11°W completed our observations. H.M.S. *Hecla* returned to Gibraltar on 22 July and arrived home in Plymouth on 29 July 1982.

Acknowledgements

The author would like to acknowledge the help and encouragement of Captain Hope, Royal Navy, and all the Officers of the Watch in H.M.S. *Hecla*. Not only did they record observations themselves, but would have the author summoned to the bridge in the event of a new or strange species or to settle an altercation over identification. They have my grateful thanks.

Tuck and Heinzel's *Field Guide to the Seabirds of Britain and the World* was the main guidebook used for identification at sea. It was found to be of inestimable value.

Surgeon Lt.-Cmdr. D. G. Bruce, R.N., 13a High Street, Old Portsmouth, Hants. PO1 2LP.

SEABIRD OBSERVATIONS FROM SIX PACIFIC OCEAN CROSSINGS

By P. and K. Meeth

Between 1975 and 1981 we had the opportunity to make voyages by vessels of the Dutch shipping group Koninklijke Nedelloyd in order to observe and record seabirds. During this time we made six Pacific Ocean crossings by the following ships:

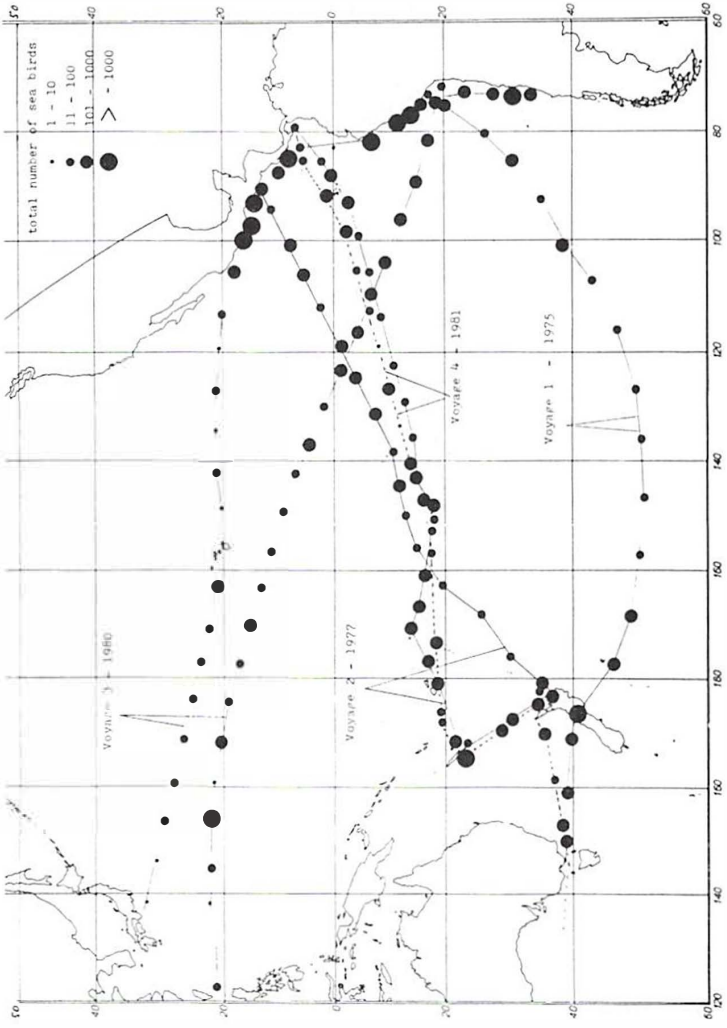
1975 Voyage 1 m.s. *Nedlloyd Main*. Departing Melbourne on 21 November via Cook Strait to Matarani, Peru, calling at Callao en route to the Panama Canal.

