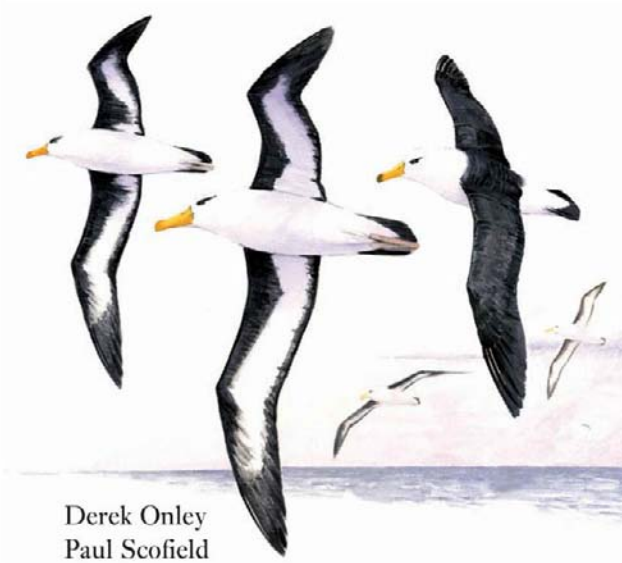
HELM FIELD GUIDES

Albatrosses, Petrels and Shearwaters

of the World



Derek Onley
Paul Scofield

FIELD GUIDE TO THE

Albatrosses, Petrels and Shearwaters of the World

Derek Onley and Paul Scofield

CHRISTOPHER HELM
LONDON

Like so many ocean sailors, I have a huge respect for these incredible birds, which circle Antarctica over the most inhospitable oceans in the world. I hope that through the images and information in this book those of you who have felt the sheer presence of these birds can re-live it, and those who haven't can begin to experience it.

Dame Ellen MacArthur

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LIST OF SPECIES AND SUBSPECIES

The species within the families are generally listed in the same sequence as in Dickinson (2003). However, a number of taxa treated as subspecies there have been raised to species level, bringing the total number of procellariiform species illustrated and discussed in this book to 137. The figure on the right shows the relevant plate in each case. For polytypic species, races are listed in small type. Abbreviated ranges are given for all taxa. Subspecies are generally listed in order of publication. The order used here within the pterodromas and shearwaters is artificial and is designed simply to help identification.

plate no.

Family DIOMEDEIDAE (albatrosses)

a) Wandering albatrosses

Diomedea exulans **Snowy Albatross** (Wandering Albatross) **1, 2**
Circumpolar S Hemisphere, breeding on higher-latitude islands of Southern Ocean except New Zealand.

Diomedea dabbenena **Tristan Albatross** **1, 2**
Tristan da Cunha and Gough I., ranging at sea through South Atlantic.

Diomedea antipodensis **New Zealand Albatross** **1, 2**
D. a. antipodensis (Antipodean Albatross) Circumpolar S Hemisphere, breeding on Antipodes I. and in small numbers on Campbell I. and Chatham Is.
D. a. gibsoni (Gibson's Albatross) Circumpolar S Hemisphere, breeding on Auckland Is.

Diomedea amsterdamensis **Amsterdam Island Albatross** **1**
Amsterdam I. (Indian Ocean). Ranges at sea across southern Indian Ocean.

b) Royal albatrosses

Diomedea sanfordi **Northern Royal Albatross** **1, 3**
Circumpolar S Hemisphere; breeds mainly on Chatham Is.

Diomedea epomophora **Southern Royal Albatross** **1, 3**
Circumpolar S Hemisphere; breeds mainly on Campbell Is., with smaller population on Enderby I., Auckland I.

c) North Pacific albatrosses

Phoebastria irrorata **Waved Albatross** **5**
Tropical E Pacific; breeding confined to the Galápagos Is.; range to adjacent seas as far as S America.

Phoebastria albatrus **Short-tailed Albatross** **4**
NW Pacific. Breeds mainly on Tori-shima (Japan), ranges S and E.

Phoebastria nigripes **Black-footed Albatross** **4**
Central and western N Pacific. Most breed on NW Hawaiian Is. with some in S Japan. Ranges SE to equator.

Phoebastria immutabilis **Laysan Albatross** **7**
Central N Pacific and off Baja California. Ranges from Japanese seas N to Bering Sea, E to Pacific coast of N America.

d) Mollymawks

Thalassarche melanophris **Black-browed Albatross** **7, 9**
Circumpolar S Hemisphere, breeding on higher-latitude islands of Southern Ocean.

Thalassarche impavida **Campbell Albatross** **7, 9**
Circumpolar S Hemisphere, breeding only on Campbell I.

Thalassarche cauta **Shy Albatross** **6**
T. c. cauta Circumpolar S Hemisphere, breeding on islands off Tasmania.
T. c. steadi (White-capped Albatross) Circumpolar S Hemisphere, breeding on islands off New Zealand.

Thalassarche eremita **Chatham Islands Albatross** **6**
S Pacific. The Pyramid in Chatham Is. provides sole breeding ground. Migrates to Chilean and Peruvian waters in winter.

Thalassarche salvini **Salvin's Albatross** **6**
S Pacific. Breeds on Bounty and Snares Is., migrates to Chilean and Peruvian waters in winter.

Thalassarche chrysostoma **Grey-headed Albatross** **8, 9**
Circumpolar S Hemisphere, breeding on higher-latitude islands of Southern Ocean.

***Thalassarche chlororhynchos* Atlantic Yellow-nosed Albatross** **8, 9**
Circumpolar S Hemisphere, Tristan da Cunha group and Gough I., ranging at sea through S Atlantic.

***Thalassarche carteri* Indian Yellow-nosed Albatross** **8, 9**
Circumpolar S Hemisphere, breeding on lower-latitude islands of S Indian Ocean.

***Thalassarche bulleri* Buller's Albatross** **8, 9**
T. b. bulleri (Southern Buller's Albatross) Circumpolar S Hemisphere, breeds on the Snares and Solander around Stewart Is.
T. b. ssp. nov. (Northern Buller's Albatross) Breeds on Sisters and Forty-Fours in Chatham Is. and on Three Kings Islands north of New Zealand. Subspecies yet to be formally named.

e) Sooty albatrosses

***Phoebetria fusca* Sooty Albatross** **10**
Circumpolar S Hemisphere, warmer subantarctic waters of S Atlantic and Indian Oceans.

***Phoebetria palpebrata* Light-mantled** (Sooty) **Albatross** **10**
Circumpolar S Hemisphere. Ranges at sea in colder Antarctic waters as far south as ice edge.

