed a complete overlap in the size and shape of the eyepatch between Cook's and Defilippe's, owing to molt (fresh

birds show the most prominent eye-patches, worn birds the least). There is one fairly consistent head pattern feature. Defilippe's has a white cheek that curves up behind the auriculars in a short "half-collar," which is easy to see in the field (see Figs. 7, 8, 9). This is lacking or insignificant on Cook's Petrels. Twenty-three of 28 *defilippiana* we reviewed clearly showed this feature, and the remainder of the specimens hinted at it, while only 13 of the 72 *cookii* we scored (18%) showed any suggestion of a half-collar, and at most it was only a poorly defined indentation (Fig. 3 illustrates a Cook's with this suggestion, while the other photos of Cook's show the more typical pattern).

Tail pattern completely separates Defilippe's from Cook's and Pycroft's petrels. Defilippe's has uniformly gray central rectrices *without the dark tip* shown by all Cook's and Pycroft's (Figs. 7 and 8). Alas, it is our experience that a bird must be approached to within about 100 m to determine with confidence whether the central rectrices have a dark tip. Defilippe's has much white on the outermost rectrices, including much white on the outer web of the outermost two feathers. On average, Defilippe's shows less white in the tail than Cook's, but there is much overlap (Table 1). However, none of 30 *defilippiana* specimens with full tails had white on the outer web inside the second rectrix, or much white on the inner web inside the third rectrix, and there is no evidence that Defilippe's may show the white-tail-with-dark-central-stripe pattern shown by a minority of Cook's. A bird with an extreme amount of white in the tail should be a Cook's.

Tail shape differences are also relatively apparent. While Cook's always looks short-tailed (emphasized by its long thin wings), Defilippe's looks long-tailed and the tail is more wedge-shaped. The exceptionally long tail of Defilippe's was first noted

by Murphy (1936), and the more-wedged tail was supported by our measurements of rectrices on specimens. While the least-wedged tail of Defilippe's was only slightly more pointed than the most pointed Cook's, the averages are quite different and tail shape is a good average character between the species.

The underparts are similar to those of Cook's, except that the thin carpal bar is slightly longer (compare Fig. 9 and Part I Fig. 2). Some observers off Peru have described broader dark margins to the underwings than noted on Cook's Petrel. However, we measured the extent of dark margins on the outer primaries of 18 *defilippiana* and 10 randomly selected *cookii*. The Defilippe's had wingtip margins 30-54 mm wide and averaging 40 mm. Those of Cook's were 40-68 mm and averaged 51 mm

usually seem to have proportionately broader margins than distant birds.

The bill is large and chunky (Table 2). Under good conditions one might be able to distinguish this bill shape from the slimmer-billed Cook's; but if one is that close, more attention should be directed to tail pattern than to the bill.

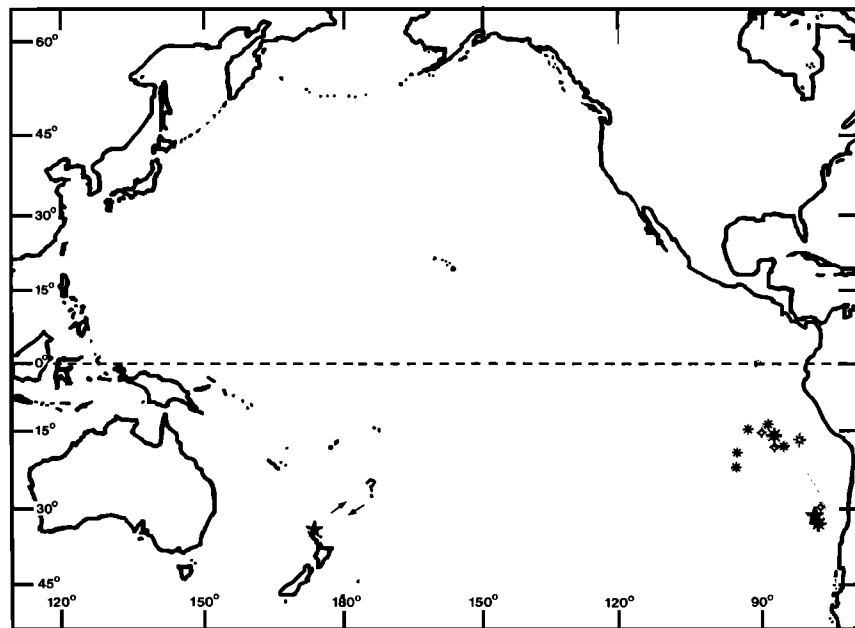
**DISTRIBUTION:** Defilippe's Petrels breed on the Juan Fernandez Islands of Santa Clara and Robinson Crusoe (= Mas a tierra Island), about 300 miles off central Chile, and on the Islas Desventuradas of San Ambrosio and San Felix, some 400 miles farther north and over 500 miles off northern Chile. Unlike Cook's, which is a burrow nester returning to land at night, Defilippe's nests on the surface and in crevices and caves, and visits the breeding islets during the day

February (Murphy 1936).

The species is largely absent from waters around these islands February to May (Murphy 1936, Harrison 1985). Most migrate north in waters west of the Peru Current (Map 2), where they occur along with Cook's. Rollo Beck found it only 50 nautical miles off Peru in June, but it was much more common 150 miles offshore (Murphy 1936). It has occurred nearly 1550 nautical miles west of Chile at 20°S, 95°05'W (undated specimen at SDNHM). There is no acceptable evidence that it occurs farther north than 12°S, although Peter Pyle saw three *Cooki-laria* 40 miles southwest of Isabella Island, Galapagos Islands, at about 2°S, February 12, 1989 that he considered "possibly" Defilippe's. There is no evidence that this species has occurred north of the equator, and except perhaps under El Niño conditions, we do not consider Defilippe's Petrel likely for vagrancy anywhere near North American waters.