1977 Voyage 2 m.s. *Nedlloyd Adelaide*. Departing Panama on 21 November via Papeete (Tahiti), Apia (Western Samoa), Suva and Lautoka (Viti Levu, Fiji Islands), and Noumea (New Caledonia) to Tauranga (New Zealand). Returning eastwards the ship left Whangarei 19 October direct to Acajutla (El Salvador) arriving at the Panama Canal on 6 November.

1980 Voyage 3 m.s. *Nedlloyd Streefkerk*. Departing from Kobe on 6 February direct to Manzanillo (Mexico), passing the Hawaiian Islands between Maui and Hawaii. After Manzanillo the vessel called at ports in Central and South America before returning from Iquique direct to Kaohsiung (Taiwan) arriving on 26 April.

1981 Voyage 4 m.s. *Nedlloyd Westerkerk*. Passing the Panama Canal on 25 November and crossing via Papeete, Suva and Noumea to Whangarei arriving on 21 December. The vessel sailed from Whangarei on 26 December and passed Bass Strait on 30 December en route to Africa.

The Pacific Ocean routes, based on the vessels' noon positions, are shown on the Map.



Map. Noon positions indicating total daily sightings of seabirds.

We observed daily, recorded and, weather permitting, sketched and photographed seabirds from 0800 to 1200 and 1400 to 1700. Often we started earlier and/or carried on after 1700. During the six Pacific Ocean crossings we were 138 days at sea, spending about 1,000 hours birdwatching and logging quantitative counts every 5 minutes. In total we recorded over 100,000 seabirds. The density and distribution of these records are shown for the

noon positions on the Map, excluding 65,000 Short-tailed Shearwaters seen in the Tasman Sea and Bass Strait on 30 December 1981 and most of the offshore birds like Franklin's Gulls, terns, cormorants and Peruvian Boobies. Daily average voyage figures would have been greatly inflated by the high numbers of birds along the Central and South American coasts as well as in Cook Strait and eliminating these records gives a more realistic picture of the density and pelagic distribution as shown.

	Passage time (days)	Distance (n. miles)	Speed (knots)	Number of Seabirds	Daily Average	Seabirds per linear mile
Voy 1 Eastbound	16	1960	ca 17.5	2155	135	0.91
Voy 2 Westbound	20	2492	17.8	4045	202	1.62
Voy 2 Eastbound	15	1848	17.6	1855	124	1.00
Voy 3 Eastbound	17	2035	17.1	790	46	0.39
Voy 3 Westbound	24	2948	17.6	5645	235	1.91
Voy 4 Westbound	21	2614	17.8	4595	219	1.76
Total	113	13897		19085	169	1.37

During all these days transitting the Pacific only on 2 days was the sea birdless, namely on 9 December 1981, 180 miles NE of Aitutaki Atoll and next day 280 miles NE of Niue.

The following notes selectively summarise our observations where these may add to existing distribution data, and discuss some aspects of identification.

Notes on selected species.

Waved Albatross *Diomedea irrorata*

The majority of these albatrosses were seen off the Peruvian coast. On 10 Mar 80 near the Islas Lobos de Afuera we counted more than 450 birds, with a day total count of 580.

Shy Albatross *Diomedea cauta*

During Voy 1 we logged 64 birds of which 37 belonged to the New Zealand race *D. c. salvini* and 7 to *D. c. eremita* of the Chatham Islands. On 14 Mar 80 we recorded 1 off Isla San Gallan, about 60 miles S of Callao, whilst another 9 were sighted off Valparaiso on 20 Mar. About 270 miles S of Antofagasta on 25 Mar we again observed 9 of this species. On 30 Dec 81 we noticed 7 Shy Albatrosses and photographed one immature banded with a red ring. The secretary of the Australian Bird-banding Scheme informed us that this bird had been banded as a nestling some time between 30 Dec 80 and 14 Jan 81 on Albatross Island, NW Tasmania.

Yellow-nosed Albatross *Diomedea chlororhynchos*

On 30 Dec 81, 58 birds counted 80 miles SW of Melbourne.