Family PROCELLARIIDAE (petrels)

a) Fulmarine petrels

***Macronectes giganteus* Southern Giant Petrel** **11**
Circumpolar Southern Ocean; restricted to Antarctic waters in winter.

***Macronectes halli* Northern Giant Petrel** **11**
Circumpolar Southern Ocean; ranges to subtropics in winter.

***Fulmarus glacialis* Northern Fulmar** **12**
F. g. auduboni Low Arctic and temperate N Atlantic.
F. g. glacialis High-arctic N Atlantic.
F. g. rodgersii Colder waters of N Pacific and Bering Sea.

***Fulmarus glacialoides* Southern Fulmar** **12**
Circumpolar Southern Ocean; cold-water species of Southern Ocean and Antarctic.

***Thalassoica antarctica* Antarctic Petrel** **13**
Circumpolar Southern Ocean; cold-water species of Southern Ocean and Antarctic.

***Daption capense* Cape Petrel** **13**
D. c. capense Circumpolar Southern Ocean; occurs in subtropics in winter
D. c. australe New Zealand waters

***Pagodroma nivea* Lesser Snow Petrel** **13**
Antarctic waters, rarely far from ice.

***Pagodroma confusa* Greater Snow Petrel** **13**
Eastern Antarctic waters, rarely far from ice.

***Lugensa brevirostris* Kerguelen Petrel** **14**
Circumpolar Southern Ocean; a cold water species.

***Halobaena caerulea* Blue Petrel** **27**
Circumpolar Southern Ocean; a cold water species.

b) Prions

***Pachyptila vittata* Broad-billed Prion** **26**
New Zealand and SE Atlantic, in warmer subantarctic waters just north of subtropical convergence.

***Pachyptila salvini* Salvin's Prion** **26**
Breeds SW Indian Ocean, occurs throughout cooler circumpolar waters except SE Pacific in winter.

***Pachyptila macgillivrayi* MacGillivray's Prion** **26**
Endemic to St Paul Is. Range at sea unknown.

***Pachyptila desolata* Antarctic Prion** **26**
Circumpolar Southern Ocean, in colder waters but rarely reported in central S Pacific.

***Pachyptila belcheri* Slender-billed Prion** **26**
Circumpolar Southern Ocean, dispersive in colder waters.

***Pachyptila turtur* Fairy Prion** **27**
P. t. turtur Circumpolar species of warmer subantarctic and subtropical waters.
P. t. subantarctica Breeds on Antipodes, Snares and Macquarie Is.

***Pachyptila crassirostris* Fulmar Prion** **27**
P. c. crassirostris Chatham Is, The Snares and Bounty Is.
P. c. flemingi Heard and Auckland Is.

c) *Bulweria* and *Pseudobulweria* petrels

***Bulweria bulwerii* Bulwer's Petrel** **15**
Tropical waters of N Pacific and N Atlantic.

***Bulweria fallax* Jouanin's Petrel** **15**
NW Indian Ocean, breeding on Socotra Is. and islands off southern Oman.

***Pseudobulweria aterrima* Mascarene Petrel** **15**
Réunion I. in W Indian Ocean.

***Pseudobulweria becki* Beck's Petrel** **17**
Seas off New Ireland and Solomon Islands.

***Pseudobulweria rostrata* Tahiti Petrel** **17**
P. r. rostrata Marquesa Is. and Society Is.
P. r. trouessarti New Caledonia.

***Pseudobulweria macgillivrayi* Fiji Petrel** (MacGillivray's Petrel) **17**
Gau I., Fiji and adjacent waters.

d) Gadfly petrels

i) Cookilaria petrels

***Pterodroma axillaris* Chatham Islands Petrel** **23**
SW Pacific, breeding only on Chatham Is.

***Pterodroma nigripennis* Black-winged Petrel** **23**
Tropical and subtropical S Pacific.

***Pterodroma inexpectata* Mottled Petrel** **23**
Pacific Ocean; breeds in S New Zealand, foraging south to ice edge; migrates to NW Pacific.

***Pterodroma hypoleuca* Bonin Petrel** **23**
Subtropical west and central N Pacific.

***Pterodroma leucoptera* Gould's Petrel** **24**
P. l. leucoptera Cabbage Tree I., Australia; SW and C Pacific.
P. l. caledonica (New Caledonia Petrel) New Caledonia; E Pacific.

***Pterodroma cookii* Cook's Petrel** **22**
Hauraki Gulf and Stewart Is., New Zealand; migrates to NE and central E Pacific.

***Pterodroma pycrofti* Pycroft's Petrel** **22**
N New Zealand islands; migrates to NE and central E Pacific.

***Pterodroma brevipes* Collared Petrel** **24**
Islands of SW Pacific.

***Pterodroma defilippiana* De Filippi's Petrel** (Mas a Tierra Petrel) **22**
Islands of E Pacific.

***Pterodroma longirostris* Stejneger's Petrel** **22**
Alejandro Selkirk I. (Mas Afuera), Juan Fernández Is. Range at sea in Pacific poorly known.

ii) The large, subtropical *Pterodroma* petrels

***Pterodroma alba* Phoenix Petrel** **17**
Tropical and subtropical central Pacific.

***Pterodroma heraldica* Herald Petrel** **16, 17, 25**
Tropical and subtropical Pacific.

***Pterodroma arminjoniana* Trindade Petrel** **20, 25**
Tropical W Atlantic and W Indian Oceans.

***Pterodroma atrata* Henderson Petrel** **16**
Henderson Island, central E Pacific.

***Pterodroma neglecta* Kermadec Petrel** **16, 20, 25**
P. n. neglecta SW and central Pacific.
P. n. juana Juan Fernández Is. and Desventuradas.

***Pterodroma ultima* Murphy's Petrel** **16**
Tropical Pacific.

***Pterodroma solandri* Providence Petrel** **16**
Lord Howe and Phillip I. (Norfolk Is); migrates to N Pacific.

iii) Large black-and-white *Pterodroma* petrels

***Pterodroma cervicalis* White-necked Petrel** **18**
SW Pacific Ocean. Breeds on Kermadecs and Phillip Island, Norfolk Is.

***Pterodroma occulta* Vanuatu Petrel** **18**
SW Pacific. N Vanuatu.

***Pterodroma externa* Juan Fernandez Petrel** **18**
Alejandro Selkirk I., Juan Fernández Is., dispersing over the tropical and subtropical waters of E Pacific.