**MOLT:** Molting birds have been seen at sea November-May (Pitman in litt.) and some June specimens are in heavy molt. Like the Cook's, Defilippe's molts after nesting and is in fresh plumage by the time it returns to the breeding grounds. It becomes quite worn on the nest and is the dingiest after breeding, before annual molt. Since its breeding season starts three months or more before Cook's, it is in fresh plumage earlier. Some June specimens were quite fresh, as the bird photographed in May (Fig. 8). Juvenal plumage is fresh during December-March, when adults are quite worn.

**POPULATION:** Jehl (1973) described "ten thousand or more chasing, calling birds" in late June 1970 on Ambrosio Island; only a dozen were on nearby San Felix Island. Millie (in Johnson 1965) reported only 150-200 pairs on San Ambrosio by October. The population around Robin-



**Map 2. Range of Defilippe's Petrel (eastern Pacific, off South America) and of Pycroft's Petrel (western Pacific, New Zealand). See Map 1 for key to symbols. Arrows to and from northern New Zealand indicate a probable direction of migration for Pycroft's Petrel, but the parameters thereof are not currently known.**

wide. Thus, specimen review did not support this potential field character, and we do not see significant differences in photographs. Distinguishing small differences in the width of the underwing margins in the field is likely impossible, given the problem of "sea glare illusion": close birds will

(Jehl 1973, W.R.P. Bourne in litt.). Birds on San Ambrosio Island may begin nesting as early as June (Jehl 1973), but those on Robinson Crusoe Island apparently begin nesting in August or September (Murphy 1936, Johnson 1965). Young have been found on San Felix as late as



**Fig. 3.** Fresh Cook's Petrel north of New Zealand, December 20, 1981. Note dark tip to central rectrices. Photograph/Piet Meeth.



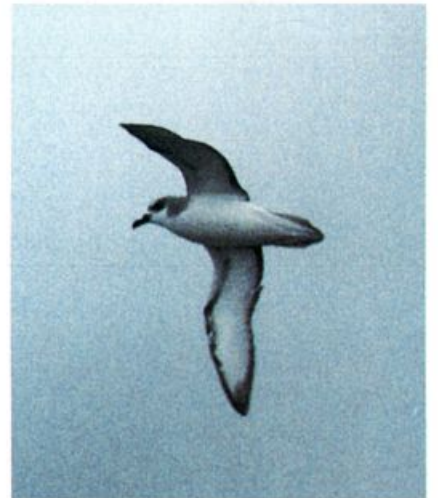
**Fig 6.** Outer rectrices of typical Cook's Petrel, AMNH 254312. Collected at 37°S, 179°W, December 1, year unknown. Photograph/Stephen F. Bailey.



**Fig. 4.** Worn Cook's Petrel north of North Island, New Zealand, December 20, 1981. Note dusky nape, browner plumage. Photograph/Piet Meeth.



**Fig. 7.** Defilippe's Petrel off Valparaiso, Chile, in February, 1974. Note chunky, short-winged shape, white half-collar to auriculars and sides of neck, and lack of dark tip on tail. Photograph/Lars-Erik Löfgren.



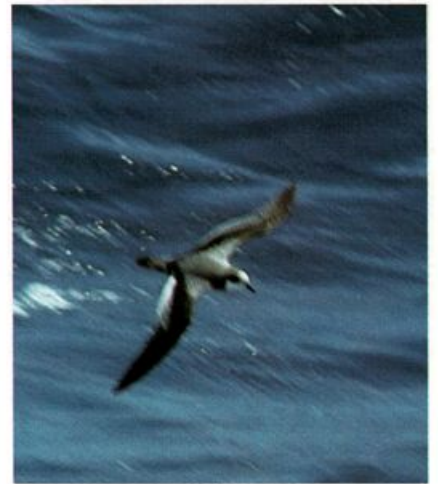
**Fig. 9.** Defilippe's Petrel off Peru, July 17, 1988. Photograph/Ben Haase.



**Fig. 5.** Fresh Cook's Petrel showing extreme amount of white in outer tail, about 55 nautical miles southwest of Pt. Sur, Monterey Co., California, November 17, 1979. Photograph/Don Roberson.



**Fig. 8.** Defilippe's Petrel off Peru at 15°S, 85°W, May 3, 1986. Photograph/Robert L. Pitman.



**Fig. 10.** Stejneger's Petrel at 10°N, 147°W, October 8, 1987. Note striking mantle pattern, reduced blackish hood, prominent white forehead, and white half-collar to sides of neck. Photograph/Peter Pyle.