Southern Fulmar *Fulmarus glacialoides*

On 9 Dec 75 one sighted about 200 miles S of Callao, 15°S.

Cape Pigeon *Daption capensis*

The northernmost sighting was recorded at 5°45'S, about 220 miles S of Guayaquil on 12 Dec 75.

Antarctic Petrel *Thallassoica antarctica*

This petrel was sighted on 26 Nov and another one on 28 Nov 75. The Antarctic Petrel is normally confined to the antarctic zone of surface water and is scarcely known from northward of latitude 50°S. Our mid-ocean records were logged at 48°S.

Blue Petrel *Halobaena caerulea*

During the South Pacific transit in 1975 about 150 Blue Petrels were recorded, of which 30 were seen on 6 Dec when our ship approached the Humboldt Current in latitude 20°S.

Wedge-tailed Shearwater *Puffinus pacificus*

More than 1,700 Wedge-tailed Shearwaters were counted:

Voy 2 271 of which 175 were *P. p. cuneatus*
Voy 3 1046 of which 930 were *P. p. cuneatus*
Voy 4 385 all *P. p. pacificus*.

The light-phase subspecies was mainly recorded off the Central American coast between Manzanillo and Puntarenas. This range is apparently the wintering area of the Hawaiian breeding birds. Great numbers were in moult.

Wedge-tailed Shearwaters *drawn by* K. Meeth

Grey-backed Shearwater *Puffinus bulleri*

As could be expected, large numbers were counted between Whangarei, the Poor Knights and Cape Brett, North Island, N.Z. In Mar 80 we saw large groups in the Humboldt Current along the Chilean coast between Valparaiso and Antofagasta. The birds were

sitting on the water and flew away before the ship could reach them.

Short-tailed Shearwater *Puffinus tenuirostris*

On 21 April 80 we counted about 1,670 Short-tailed Shearwaters at about 690 miles NE of Guam, all flying northwards. In comparison with the Sooty Shearwater *Puffinus griseus*, which has a clear silvery underwing pattern, we find the underwing of the Short-tailed Shearwater only partly a little pale. Moreover, we think that the latter species give a more bulky impression.

Christmas Shearwater *Puffinus nativitatis*

Sixteen were seen between the Equator and 20°S. This shearwater resembles a small Wedge-tailed Shearwater with a short tail. It is larger than the Bulwer's Petrel *Bulweria bulwerii* which is found in the same area. We consider the flight slow, whereby the bird swings in various directions.

Black-vented Shearwater *Puffinus p. opisthomelas*

Large numbers were seen off Acajutla, about 400, on 3 Nov 77 and 130 on 4 Mar 80 in the same region.

Newell's Shearwater *Puffinus p. newelli*

After departure from Apia proceeding to Fiji on 19 Sep 77 we observed 5 Manx Shearwater species with the characteristics of *P. p. newelli*. The two white spots on the back near the flanks were conspicuous. We wonder, however, whether this feature is diagnostic since we once photographed a Hutton's Shearwater *P. p. huttoni* showing the same pattern.

White-headed Petrel *Pterodroma lessoni*

During the crossing from Cook Strait to Peru in 75 we counted 157 White-headed Petrels along the great circle route from 25 Nov to 28 Nov, 12 on 29 Nov, one on 30 Nov and one on 1 Dec. On 29 Dec 81 we logged small numbers in the Tasman Sea.

Mottled Petrel *Pterodroma inexpectata*

This petrel did not give us identification problems as the underwing pattern of an almost straight diagonal dark leading margin running from the carpal to the abdomen is very conspicuous. The greyish patch on the belly is variable. We sighted 9 Mottled Petrels between 10 and 18 April 80.

Tahiti Petrel *Pterodroma rostrata*/
Phoenix Petrel *Pterodroma alba*

As it is difficult to separate these two species in the field, we deal with our observations under one heading. In total we saw 109 petrels we identified as Tahiti Petrels, 11 as Phoenix Petrels and 21 as Tahiti/Phoenix.