***Pterodroma baraui* Barau's Petrel** **20**
Central and SW Indian Ocean, breeding only on Réunion I.

***Pterodroma sandwichensis* Hawaiian Petrel** **18**
Central N Pacific, breeds on higher Hawaiian Islands.

***Pterodroma phaeopygia* Galápagos Petrel** **18**
Central E Pacific; breeds on higher Galápagos Islands.

***Pterodroma cahow* Cahow** (Bermuda Petrel) **21**
Breeds on Bermuda; moves N into the Atlantic.

***Pterodroma hasitata* Black-capped Petrel** **21**
N Caribbean and western N Atlantic. Breeds on higher C Caribbean Islands; moves up Gulf Stream as far as North Carolina.

***Pterodroma caribbaea* Jamaican Petrel** **21**
Jamaica. Probably extinct.

iv) *Pterodroma* petrels with dark underwings

***Pterodroma macroptera* Great-winged Petrel** **14**
Circumpolar subantarctic and Antarctic waters except New Zealand.

***Pterodroma gouldi* Grey-faced Petrel** **14**
Warmer waters of New Zealand and Tasman Sea.

***Pterodroma lessonii* White-headed Petrel** **19**
Circumpolar in colder subantarctic waters.

***Pterodroma magentae* Magenta Petrel** (Taiko) **19**
Chatham Is. and surrounding seas.

***Pterodroma mollis* Soft-plumaged Petrel** **14, 19, 21**
P. m. mollis Colder waters of Atlantic and New Zealand.
P. m. dubia Colder waters of Indian Ocean and Tasmania.

***Pterodroma feae* Fea's Petrel** (Cape Verde Petrel) **21**
Subtropical NE Atlantic.

***Pterodroma madeira* Zino's Petrel** (Madeira Petrel) **21**
Madeira Is.

***Pterodroma incerta* Atlantic Petrel** (Schlegel's Petrel) **19**
S Atlantic; breeds on Tristan da Cunha Is. and Gough I.

e) *Procellaria* petrels

***Procellaria aequinoctialis* White-chinned Petrel** **28**
Circumpolar Southern Ocean; breeds in colder waters, moving north in winter.

***Procellaria conspicillata* Spectacled Petrel** **28**
SW Atlantic, breeding only on Inaccessible I. (Tristan da Cunha Is.).

Procellaria parkinsoni **Parkinson's Petrel** (Black Petrel) **29, 30**
Little and Great Barrier Is., New Zealand; winters in E tropical Pacific.

Procellaria westlandica **Westland Petrel** **29**
West coast of South Island, New Zealand; migrates E temperate Pacific.

Procellaria cinerea **Grey Petrel** **29, 32**
Circumpolar in colder subantarctic waters.

f) Larger shearwaters

Calonectris diomedea **Cory's Shearwater** **33**
C. d. diomedea (Scopoli's Shearwater) Mediterranean.
C. d. borealis Subtropical W Atlantic Is. other than Cape Verde; migrant to S Atlantic and Indian Oceans.

Calonectris edwardsii **Cape Verde Shearwater** **33**
Cape Verde Is.

Calonectris leucomelas **Streaked Shearwater** **33**
NW Pacific, migrating to central W Pacific, Indonesia and E tropical Indian Ocean.

Puffinus pacificus **Wedge-tailed Shearwater** **15, 30, 32**
Tropical Pacific and Indian Ocean.

Puffinus bulleri **Buller's Shearwater** **32**
Warmer waters of Pacific except SE Pacific. Breeds only on Poor Knights I. near New Zealand; migrates to N Pacific.

Puffinus carneipes **Flesh-footed Shearwater** **29, 30**
Subtropical Indian and SW Pacific Oceans; migrates to N Pacific and NW Indian Oceans.

Puffinus creatopus **Pink-footed Shearwater** **32**
E Pacific; migrates to N Pacific.

Puffinus gravis **Great Shearwater** **32**
Atlantic and Indian Oceans; breeds only on Tristan da Cunha and Gough I. Migrates north.

Puffinus griseus **Sooty Shearwater** **14, 31**
Circumpolar in warm and subantarctic waters; migrates north mainly into Pacific and Atlantic Oceans.

Puffinus tenuirostris **Short-tailed Shearwater** **31**
Circumpolar in colder waters; breeds only in Tasmania; migrates north into arctic Pacific and Bering Sea.

Puffinus nativitatis **Christmas Island Shearwater** (Kiritimati Shearwater) **30**
Tropical and subtropical Pacific.

g) Manx-type shearwaters

Puffinus puffinus **Manx Shearwater** **35**
Atlantic Ocean; breeds in cooler N waters and winters in C and SW Atlantic.

Puffinus yelkouan **Yelkouan Shearwater** **35**
Breeds throughout Mediterranean except Balearic Is., mostly migrating to Black Sea.

Puffinus mauretanicus **Balearic Shearwater** **35**
Breeds on Balearic Is., dispersing into W Atlantic.

Puffinus opisthomelas **Black-vented Shearwater** **34**
Pacific off Mexico, dispersing NW.

Puffinus gavia **Fluttering Shearwater** **36**
Northern New Zealand and Tasman Sea.

Puffinus huttoni **Hutton's Shearwater** **36**
Central E New Zealand; migrates to Australia.

h) Little/Audubon's Shearwater complex

Puffinus elegans **Subantarctic Little Shearwater** **36, 37**
Colder waters of SW Pacific, and Gough I. and Tristan da Cunha Is. in Atlantic.

Puffinus assimilis **Little Shearwater** **36, 37**
P. a. assimilis SW Pacific. Lord Howe Island and Norfolk Island.

P. a. kermadecensis SW Pacific. Kermadec Island.
P. a. haurakiensis SW Pacific. Islands off North Island, New Zealand.
P. a. tunneyi SE Indian Ocean. Amsterdam and St Paul Is. and W Australia.

***Puffinus baroli* Macaronesian Shearwater** **35, 37**
The Azores, Madeira, Canary Is., Desertas and Salvage Is.

***Puffinus lherminieri* Audubon's Shearwater** **34–37**
P. l. lherminieri Bahamas and West Indies.
P. l. loyemilleri Caribbean Islands to Venezuela
P. l. boydi Central E Atlantic Ocean. Cape Verde Is.

***Puffinus bannermani* Bannerman's Shearwater** **37**
NW Pacific Ocean. Bonin Is.

***Puffinus persicus* Arabian Shearwater** **37**
P. p. persicus Arabian Sea.
P. p. temptator Comoros Is., NW Indian Ocean.