**Fig. 11. Stejneger's Petrel at 0°, 140°W, October 13, 1987. Photograph/Peter Pyle.**



**Fig. 12. Variation in head pattern of Stejneger's Petrel, specimens at AMNH. Note that wear darkens mantle and reduces head/back contrast. Photograph/Stephen F. Bailey.**



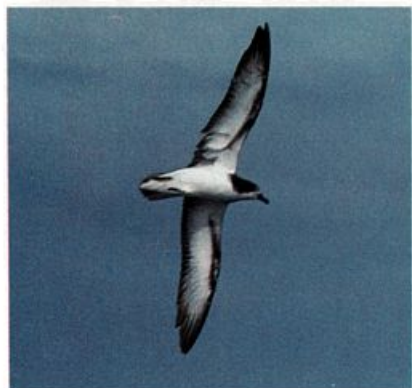
**Fig. 13. Comparative head patterns of *Cookilaria*, from top to bottom: Defilippe's Petrel (UMMZ 217783, San Ambrosio I., Chile, June 27, 1970); Pycroft's Petrel (AIM AV200.24, Hen I., New Zealand, November 26, 1933); Stejneger's Petrel (CMNH 122982, near Masatierra I., Chile, January 3, 1914); Cook's Petrel (AIM AV148.45, Auckland, New Zealand, May 26, 1943). Photograph/Stephen F. Bailey.**



**Fig. 14. White-winged Petrel at 0°; 124.5°W, October 18, 1987. Note extent of black hood. Photograph/Peter Pyle.**



**Fig. 15. White-winged Petrel in molt, eastern tropical Pacific, February 19, 1983. Photograph/Robert L. Pitman.**



**Fig. 16. White-winged Petrel at 7°N, 140°W, November 24, 1988. Photograph/Peter Pyle.**



**Fig. 17. Black-winged Petrel at 5°N, 140°W, November 23, 1988. Photograph/Peter Pyle.**



**Fig. 18. Black-winged Petrel, Tasman Sea, December 28, 1981. Photograph/Piet Meeth.**

son Crusoe Island was in the hundreds, perhaps thousands, in December 1985 (de L. Brooke 1987), but predators probably prevent nesting there now. In recent years, evidence of nesting has been restricted to Santa Clara Island (de L. Brooke 1987) and nearby islets (W.R.P. Bourne in litt.).

STEJNEGER'S PETREL (*Pterodroma longirostris*)

**IDENTIFICATION:** Stejneger's Petrel is among the smallest and fastest *Cookilaria*. Compared to Cook's, which it resembles at a distance, it has shorter wings (still looking quite thin) and a longer tail. The "M" across the mantle is quite black and contrasts strongly against fresh pale gray mantle feathers (Fig. 10). At a distance it looks overall darker than Cook's.

The underparts and underwings are very like Cook's, looking simply "all white" at a distance, but showing a thin black margin and a thin carpal bar at close range (Fig. 11). When lighting is good and the bird is close, the margins look broader and the thin carpal bar longer than on Cook's. Except for a darker tip, the upper surface of the tail is uniformly medium gray, consistent with rump color, and only the outermost rectrix shows white at close range. This is different from Cook's, which often shows a white-sided tail at a distance. The tail is also proportionately the longest and most wedge-shaped of the group.

The well-defined black half-hood is apparent at medium and close range (within 300 m). It contrasts strikingly with the white forecrown, white lower face, and gray back (at the nape). The white of the face curves up on the auriculars, as on Defilippe's, but is more conspicuous owing to contrast. The pattern recalls a first-winter Franklin's Gull (*Larus pipixcan*). Unlike White-winged Petrel, the hood does not extend diagonally down from below the eye

onto the sides of the breast. Instead, the black is restricted by the white "half-collar," and the gray pectoral patches are relatively small. Stejneger's looks white-faced with a neat half-hood; White-winged looks dark-faced with a white forecrown.

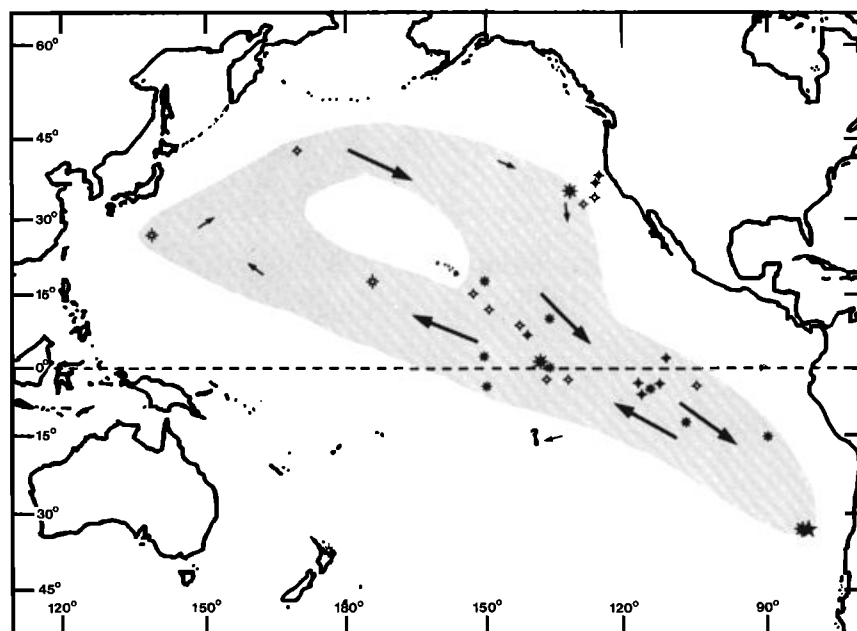
Although the half-hood is characteristic, it can be difficult to see at a distance when the bird is angling away. This is unlike White-winged Petrel, which shows the extensive black hood at long distance. Under these conditions, one is likely to be struck with Stejneger's decisive mantle pattern first. Figure 12 illustrates variation in the contrast of the blackish hood. The bill is short and thin.

**DISTRIBUTION:** Stejneger's Petrels nest December to March on Isla Alejandro Selkirk (= Mas Afuera Island), of the Juan Fernandez group off Chile (de L. Brooke 1987). It is a migrant to the northwest Pacific off Japan, but the migration route has been poorly known. It now appears birds move through a corridor southeast of Hawaii toward the western Pacific, with birds regularly here in April-June (Map 3). Birds have strayed as far south as North Island, New Zealand (Falla 1962).