Hawaiian Petrel *Pterodroma phaeopygia*

This breeding bird of the Galapagos and Hawaiian Islands is considered to be an endangered bird by the I.C.B.P. (King 1981). In Sep 77 we saw 20 birds before and just after passing the Galapagos. On 3 April 80 we recorded 44 of this species about 700 miles WSW of Callao.

Black-winged Petrel *Pterodroma nigripennis*

During Voy 2 Oct 77 and Voy 3 April 80, 3 and 26 respectively were seen in the east central Pacific. On Voy 4 during Dec 81 we counted 84, of which at least 8 were recorded a few hours before arrival at Noumea between Isle Mare and Canal de Havannah. Only recently, Dec 71, breeding of this petrel was discovered by R. de Naurois, who found several hundreds of breeding pairs on islets of the reef S of Noumea, (de Naurois 1978). During the morning and afternoon of 28 Dec 81, in the central Tasman Sea, the ship was accompanied by Black-winged Petrels, varying in numbers from a few to more than 20. It was fascinating to watch their display flights.

Bonin Petrel *Pterodroma hypoleuca*

We sighted 8 Bonin Petrels on 12 Feb, 4 on 12 Apr and 1 on 13 Apr 80. We think these petrels are rather easy to identify by the underwing pattern, which resembles somewhat the underwing of the Laysan Albatross *Diomedea immutabilis*.

Cook's Petrel *Pterodroma cookii*

In 1975 we saw more than 160 Cook's Petrels, in 1977 we noted 24, in 1980 more than 165 but in 1981 only 16. The majority were seen near the South American coast. These birds probably belong to the breeding colony of the Juan Fernandez Islands, *P. c. defilippiana*.

Between 1 and 7 Apr 80 we recorded 82 Cook's Petrels, 26 Black-winged Petrels and 11 Gould's Petrel between 75° and 120°W. These 3 species are separable in the field, if circumstances are favourable. The Cook's Petrel's upperparts are very similar to those of the Black-winged Petrel, but overall a little lighter, particularly on the head and face. The underwing of Cook's is almost entirely white, with the exception of a very thin dark leading margin, whereas the underwing of the Black-winged shows a conspicuous dark margin to the leading edge and to the trailing edge. The dark eye patch is smaller than that of Cook's and the grey of the neck and nape continues to the upper breast. The sooty black head of Gould's Petrel is very conspicuous and distinguishes it from Cook's and Black-winged Petrel. The dark trailing margin of the Black-winged is thicker and more pronounced than in the underwing of Gould's Petrel. The above characteristics can often be seen quite clearly, making identification possible.

Gould's Petrel *Pterodroma leucoptera*

The Gould's Petrel, breeding bird of Cabbage Tree Island, Australia, is also included in the Red Data Book, as "rare". In 1977 we recorded 126 *P. leucoptera* of which 46 were seen on 4 Sep and 29 on 29 Oct. From the distribution map it can be seen that the majority were logged between 100°W and 130°W and between 0°S and 10°S. In general, these birds moved in a south to southwest direction. The distribution map in the *Field Guide to the Seabirds* (Tuck 1978) does not show Gould's Petrels E of 140°W. We suppose that these gadfly-petrels, which we identified as *P. l. brevipes*, belong to the breeding colonies of the New Hebrides and the Fiji Islands. On 18 Dec 81 our ship sailed from Noumea, disembarked the pilot in Dumbéa Passage at 1303 and followed a SE course along the Grand Récif Aboré till 1400 and the Grand Récif Kue from 1400 onwards. From 1320 to 1410 we counted about 935 Gould's Petrels and from 1410 to 1730 recorded small numbers, totalling 164. All these petrels were seen along a route of approximately 70 miles. René de Naurois (1978) has proved the breeding of *P. leucoptera* in New Caledonia but no numbers are given.