***Puffinus bailloni* Tropical Shearwater** **37**
P. b. bailloni Central W Indian Ocean. Mascarene Is.
P. b. dichrous Tropical S Pacific and Indian Oceans (except Mascarene Is.).

***Puffinus subalaris* Galápagos Shearwater** **34, 37**
Galapagos Is.

***Puffinus newelli* Newell's Shearwater** **34**
P. n. newelli Central N Pacific Ocean. Main Hawaiian Is.
P. n. myrtae Rapa Island in the Austral Group (possibly elsewhere in French Polynesia).

***Puffinus auricularis* Townsend's Shearwater** **34**
Eastern N Pacific. Clarión, San Benedicto and Socorro Is., Revillagigedo Is.

***Puffinus heinrothi* Heinroth's Shearwater** **30**
Central W Pacific, W Solomon Is.

Family PELECANOIDIDAE (diving-petrels)

***Pelecanoides garnotii* Peruvian Diving-petrel** **38**
Humboldt current.

***Pelecanoides magellani* Magellanic Diving-petrel** **38**
Magellanic current and extreme SE Argentina.

***Pelecanoides georgicus* South Georgia Diving-petrel** **38**
Circumpolar Southern Ocean in colder Subantarctic waters and Stewart I.

***Pelecanoides urinatrix* Common Diving-petrel** **38**
P. u. urinatrix N New Zealand and SE Australia.
P. u. chathamensis S New Zealand (not subantarctic) and Chatham Is.
P. u. dacunhae Tristan da Cunha Is. and Gough I.
P. u. berard Falkland Is.
P. u. coppingeri S Chile.
P. u. exsul Remainder of subantarctic.

Family HYDROBATIDAE (storm-petrels)
Subfamily OCEANITINAE (southern storm-petrels)

***Oceanites oceanicus* Wilson's Storm-petrel** **39**
O. o. oceanicus Breeds on high-latitude subantarctic islands; migrates to N Pacific and Atlantic.
O. o. exasperatus Breeds on the Antarctic mainland; migrates to N Pacific and Atlantic.
O. o. chilensis Breeds in Chilean fjords; may migrate to N Pacific.

***Oceanites gracilis* Elliot's Storm-petrel** (White-vented Storm-petrel) **40, 45**
O. g. galapagoensis (Galápagos White-vented Storm-petrel) Galapágos Islands.
O. g. gracilis N Chile and Peru.

***Pealeornis maoriana* New Zealand Storm-petrel** **45**
New Zealand waters

***Garrodia nereis* Grey-backed Storm-petrel** **40**
Circumpolar subantarctic.

***Pelagodroma marina* White-faced Storm-petrel** **44**
P. m. marina S. Atlantic. Tristan da Cunha Is.
P. m. dulciae SW Indian Ocean and Tasman Sea, Southern Australia
P. m. eadesi Central W Atlantic. Cape Verde Is.
P. m. hypoleuca Central W Atlantic. Salvages Is.
P. m. maoriana SW Pacific. New Zealand (other than Kermadec Is.).
P. m. albiclunis SW Pacific. Kermadec Is.

***Fregetta tropica* Black-bellied Storm-petrel** **41, 45**
F. t. tropica Circumpolar subantarctic.
F. t. melanoleuca S Atlantic. Tristan da Cunha Is.

***Fregetta grallaria* White-bellied Storm-petrel** **41, 45**
F. g. grallaria Tasman Sea.
F. g. leucogaster S Atlantic. Tristan da Cunha Is.
F. g. segethi SE Pacific, Juan Fernández Is.
F. g. titan Central Pacific. Rapa Is.

***Nesofregetta fuliginosa* Polynesian Storm-petrel** (White-throated Storm-petrel) **44**
Central S Pacific Ocean.

Subfamily HYDROBATINAE (northern storm-petrels)

***Hydrobates pelagicus* European Storm-petrel** **39**
N Atlantic; migrates to S. Atlantic.

***Oceanodroma microsoma* Least Storm-petrel** **42**
Mexican Pacific coast; migrates south.

***Oceanodroma tethys* Wedge-rumped Storm-petrel** **40**
O. t. tethys (Galápagos Storm-petrel) Galápagos Is.
O. t. kelsalli (Peruvian Storm-petrel) Peruvian waters

***Oceanodroma castro* Madeiran Storm-petrel** (Band-rumped Storm-petrel) **39**
Tropical and subtropical Atlantic and Pacific.

***Oceanodroma leucorhoa* Leach's Storm-petrel** **39, 40, 42, 43**
O. l. leucorhoa N Pacific, N Atlantic and Pacific (except central NE Pacific).
O. l. chapmani Central NE Pacific. Baja California.
O. l. cheimomnestes Pacific Mexican coast. Guadalupe I. (winter breeder).
O. l. socorroensis Pacific Mexican coast. Guadalupe I. (summer breeder).

***Oceanodroma monorhis* Swinhoe's Storm-petrel** **43**
NE Pacific; migrates into N Indian Ocean.

***Oceanodroma macrodactyla* Guadalupe Storm-petrel**
Central NE Pacific. Guadalupe I., probably extinct.

***Oceanodroma tristrami* Tristram's Storm-petrel** **43**
NE Pacific. S Japanese Is.

***Oceanodroma markhami* Markham's Storm-petrel** **42**
Waters of Humboldt current.

***Oceanodroma matsudairae* Matsudaira's Storm-petrel** **43**
NE Pacific, Iwo Jima; migrates to N Indian Ocean.

***Oceanodroma melania* Black Storm-petrel** **42**
Central NE Pacific. Baja California.

***Oceanodroma homochroa* Ashy Storm-petrel** **42**
Central NE Pacific. Islands off California coast and Baja California.

***Oceanodroma hornbyi* Hornby's Storm-petrel** (Ringed Storm-petrel) **44**
Waters of Humboldt current.

***Oceanodroma furcata* Fork-tailed Storm-petrel** **42**
O. f. forcata N Kuril, Commander and Aleutian Is.
O. f. plumbea Alaska to N California.

PREFACE

This book covers the 137 currently accepted species of the avian order Procellariiformes, ubiquitous denizens of the oceans of the world. The common name for the entire group is 'tubenoses', a reference to their external tubular nostrils, which are often very evident on the upper mandible. The order is usually divided further into four families: the albatrosses, Diomedeidae; petrels and shearwaters, the Procellariidae; the storm-petrels, Hydrobatidae; and the diving-petrels, Pelecanoididae.