Birds are west of Hawaii (Clapp 1984) and in the western Pacific by June and apparently remain through the northern summer. There may be a clockwise movement through the north Pacific in the northern late summer and fall. Wahl has seen the species as far north as 45°50'N, 168°13'E. Several were collected about 600 miles off California in November 1908 (Loomis 1918, Moffitt 1938), and others have been seen in November off California, suggesting a regular passage. Others are heading southeast past Hawaii by September, and numbers are found in this corridor by October-November (P. Pyle, R. Pitman pers. comm., pers. obs.).

**MOLT:** Stejneger's Petrel follows the same pattern as other *Cookilaria* migrants, molting on the non-breeding grounds in the northwest Pacific (Falla 1942). Fresh birds are found July-January, with wear becoming apparent on the nesting islands and the most worn birds occurring in March-June (Murphy 1936). Juvenal birds, however, would be fresh when the adults are most worn.

**POPULATION:** A survey of Alejandro



Map 3. Range of Stejneger's Petrel. Arrows indicate direction of migration. See Map 1 for key to symbols.



Selkirk Island in 1986 estimated 131,000 pairs (de L. Brooke 1987). Schlatter (1984) felt the population was declining, owing to predation by cats.

PYCROFT'S PETREL (*Pterodroma pycrofti*)

**IDENTIFICATION:** Pycroft's Petrel is small and compact. Compared to Cook's, it looks small, short-winged, and relatively long-tailed in the field, and has a different flight style (L. Spear pers. comm.). Birds believed to be Pycroft's off New Zealand in March were "lethargic" even in high winds (A. McBride pers. comm.). Fresh birds show a pale head with blackish eyepatch, very like a typical Cook's. There may be a tendency for fresh Pycroft's to be slightly darker than fresh Cook's. Worn birds have a poorly defined dusky crown, as dark as the eyepatch. When present, this hood does not contrast sharply against the gray back at the nape, as in Stejneger's, but more closely resembles the "shadow hood" impression of some worn Cook's. On average in a limited sample, Pycroft's shows a duskiest crown than Cook's, averaging a score of 0.8 in our comparison of head/back contrast. Pycroft's tends to have the white face extend up on the auriculars as a short half-collar more often than does Cook's (60% of Pycroft's we reviewed showed at least a suggestion of this character, whereas less than 20% of Cook's did, and none showed a prominent half-collar) (Fig. 13).

Harrison (1987) said this species was more brownish dorsally, but this was not confirmed in specimens we reviewed. Instead, all *Cookilaria* became darker and to some degree "brownier" with wear.

The underwings appear like Cook's, looking "all white" at a distance, but with a narrow blackish margin and thin carpal bar noted at close range. It has been suggested that

the underwing border may differ, with Pycroft's having a broader dark anterior margin and carpal bar than Cook's. Bailey looked at this character on a selection of skins and found a small average difference but much overlap, caused largely by wear and molt.

Tail pattern of Pycroft's recalls that of Cook's, with gray central rectrices tipped slaty, and variable white on the outer rectrices (usually restricted to the inner webs). Of 12 *pycrofti* we scored, white was restricted to the outer two rectrices, except for one that had a white inner web of the third rectrix. None showed white on the outer web of the third rectrix or on the inner web of the fourth rectrix, as do many *cookii*. Thus while there is overlap, we have no reason to suspect that *pycrofti* may look white-tailed with a dark central stripe, as a minority of *cookii* do. A very white-tailed bird should be a Cook's.

Pycroft's Petrel is small. There is no known overlap in wing measurements: 210-226 mm on Pycroft's, 230-250 mm on Cook's (Murphy 1929, 1936; Falla 1933, Fleming 1941, and specimen tags). The short wings, especially contrasted with the longer and more wedge-shaped tail (similar in shape to the Defilippe's in our tail shape analysis), and its small size should present the experienced observer with the opportunity to identify this species in the field. Observers should be very familiar with the characteristic long-winged shape of Cook's before making an identification. The bill also averages shorter than in Cook's, but there is overlap.

**DISTRIBUTION:** Pycroft's Petrels nest late November to March on Hen and Chickens, Poor Knights, Mercury, Stanley, and Stephenson islands off North Island, New Zealand (Bartle 1968). Nesting begins a month later than that of Cook's Petrels on Little Barrier Island, 20 miles south of Hen Island, supporting specific status for

Pycroft's (Fleming 1941). Harrison (1987) suggests it is an April-September migrant to the north Pacific, and some observers speculate that small *Cookilaria* seen there might be *pycrofti*. Larry Spear has collected four Pycroft's in the eastern tropical Pacific (details to appear elsewhere), confirming that it is migratory, but its distribution is not fully known. The lack of solid "yes-no" field marks makes identification, and thus knowledge of distribution, problematic (Map 2).

**MOLT:** The molt appears to be similar to Cook's, but averaging later. Adults are fresh in October-January, become worn on the breeding grounds, and are presumably in molt April-July. Juvenal birds are in fresh plumage in January-May.

**POPULATION:** Robertson and Bell (1984) list a population below 1000 pairs and suffering from poor breeding success owing to predators and pigs. Conservation measures have been adopted, and pigs have been removed from Poor Knights Island, although Pycroft's is nearly extirpated there (P. Harper in litt.).