On 29 Dec we counted 53 Gould's Petrels at 120 miles SE of Cape Howe, Tasman Sea.

Stejneger's Petrel *Pterodroma longirostris*

On 5 Dec at 25°S 81°W we sighted several Cookilaria petrels which we were unable to identify. They looked rather small, grey-brown upperparts with an open M-marking and a white underwing with an inconspicuous dark leading and trailing edge. The bill was longer than that of Cook's or Gould's Petrel. In the first instance we were thinking of Gould's but these are unknown from this area. Moreover, the underwing pattern did not fit, whilst the crown, nape and sides of neck were not sooty black but dark grey. Eventually we came to the conclusion that these petrels were Stejneger's Petrels, breeding birds of the Juan Fernandez Islands, where Cook's and White-necked Petrels also breed, of which 8 and 11 respectively were seen on the same day. In 1977 we saw 9 petrels and another 7 in 1980 in the Central Pacific, which we thought to be Stejneger's Petrels. We found them small, with light grey upperparts and broad, rather short tails. There was a thin, dark open M-marking. The underwing margin to the leading edge was smaller and thinner than in *P. leucoptera*. Crown, nape and sides of neck were, however, of the same colour as in *P. leucoptera*. On 2 April 81 at 17°S 81.5°W we recorded and photographed similar birds as seen in 1975. Now we counted 5 of these petrels and again the rather long, slightly bended bill was noticeable.

Fork-tailed Storm-petrel *Oceanodroma furcata*

This light greyish storm-petrel, with a kind of white flash on the underwing and forked tail, was seen on 8 Feb 80 at 30°N

153.5°E and another 2 next day at 28.5°N 161°E. These records are rather far south, although there are records from the Vulcano and Bonin Islands.

Sabine's Gull *Xema sabini*

Sabine's Gulls were seen along the South American coast as well as the Central American coast. The most southerly observation was recorded on 5 Dec 75 at 20°11′S, 740 miles NW of Valparaiso. More than 200 were counted at 220 miles SSW of Guayaquil and on 4 Mar 81 we observed 14 which were in moult, in the harbour of Acajutla.

Swallow-tailed Gull *Creagrus furcatus*

Sailing from Callao to Matarani on 14 Mar 81, noon position 13°06′S 76°53′W, we counted 1,346 Swallow-tailed Gulls, of which 1,310 were recorded between Isla San Gallan and Isla Viejas.

Acknowledgements

We are much indebted to the Koninklijke Nedlloyd, Rotterdam and in particular to the Captains, Officers and crew of the ships who gave us all possible assistance during the voyages.

REFERENCES

Harper, P. C. and Kinsky, F. C. 1978. Southern Albatrosses and Petrels. Price Milburn. Wellington.

King, Warren B. 1981. Endangered Birds of the World. The I.C.B.P. Bird Data Book. Smithsonian Institution, Washington D.C.

de Naurois, R. 1978. Procellariidae reproducteurs en Nouvelle-Caledonie pendant l'ete austral. C.R. Acad. Sc. Paris t. 287:269-271.

Tuck, G. S. and Heinzel H. 1978. A Field Guide to the Seabirds of Britain and the World. Collins. London.

P. and K. Meeth, Bramenlaan 5, 2116 TR Bentveld, The Netherlands.

THE APPEARANCE AND CLASSIFICATION OF THE *COOKILARIA* PETRELS

By Dr W. R. P. Bourne

A group of small, more or less migratory, grey and white petrels with a dark "inverted W" on the back which replace each other at different seasons in different parts of the Pacific have long been a by-word for difficulty of classification and identification. Since they were discovered during Cook's voyages two hundred years ago they have first been referred to a single variable species *Pterodroma cookii*, then to a separate subgenus *Cookilaria* including about a dozen species and races, and finally shown by Sir Charles Fleming to include two parallel radiations of similar species of much the same size (Table 1) which differ in their anatomy (*Emu*