The Procellariiformes are an ancient group that have been recognisable in the fossil record for more than 35 million years. The order includes some of the world's commonest birds, such as Wilson's Storm-petrel. Yet the group's very existence is scarcely known to the general public, due mainly to the fact that petrels and albatrosses are almost exclusively marine birds, spending the majority of their lives at sea and only coming to land in order to breed.

Before the 1980s, observation and identification of petrels had been limited mostly to those who lived and worked at sea, and was hampered by the absence of a good field guide. The landmark publication of Peter Harrison's *Seabirds: an identification guide* by Croom Helm in 1983 began the 'rush to sea'. In recent years, the advent of 'pelagic' birdwatching trips and eco-tourism that reaches the poles and the Southern Oceans has seen the identification of seabirds become a frontier of birding. Many questions have been answered since the publication of Harrison's guide, but a number of identification issues remain unresolved, and there are cases in this book where we had to admit that separation of a species at sea is extremely difficult or even impossible given our current knowledge of the group. Indeed, even our understanding of what constitutes a species is still in a state of flux. Bird taxonomy cycles through periods of 'lumping' and 'splitting' of species. The current trend is to split, stimulated by enthusiastic use of genetic research, and nowhere is this more apparent than among the albatrosses; the 14 traditionally accepted species have been split, by some, into as many as 27 separate species. In this book we have tended to be conservative and have leant toward the adage that if you can't recognise it at sea then don't separate it.

This book is for birders, birdwatchers and others who go to sea and who wish to find and identify the birds that they see there, whether flying alone through storms, feeding *en masse* in the sun with dolphins, tuna and gannets, or paddling around at the back of a boat waiting for a handout. It is aimed mainly at identifying flying birds and we concentrate on those aspects of plumage, moult, morphometrics and biology that help with this. For example, we include features such as egg-laying dates to give an indication of the time of year the species can be found near land, but we omit details of incubation shifts by males and females. At times we have to discuss plumage in some detail, but we do not go into the meticulous feather-by-feather detail that may enable identification of birds in the hand. We include descriptions of characteristic flight styles but rarely mention voice. Most petrels are silent during the day at sea except when they congregate in groups; in our experience, voice is not useful in the separation of any species of albatross or petrel. We recommend that if you wish to find out more about the lives of albatrosses and petrels you take a look at Warham (1990, 1996) or Brooke (2004).

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We would like to point out that many texts in this book do not agree with the 'conventional wisdom' and contradict published identification texts that many birders accept as the 'truth'. These differences of opinion are based on many hours of observation at sea and detailed examination of museum specimens. We may be wrong in some cases and we accept that any inaccuracies here are our own. We would love to hear from anyone (c/o the publishers) who disagrees with us and welcome a vigorous debate. That is the only way field identification can progress.

TAXONOMY AND THE SPECIES DEBATE

The classification of birds is traditionally based on an assessment of similarities in morphology, with measurements and plumage being the main considerations, together with additional input from less conveniently studied aspects, such as behaviour, calls, distribution and even lice. Those birds that exhibit the least differences are deemed to be the most closely related, and with the study of the fossil record conclusions are possible about their evolutionary history. Before dealing with criticisms of this approach, it should be remembered that for 95% of the time this gives a reasonably clear idea of what constitutes a species and of the relationships between them, and for many birders this is quite adequate.

GENETIC RESEARCH

Data of a molecular nature, mainly the analysis and comparison of nuclear and mitochondrial DNA, became commonplace about 15 years ago and have added to the information available from traditional methods. It should be stressed, however, that these molecular techniques do not mean that a researcher can clip off a bit of a bird, whether alive, recently dead on the tideline, or long dead in a museum tray, stick it in a machine and get a printout of the species. The technique essentially involves comparing genetic material, much as traditional taxonomists compared morphological data, and coming up with a measure of the degree of separation. Then, employing some vigorously debated figures about the rate of molecular evolution, statistical techniques are used to arrive at a phylogenetic tree. Or, to be honest, several trees; the techniques are a long way from being as cut-and-dried as some biologists would suggest. However, genetic research has unquestionably made valuable contributions to our understanding of seabird phylogeny; we now recognise the importance of convergent evolution in the group, for example, where birds have evolved similar morphologies and behaviours in response to similar environmental cues, but do not share a recent common ancestor. It is also possible, using genetic material such as mitochondrial DNA that mutates at a known rate over the course of millions of years, to quantify the degree of genetic difference between two samples. This allows us to date with a degree of confidence major events in the seabird lineage, such as the divergence of the ancestors of modern storm-petrels and albatrosses some 10 million years ago.

Both traditional and molecular techniques come up with measures of the degree of relationship between the birds in question. Traditional taxonomists might arrive at what appears to be a complex array of features such as bill measurements, foot colour, and timing of moult and breeding, compared with the apparently neat percentage distances of molecular researchers (e. g. genetic distances within the genus *Thalassarche* range from 1.66% to 3.15%), but the next step is essentially the same; they have to decide on a degree of difference that will be used to define genera, species, super- and subspecies, and, indeed, whether they are even going to recognise all of these categories. At this point, having perhaps plodded through a number of user-unfriendly scientific papers in order to understand the intricacies of molecular techniques, it would seem quite legitimate for the ordinary birder to quietly despair or yell out loud in anger – biologists can't even agree on what a species is!

SPECIES CONCEPTS

There are several opinions as to what constitutes a species. Perhaps the simplest in concept, if not in name, is the Phylogenetic Species Concept, as summarised by Cracraft (1983). It gives species status to any group of birds that are morphologically distinguishable. In this scheme of things the pale-faced subantarctic race of Fairy Prion would become a full species, *Pachyptila subantarctica*, equal in status to the big, dark-billed Broad-billed Prion *P. vittata*; but for its English name, all trace of the closer relationship with Fairy Prion would be lost. Thus the PSC conceals a lot of useful information; several authors have tried to deal with this problem and subsequently added to the confusion.

An alternative approach is the Biological Species Concept, as advocated by Ernst Mayr, which maintains that 'Species are groups of interbreeding natural populations that are reproductively isolated from one another'. At first glance, this seems a more sensible point of view as a statement of what everyone understands as a species; albatrosses are obviously different from storm-petrels. In molecular terminology, there is no gene flow between the populations. For the majority of cases the BSC works well. It does, however, run into difficulties with populations that have recently diverged and may still interbreed, or are morphometrically or genetically similar but have ranges that do not overlap, a frequent occurrence with albatrosses and petrels that nest on isolated islands. This problem led biologists to expand the BSC into a Multidimensional Biological Species Concept (MBSC), which allows the combination of similar populations into polytypic species.