WHITE-WINGED PETREL (*Pterodroma leucoptera*)

**IDENTIFICATION:** White-winged Petrel has three races: the larger nominate *leucoptera*, from Cabbage Tree Island, Australia; the intermediate-sized *caledonica*, breeding on New Caledonia; and the smaller *brevipes*, nesting in Melanesia, often considered a separate species, "Collared Petrel." All races are shorter-winged and appear broader-winged than Cook's Petrel, for a small, compact appearance in the field. The nominate race is the size of Cook's, but most birds seen in the eastern tropical Pacific looked smaller. The flight is more languid than Cook's, with more horizontal gliding than is typical of

the group, though in higher winds it flies in see-saw zig-zags.

Fresh-plumaged birds are easily identified by the extensive black hood contrasting with the gray mantle, which is crossed by a prominent blackish "M" (Fig. 14). The hood is glossy black, reaches the uppermost back, and extends down below the eyes in a diagonal line across the face and neck to the sides of the breast. As this black hood includes the pectoral patch, the impression is that the bird is wearing a shawl. This hood contrasts strikingly with the white fore-crown. It covers so much of the head that the white throat, lores, and fore-crown give the impression of a white "ring-around-the-bill." At all distances and in all lights, this head pattern is very different from Stejneger's neat, restricted half-hood.

The broad "M" across the pale mantle is well defined and conspicuous, though one's attention tends to be drawn to the head (with Stejneger's, one's attention is first drawn to the mantle). However, as the bird wears the mantle becomes darker and the hood and dorsal "M" less well-defined (Fig. 15). On very worn birds, the strong contrast between cap (which wears to a sooty-brown) and back (which wears to a gray-brown) is less conspicuous. The tail is rounded and evenly gray, concolor with the rump, except for a slightly dark tip. The tails of birds observed in the eastern Pacific showed no apparent white in the outer rectrices, but those of nominate *leucoptera* (n=10) showed white mottling on the outermost rectrix and half had such mottling in the next feather in the hand; the *caledonica* examined (n=3) had more extensive white on the inner web of the outermost two rectrices.

All nominate *leucoptera* and all *caledonica*, and some *brevipes*, are white below, except that the hood projects down onto the sides of the breast in blackish triangles. The underwings of these birds are fairly

broadly margined black, more so than the Cook's/Stejneger's group but less so than Black-winged. The underwing carpal bar is broad, but short, and once the bar turns inward, the leading edge of the underwing coverts look white (Fig. 16). The bill is short and thick.

The underparts of *brevipes* ("Collared Petrel") are extremely variable. On some the hood simply extends down onto the sides of the breast to form a partial collar. More commonly, these extensions merge to form a breastband of varying width. Darker birds show blackish mottling down the breast and belly, while the darkest are so heavily mottled to appear simply charcoal on the breast and belly, contrasting with white undertail coverts. Photographs of a series of specimens showing the variability appear in Watling (1986) and Harrison (1987). Populations from different islands may show consistent differences in the amount of dark on the underparts (Watling 1986). The tail is more uniformly gray than in other races, and shows no white in the outer rectrices.

The underwings are broadly margined with black, with a tendency for birds with darker underparts to have broader underwing margins and more duskiess in the underwing coverts (Watling 1985, Pitman in litt., pers. obs.). There is also a tendency for birds with darker underparts to look darker dorsally. The darkest birds may look uniform dark above (with the blackish "M" ill-defined due to reduced contrast), with a blackish breast and belly.

Except for those birds with a breastband or dusky underparts, we do not believe the races can be identified in the field. Except for apparent difference in the amount of white on the inner webs of the outer rectrices discussed above, all the characters suggested by Imber and Jenkins (1981) as separating nominate *leucoptera* from *caledonica* seem to be functions of molt and wear (e.g.,

darkness of upperparts, extent of partial breast band, prominence of carpal bar).

**SUBSPECIES and DISTRIBUTION:** The nominate *leucoptera* breeds during October-March on Cabbage Tree Island, off eastern Australia (Hindwood and Serventy 1941). Birds of the recently described *caledonica* nest on New Caledonia (de Naurois 1978), possibly in the Solomon Islands (Bourne 1983), and a similar individual has been collected on nearby Efate I., Vanuatu (June 1926 specimen at AMNH). Birds from New Caledonia are said to lay eggs in December and fledge in May (Robertson 1985). Birds of the race *brevipes* nest on Gau, Kadavu, Ovalau, and possibly other islands in Fiji, in Vanuatu, and on Rarotonga Island in the Cook Islands (Watling 1986). On Gau the nesting season is at least May-August (Watling 1986) but, like other tropical seabirds, it may breed year round (Bourne 1981).

During the northern summer and fall White-winged Petrels are characteristic of the equatorial countercurrent and the northern edge of the south equatorial current between 10°N and 10°S. Numbers occur regularly east to about 100°W (Meeth and Meeth 1983, Pitman 1986, pers. obs.), while smaller numbers have been found as far east as 85°W (e.g., LACM 103704, taken May 2, 1986 at 15°S, 89°W; Map 4). Unlike other *Cookilaria* in this area, it is readily attracted to flocks of Sooty Terns, frigatebirds, boobies, and Wedge-tailed Shearwaters feeding over tuna and often dolphins, where it rapidly cruises low in the center of the flock, snatching small fish that are forced to the surface by the feeding tuna (Au and Pitman 1986).

The White-winged Petrel is regular in the Tasman Sea from December to April, and 19 specimens have been found beach-cast on the western and northern coasts of New

Zealand between November and June; Imber and Jenkins (1981) attributed them to *caledonica*. Wood (1990) saw many more birds off southeastern Australia than could be accounted for by the small nominate population; he suspected these were also *caledonica*, and at least some of the specimens from eastern Australia have been identified as *caledonica* (Blakers *et al.* 1984). Although it shows some tendency to wander south in the western portion of its range, the distribution of White-winged Petrel in the eastern Pacific seems limited by water temperature and salinity (Gould unpublished MS, in litt.). Reports west and north of Hawaii (King 1970, Gould 1983) are erroneous, and were based on a misidentified Stejneger's specimen (P. Pyle in litt.) and a typographic error (P. Gould in litt.), respectively. Given its strong affinities for warm water, it is unlikely to occur off North America.

Dark morphs of *brevipes* disperse away from breeding islands into the central Pacific, and are seen regularly during October-November in the equatorial countercurrent southeast of Hawaii, north to 10°N and east to about 130°W (Roberson pers. obs.).

Pitman (1986) found it farther south during January-July, recording it between 20°S and the equator, east to about 100°W. [Reports from Peters Island, south of the Antarctic Circle, and from Wales, United Kingdom, have been discredited and are probably the result of switched labels (Murphy 1929, Bourne 1967).]

**MOLT:** Nominate birds examined from Cabbage Tree Island were heavily worn as expected on the breeding ground, while birds in June-November were fresh. The more tropical nesting populations may have molting individuals throughout the year.

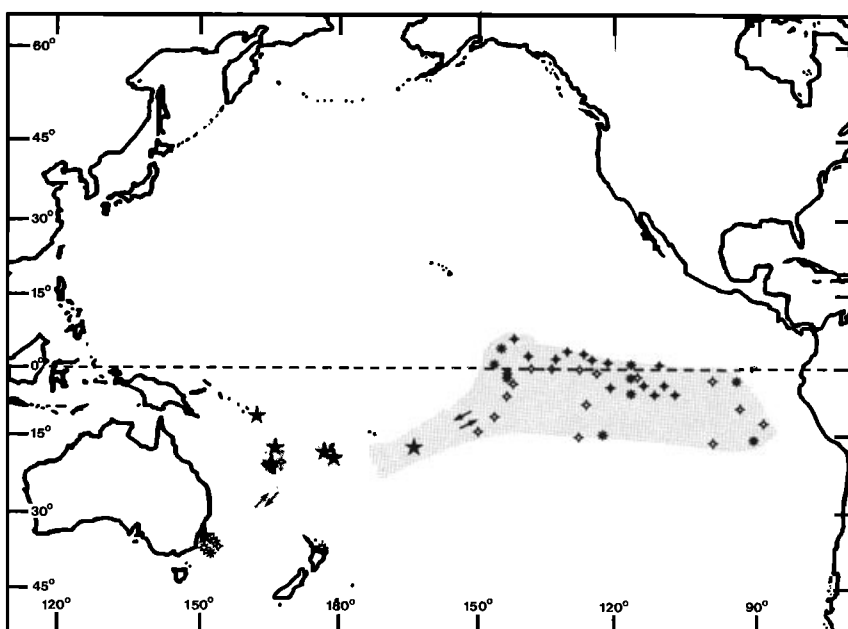
**POPULATION:** The population of nominate birds on Cabbage Tree Island was estimated at only 250-300 pairs (Fullagar 1976). The species here is now fully protected without mammalian predators (King 1979, van Tets and Fullagar 1984). There are apparently no estimates for the other populations (Garnett 1984). Meeth and Meeth (1983) saw an estimated 1100 birds on a single day off Noumea, New Caledonia, in December, suggesting that the population there is very large.

#### BLACK-WINGED PETREL (*Pterodroma nigripennis*)

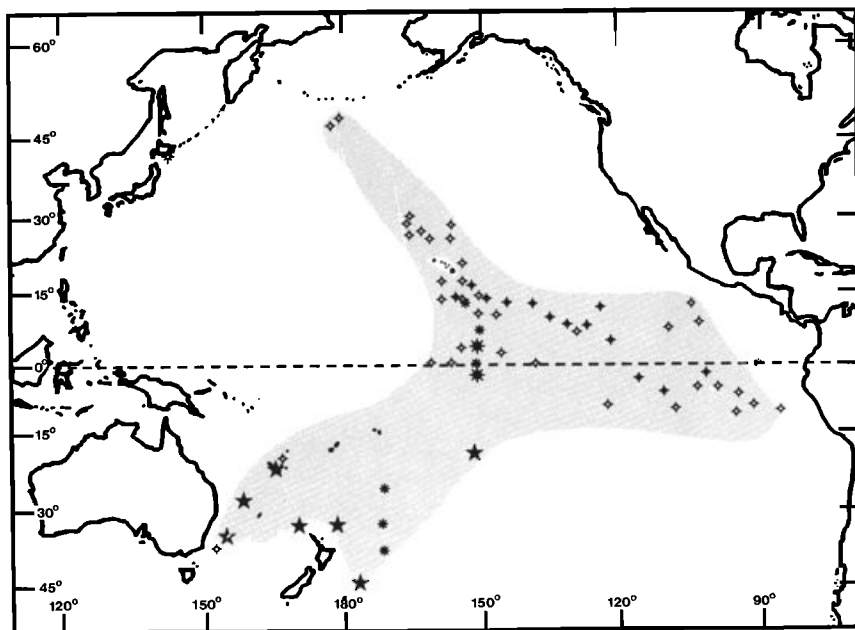
**IDENTIFICATION:** Black-winged Petrel in the field appears to be a large and heavy *Cookilaria*. It has a characteristic "big-headed" feel adding to a rather plump body shape (Fig. 17). The wings and tail seem more evenly proportioned (*i.e.*, not so long and thin) than on Cook's Petrel; the wings are actually shorter and the tail longer than Cook's. The blackish eyepatch is large and conspicuous on the pale gray head. At close range, a poorly defined narrow breastband is often seen. This breastband is pale gray (same color as head and back) and thus not noticeable unless looked for specifically (Fig. 18). The sides are also often speckled gray, and some birds possess a partial vent band in addition to the breast band.