There is a 'political' element to this debate. In developed countries, conservation funding has been forthcoming for endangered species, especially if they can be shown to be endemic. For example, the promotion of the Shy Albatross that breeds in Bass Strait to full species status (as White-capped Albatross *T. cauta*) would allow the Australian government to fund research and conservation efforts. This is much less likely to happen if

the taxon remains a subspecies of Shy Albatross, which also nests in New Zealand. According this taxon specific status would be an understandable and worthy move given the dearth of conservation funding, but it would not necessarily reflect well on scientific integrity, nor would it help our understanding of the debate.

It was the adoption of the narrowest PSC that led Robertson and Nunn (1998) to increase the number of albatross species from 13 to 24, and to happily accept nucleotide distances of less than 1% as indicative of specific species. Recent workers and reviewers, however, have tended to view the same albatrosses through fuzzier MBSC glasses, and have rejected any distances of less than 1% as indicative of specific status, ending up with 13 to 22 species.

Even when there is agreement on the definition of a species, the criteria for raising a group of birds to species status vary considerably between authors. For example, for many years the Atlantic members of the genus *Calonectris* have been lumped together under the name Cory's Shearwater (*C. diomedea*). This despite the fact that the birds from the Cape Verdes are obviously a lot smaller, have slimmer, greyish rather than yellow bills, and breed later and entirely separately from the rest. Most authors now accept that Cape Verde Shearwater should be raised to species status (*C. edwardsii*), though Brooke (2004) is not entirely convinced. There are also differences between those populations of Cory's Shearwater that breed in the Mediterranean and those that breed on the Atlantic Islands; those from the Mediterranean are smaller on average, with paler underwings and paler heads. Most authors accept that these populations warrant subspecific status, but only the most enthusiastic 'splitters' make a case for full species status. The only genetic work carried out so far on this group is by Penhallurick and Wink (2004) and unfortunately they did not include the Cape Verde birds. They interpreted their results for the Atlantic and Mediterranean populations as not warranting specific status but other workers in the field have used what appears to be the same or even a lesser degree of genetic difference as evidence to support such status.

CONCLUSIONS

There is no doubt that genetic work has added new information to the taxonomic debate, but interpretations of the data still remain a matter of opinion; some have been dogged by poor science, and are far from being the revolution that enthusiasts have claimed. The debate is not over, but it is also worth remembering that the taxonomic status of the majority of albatrosses and petrels had remained much the same for 70 years, and those that have changed have, in most cases, been recognised as different species or as a subspecies for some time. There have not been that many surprises!

Amidst all this debate we had to make some broad decisions on taxonomy and on which taxonomic sources to follow – after all, field guides are about identifying birds to species. So for much of this book we have followed Brooke (2004), only departing substantially when we get to the smaller shearwaters, where we have adopted many of the recommendations of Austin *et al.* (2004).

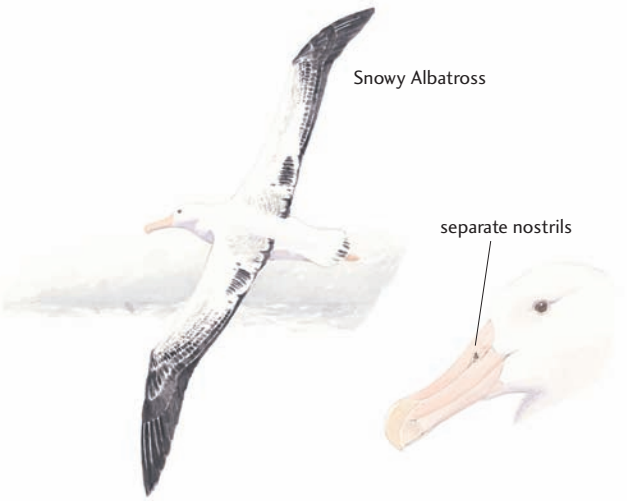
THE FOUR FAMILIES: CHARACTERISTICS AND TAXONOMIC RELATIONSHIPS

A combination of evidence from molecular studies and the fossil record suggests that petrels emerged from a common ancestor (with penguins and divers) in the mid-Eocene, some 40–45 million years ago, and the four modern families, Diomedeidae, Procellariidae, Hydrobatidae and Pelecanoididae, were present 10 million years later in the Oligocene. Storm-petrels diverged first, then albatrosses, so storm-petrels are thus rather surprisingly more closely related to the albatrosses than to the petrels, shearwaters or diving-petrels.

ALBATROSSES (DIOMEDEIDAE)

Albatrosses are big, far bigger than all other procellariiforms bar the giant petrels. They weigh between 2 and 9kg and have wingspans of between 1.8 and 3.5m. Unlike the other three families, they have separate nostrils on either side of the bill.

The long, narrow wings with low wing-loading (low weight-to-wing area ratio) are ideal for extended gliding flights, and they fly huge distances in search of food. Albatrosses feed by landing on the sea and grabbing prey at or near the surface, and all but the sooty albatrosses are attracted to fishing boats. Rather than occupying burrows, they nest on the surface.



Following molecular studies by Nunn *et al.* (1996) and Nunn & Stanley (1998), it is now generally accepted that the albatrosses can be divided into four genera. These are the North Pacific albatrosses (*Phoebastria*), the great albatrosses (*Diomedea*), the mollymawks (*Thalassarche*), and the sooty albatrosses (*Phoebetria*).

It is also generally agreed that the genus *Phoebastria* consists of four species, Laysan, Waved, Short-tailed and Black-footed Albatrosses, while *Phoebetria* contains just two, the Sooty and Light-mantled Albatrosses. However, the make-up of the other two genera is more contentious. Robertson and Nunn (1998) suggested increasing the number of species in *Diomedea* and *Thalassarche* from 10 to 18. This scheme was widely adopted despite the fact that supporting evidence remained unpublished for some time. In this guide we have accepted six species in *Diomedea*; Snowy, New Zealand, Tristan, Amsterdam Island and Northern and Southern Royal Albatrosses, and nine in *Thalassarche*: Black-browed and the very similar but yellow-eyed Campbell Albatrosses, Shy, Salvin's and Chatham Islands Albatrosses, and both Indian and Atlantic Yellow-nosed Albatrosses. However, we treat Buller's Albatross and the darker-headed birds from the Chatham Islands as one species. Grey-headed Albatross remains, as always, as one species.