At most distances under most lighting conditions, the extensive black margins and long, broad carpal bar are apparent on the underwings, making this a relatively easy species to identify. Birds generally appear to show about 30% dark on the underwing, but in strong sunlight or glare the extent of the dark area may be underappreciated. The tail looks broad and rounded and is decidedly darker than the rest of the pale gray upperparts. Specimen review showed that some had pale gray or whitish mottling on the inner web of the outermost (and sometimes also the next) rectrix, but we have not seen any white in the tail at sea. The bill is short and thick.

**DISTRIBUTION:** Black-winged Petrels breed during October-April on islets off New Caledonia, on Lord Howe, Norfolk, Three Kings, Poor Knights, Portland, the Kermadec, the Chatham, and the Austral islands, and probably on Tonga (Falla *et al.* 1970, Robertson 1985). It disperses well north into the central Pacific during May-November (Map 5). The largest numbers appear to con-



Map 4. Range of White-winged Petrel. Arrows indicate apparent migration directions. See Map 1 for key to symbols.



Map 5. Range of Black-winged Petrel. See Map 1 for key to symbols.

concentrate west of 130°W and north to about 20°N southwest of the Hawaiian Islands, especially in October-November (King 1970), when it is the commonest *Cookilaria* in this portion of the Central Pacific. Birds have been recorded as far north as 32°N in October 1989 (P. Gould in litt.) and even farther north to 49°45'N, 179°57'W on June 21, 1980 (photographed; T. Wahl in litt.). There is also a published record from Hokkaido, Japan (Sonobe 1982).

Smaller numbers are rather thinly spread over the eastern Pacific to about 110°W, and Pitman (1986) recorded them south of the Galapagos and west of Peru (Map 5). The tendency to wander northward in fall might bring a bird to offshore California.

**MOLT:** Apparently as in other species discussed, molting occurs at sea after the breeding season and birds return to nest in fresh plumage during the austral spring. November specimens we examined were fresh, while those from February were worn.

**POPULATION:** The breeding population in the New Zealand area is esti-

mated from a low of 50,000-100,000 pairs (Robertson and Bell 1984) to a high of "a million birds" on Macauley Island, Kermadecs (Robertson 1985). Another 500 pairs nest near Australia on Lord Howe, Norfolk, and Muttonbird islands (van Tets and Fullagar 1984). The species has been extending its breeding range in recent years.

### AMERICAN RECORDS

The first *Cookilaria* confirmed from North American waters was one of two aboard the *USS Kingfisher* "during a blow while operating in the vicinity of Adak Island, Alaska, during the first week in August," 1933, which was given to a zoo in San Diego when the ship returned to port (Anthony 1934). The specimen proved to be a Cook's Petrel (identification confirmed by Murphy 1936; W.R.P. Bourne in litt.).

Robert L. Pitman and Gary Friedrichsen were the first to document free-flying *Cookilaria* from North America during a cruise far offshore central California October 3-7, 1979 (others had been reported, without details, during the Smithsonian POBSP project in 1968; Pitman

in litt.). Of six birds seen, the California Bird Records Committee has accepted two as Cook's Petrels (with the disclaimer re *defilippiana* and *pycrofti* noted in the introduction). Following news of this research cruise, birders chartered fishing boats to visit the area around the Davidson Seamount, about 60 miles southwest of Pt. Sur, Monterey Co., California November 17 & 24 and December 1, 1979. A total of 11 *Cookilaria* were seen during these trips, of which six have been accepted as Cook's. One of those photographed November 17 (Fig. 5), is clearly a Cook's Petrel to the exclusion of all other species, based on tail pattern and its long, thin wings.

On November 17, 1983, an injured bird was picked up in a backyard in Santa Cruz, California, and later expired. It proved to be a Cook's Petrel, in atypical molt, growing its tail and molting its nape feathers (Tyler and Burton 1986); the specimen (CAS 71447 in the California Academy of Sciences) provided the first unambiguous record in California.

Richard R. Veit observed over 40 Cook's Petrels 120-150 miles off southern California (from off Santa Barbara County south to the Mexican Border) on August 16-17, 1980, during a cruise undertaken by researchers interested in fisheries conditions (CAL-COFI). Although these cruises have generally been made quarterly since 1949, *Cookilaria* had not been previously reported. R. L. Pitman saw single Cook's on August 14 & 19, 1984, some 65 - 85 miles southwest of Pt. Conception (Roberson 1986). Cook's Petrel now appears to be regular in these offshore areas from at least May to October. Veit and colleagues have recorded and photographed Cook's Petrels on these research cruises in August 1984 (2 birds), May 1987 (70+ birds), September 1987 (3 birds), August 1988 (45+ birds), October 1988 (13 birds), and July 1989 (30+ birds; R.

Veit, P. Pyle, in litt.). All relevant records (except the as yet unsubmitted October 1988 report) have been accepted by the CBRC (e.g., Roberson 1986, Dunn 1988; the CBRC deleted the species from the review list in 1989).