STORM-PETRELS (HYDROBATIDAE)

Storm-petrels are the smallest of all the oceanic birds, weighing from 20g (a third less than a House Sparrow) to just over 100g, with wingspans of 32–56cm. They have relatively short inner wings, a large area of primaries and a low wing-loading so they can glide well yet remain manoeuvrable. They feed by picking small prey off the surface of the sea, fluttering and swooping low over the sea, and often pattering their feet upon the surface. Most breed in natural holes and crevices rather than digging burrows, and all but the Wedge-rumped Storm-petrel on the Galápagos visit their breeding grounds only at night.

The family is divided into two subfamilies:

Oceanitinae (southern hemisphere), 8 species in 6 genera

- Wilson's Storm-petrel (*Oceanites oceanicus*)
- Elliot's Storm-petrel (*Oceanites gracilis*)
- New Zealand Storm-petrel (*Pealeornis maoriana*)
- Grey-backed Storm-petrel (*Garrodia nereis*)
- White-faced Storm-petrel (*Pelagodroma marina*)
- Black-bellied Storm-petrel (*Fregetta tropica*)
- White-bellied Storm-petrel (*Fregetta grallaria*)
- Polynesian Storm-petrel (*Nesofregetta fuliginosa*)

Grey-backed Storm-petrel

Hydrobatinae (northern hemisphere), 14 species in 2 or 3 genera but with 13 species often placed in one genus, *Oceanodroma*

- European Storm-petrel (*Hydrobates pelagicus*)
- Least Storm-petrel (*Oceanodroma* (*Halocyptena*) *microsoma*)
- Wedge-rumped Storm-petrel (*Oceanodroma tethys*)
- Madeiran Storm-petrel (*Oceanodroma castro*)
- Leach's Storm-petrel (*Oceanodroma leucorhoa*)
- Swinhoe's Storm-petrel (*Oceanodroma monorhis*)
- Tristram's Storm-petrel (*Oceanodroma tristrami*)
- Markham's Storm-petrel (*Oceanodroma markhami*)
- Matsudaira's Storm-petrel (*Oceanodroma matsudairae*)
- Black Storm-petrel (*Oceanodroma melania*)
- Ashy Storm-petrel (*Oceanodroma homochroa*)
- Hornby's Storm-petrel (*Oceanodroma hornbyi*)
- Fork-tailed Storm-petrel (*Oceanodroma furcata*)
- Guadalupe Storm-petrel (*Oceanodroma macrodactyla*)

Leach's Storm-petrel

Recent molecular data has supported the retention of all the species and the southern-hemisphere genera, but more work is required.

DIVING-PETRELS (PELECANOIDIDAE)

Common Diving-petrel

A group of four very similar, small, southern-hemisphere species that in many ways are more like the auks of the northern hemisphere than the rest of the petrels. They weigh between 100 and 200g, have two small nostril openings on top of the bill, and have small, rounded wings with a high wing-loading. They fly directly with rapid, whirring wings, and feed by diving, propelling themselves underwater with half-closed wings. Unlike many other petrels they tend to live and feed near their nesting areas and appear to have relatively short lifespans. Diving-petrels dig burrows or nest in natural holes and only visit breeding colonies at night.

There are four species in one genus, *Pelecanoides*. Darwin, amongst others, wondered about their affinities with the auks but nowadays they are taxonomically uncontroversial.

PETRELS AND SHEARWATERS (PROCELLARIIDAE)

Compared with the other three families, the Procellariidae are a rather diverse assemblage. The 80 or so species (there is considerable taxonomic debate) are usually divided into four subfamilies: the fulmarine petrels, the prions, gadfly petrels and shearwaters.

Fulmarine petrels

The fulmarine petrels are a small but diverse group ranging in size from the 250g Snow Petrel to the 5kg giant petrels, which are smaller only than the larger albatrosses. Fulmarine petrels exhibit a wide range of plumages, from the entirely white Snow Petrel, through the grey, gull-like fulmars and chequered black-and-white Cape Petrel to the variably brownish giant petrels. Fulmarine petrels all have prominent nasal tubes on top of the bill. They feed by landing on the sea and seizing prey near the surface. Northern Fulmars, Cape Petrels and giant petrels feed around fishing boats; uniquely among procellariiforms, giant petrels may feed on land, scavenging around seabird and seal colonies. Snow Petrels nest in crevices, but all the others nest on the surface or on cliff ledges, and all visit the breeding grounds by day.

Taxonomically, the Antarctic and Cape Petrels and the two fulmars are relatively uncontroversial, although there is some debate over subspecies of the Northern Fulmar, which exhibits several colour morphs and has separate populations in the Pacific and Atlantic Oceans. Taxonomic debate continues as to whether the Snow Petrel should be split into two species, Greater and Lesser, and whether it is more closely related to the Kerguelen Petrel than to the fulmarines. The two giant petrels are normally recognised as distinct species

Northern Giant Petrel

Cape Petrel

Prions

The prions are a distinctive group of small, blue-grey petrels of the cooler Southern Oceans. They weigh between 90 and 240g. All have distinctive bills with fine filters called lamellae along the edge of the upper mandible, and a gular pouch. These are used to filter out plankton in the manner of a baleen whale. Prions feed by sitting on the sea or by flying low over the surface, often using their feet to bounce off waves not unlike a storm-petrel. At sea, all but Slender-billed and Fulmar Prions are often highly gregarious and can be seen in huge flocks, but they rarely follow ships or feed around fishing vessels. Prions nest in burrows and crevices. Fulmar Prions can be seen on the breeding grounds during the day but all others visit only at night.

Slender-billed Prion

Broad-billed Prion

Most authors accept that Fairy and Fulmar Prions form a separate grouping from the rest but taxonomists agree about little else. The situation is complex; morphometric measurements overlap a lot and each island population of the 'same species' is slightly different, so much so that earlier authors regularly named prions by the island the specimens came from. The situation may become clearer when good samples of genetic and morphometric data are available from known breeding birds on a wider range of islands, and more details of breeding biology (notably of hybridisation) are better known. For this book, we recognise seven species in one genus, *Pachyptila*, and mention seven further subspecies.

Gadfly petrels

The term gadfly petrel has been used to describe a diverse group of long-winged, fast flying, medium-to-small, highly pelagic species of temperate and tropical oceans. All feed on the wing, and they can even catch flying fish. They also alight on the sea and scavenge or grab prey at or near the surface. Species that breed in the cooler oceans tend to nest in burrows or crevices and visit their colonies by night, while those in the tropics are more likely to nest on the surface and be active at the colony during the day. Gadfly petrels rarely feed around fishing vessels.