From July 24-29, 1984, a Cook's Petrel was observed at the north end of the Salton Sea, California. Numerous other seabirds had been seen at this inland body of salt water, but a *Cookilaria* was unexpected. It is thought that occasionally seabirds become "trapped" in the Gulf of California and move northward to the Salton Sea in an attempt to reach the open ocean. Cook's Petrel had not been reported in the Gulf of California, but since numbers occur around the southern tip of Baja California, it is possibly that a bird might wander northward on the "wrong" side of the peninsula. We have reviewed the photographs and notes on this bird and believe it is a Cook's, based upon the long wings shown in photos and the tail pattern described. A fine field sketch by Donna L. Dittmann was published in Dunn (1988).

Five Cook's Petrels (one photographed) were seen beyond the Cordell Bank, Marin Co., California on June 23, 1985 (Dunn 1988; we have re-reviewed the photograph and find it to be of a Cook's based on bill and wing length). Two more were reported 32 miles off Cape Mendocino, Humboldt Co., California April 10, 1986, but details have not yet been submitted to the CBRC. On April 29-30, 1989, Bailey and others counted 113 Cook's Petrels off central California, some of which were photographed (Bailey *et al.* 1989).

All the California birds (excluding the injured Santa Cruz specimen and the Salton Sea bird) have been over deep water well offshore. Records have been concentrated west of the continental slope in waters over 1500 fathoms deep. None, for example, have been seen over the Davidson Seamount itself, despite several

searches, but have been limited to the steep drop-offs southeast and southwest of the seamount. This strong preference for deep waters undoubtedly explains the lack of previous records.

A sight record of Stejneger's Petrel on November 17, 1979, some 60 miles S.W. of Pt. Sur, Monterey, Ca., was accepted by the CBRC (Luther, *et al.* 1983) but questioned by some (DeBenedictis 1991). The record was recently re-evaluated by the CBRC and again accepted; full details are in press (McCaskie and Roberson, 1992). Peter Pyle and David Sibley saw a Stejneger's Petrel on November 9, 1989, at 30°15'N, 123°52'W, about 315 nautical miles s.w. of San Nicolas Island, California, and four more on November 14, 1989 at 31°33'N, 123°55'W, about 225 miles s.w. of San Nicolas Island (but outside the 200 mile United States limit of jurisdiction; P. Pyle in litt.). Jon Dunn saw a Stejneger's Petrel only 152 miles w.s.w. of San Miguel Island in November 1990, while Bailey and others observed two Stejneger's Petrels on November 17, 1990 at 37°19'N, 124°02'W, about 50 nautical miles w.s.w. of Southeast Farallon Island; one of these was photographed. We suspect this species will prove to be regular far offshore, at least during November.

After completing our study, we independently reviewed details of published reports (Roberson 1985) of a possible White-winged Petrel off central California on October 7, 1979, and that of a possible Black-winged Petrel on November 24, 1979. The descriptions of the putative White-winged do not sound like that species, but might be of a Stejneger's, as suggested by one observer. The more detailed descriptions of the possible Black-winged Petrel suggest that species (head and underwing patterns), but the bird was seen only briefly. No one described size, shape, or flight differences from the Cook's seen on the same day, nor was a

breastband or the tail pattern noticed. The extent of black margins (estimated at 20% of underwing) also seems too little. We consider the sighting best left as an unproven report.

## IDENTIFICATION SUMMARY

The observer faced with a *Cookilaria* should concentrate on underwing pattern, presence or absence of nape/back contrast, exact head pattern, tail pattern, and bill size/shape. These characters are arranged in the order in which they usually may be seen over decreasing distances. The species we consider sort fairly easily into (a) those with virtually all-white underwings in the field (Cook's, Defilippe's, Pycroft's, and Stejneger's) and (b) those with broad black margins to the underwings (White-winged and Black-winged petrels). The species also can be separated into those with very pale heads concolor with the back and with dark eye-patches (Cook's, Defilippe's, Black-winged, and fresh Pycroft's petrels) and those which show a head/back contrast (Stejneger's, White-winged, worn Pycroft's, and, to some extent, worn Cook's and Defilippe's petrels). Black-winged is identified by its pale head, broad underwing margins, chunky shape, big-headed appearance, and often a thin breastband. Only White-winged has an extensive and striking black "shawl" covering the crown, sides of face, nape, and sides of breast.

This leaves the Cook's/Defilippe's/Pycroft's/Stejneger's group. Most Cook's can be recognized by the combination of very pale head, extensive white in the outer tail, and the dark tip to the central rectrices (at close range); they also have the most distinctive shape, being very long-winged and comparatively short-tailed. Defilippe's should be recognizable, given decent views, by its diagnostic tail pattern (all gray central rectrices without dark tip, and

white in the outermost feathers), its chunky short-winged and long-tailed shape, and a decided half-collar curling up on the auriculars. Given good views, Stejneger's is also relatively easy with its well-defined "Franklin's Gull" half-hood, sharply black against the gray back, its overall darker upperparts with very striking black "M," its apparently all dark tail, and the "half-collar" effect in its facial pattern.

Separating Cook's from the endangered Pycroft's Petrel is quite difficult. On average, Cook's has much more white in the tail, and some should be separable on that character alone. Some Pycroft's show a white half-collar curling up behind the auriculars, and this, added to the rather different shape, may separate other birds. Pycroft's is small and short-winged, and is more delicate and shorter-billed, with a proportionately longer and more wedge-shaped tail. Its aspect is thus different, to an experienced observer, from the longer-winged, shorter-tailed shape of the Cook's.

We would be pleased to hear from observers who can refine this discussion.

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