We have used the term gadfly petrel to refer solely to species in the genus *Pterodroma* but other authors also include the genera *Lugensa, Pseudobulweria* and *Bulweria.* The genus *Lugensa* consists of only one species, Kerguelen Petrel, which, despite being only relatively recently removed from *Pterodroma,* appears to be quite distinct and with no obvious close affinities.

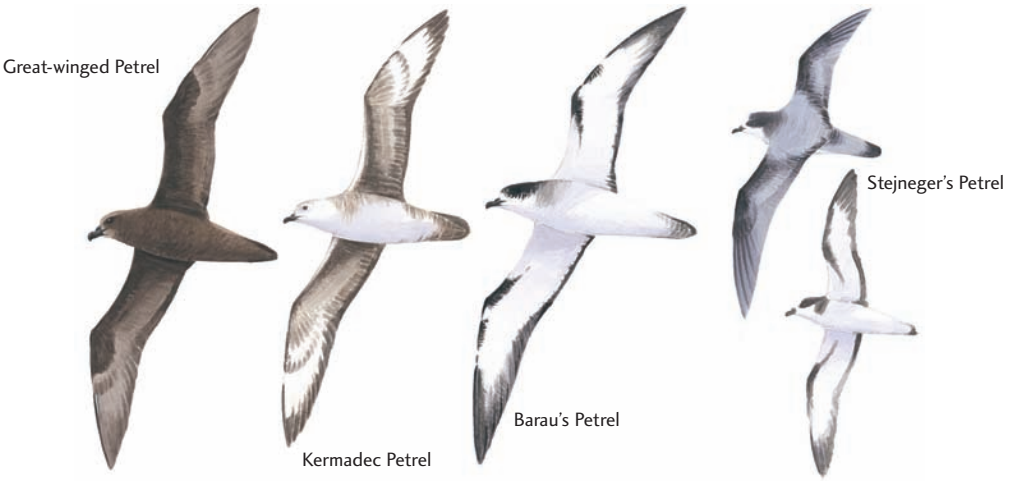

Bulwer's Petrel

The genus *Bulweria* has been recognised as distinctive for a fair while and contains two species, Bulwer's and Jouanin's Petrels. Both are dark, long-winged and long-tailed tropical species that have characteristic bills with less obvious tubular nostrils than the *Pterodroma* petrels.


Tahiti Petrel

Like *Bulweria*, the genus *Pseudobulweria* occurs in warmer seas, and its species are long-winged and long-tailed, with deep, heavy bills. The genus includes four species, Fiji and Mascarene Petrels, the larger Tahiti Petrel, and the very similar but smaller Beck's Petrel.

The genus *Pterodroma* contains 30–35 species, all of which have relatively short, strong bills with prominent nasal tubes and a hooked tip. They range in plumage from entirely dark, through several species that have dark and light phases, to a distinctive group that are white underneath and pale grey above with a dark M mark across the open wings. The smaller members of this distinctively marked group are often collectively called the cookilarias.


Great-winged Petrel

Kermadec Petrel

Barau's Petrel

Stejneger's Petrel

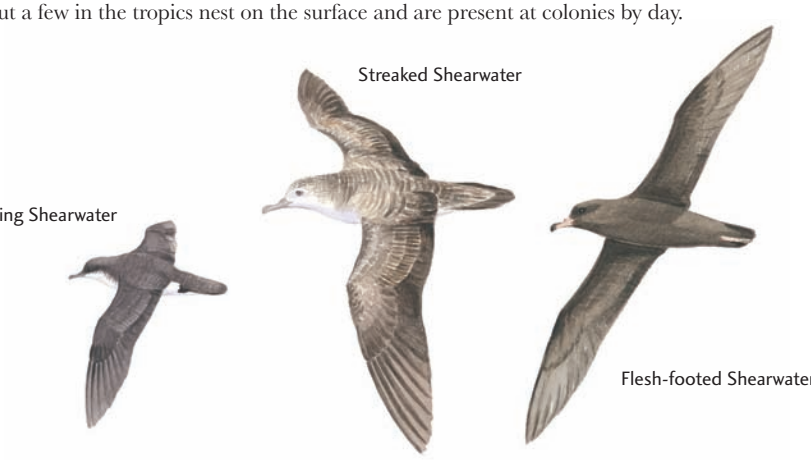
The pterodromas, especially those from the warmer oceans, are neither well-known nor well-studied, and several new species have recently been 'discovered' rather than promoted purely on the basis of molecular and taxonomic re-evaluation. These include the Henderson Petrel, ostensibly a dark form of Herald Petrel but which breeds separately from all the light forms on Henderson atoll in the Pitcairn Group, and a small form of White-necked Petrel, Vanuatu Petrel, which was described from old museum specimens and a more recent storm-blown corpse from Australia.

Current taxonomic discussion centres on the long-assumed relationship between the North Atlantic Fea's and Zino's Petrels with the Southern Ocean Soft-plumaged Petrel (Fea's actually seems to be more closely related to Cahow than Soft-plumaged Petrel), and the specific status of the polymorphic Herald/Trindade group that breeds on widely separated islands in the Atlantic, Indian and Pacific Oceans. We have accepted all the recent 'splits' and recognise a total of 35 species in the genus *Pterodroma*.

Brooke (2004) includes the five members of the genus *Procellaria* among the shearwaters, but although they possess the ability to dive, their bills are deep and strong with large hooked tips and prominent nasal tubes, more like the pterodromas. The *Procellaria* are the largest of the burrowing petrels, ranging in weight from 600–700g for Parkinson's Petrel to 1.5kg for White-chinned Petrel.

Shearwaters

The two genera of shearwaters, *Calonectris* and *Puffinus*, are small to medium-sized shearwaters with relatively long, slim bills that have less prominent nostril tubes and shallower hooks on the tips than the pterodromas. The smallest shearwaters weigh 150g and the largest more than 1kg, with many species being in the 300–400g range. All dive for food to some extent; Cory's Shearwater rarely reaches 5m under the surface, but Sooty and Short-tailed Shearwaters are capable of depths of 70m and swim well underwater, propelling themselves on half-open wings. Those that dive well, especially the smaller *Puffinus* species, have compressed, water-resistant plumage, narrower, more streamlined bodies, flattened tarsi, and short, narrow wings with stiffer, stronger primaries. These adaptations all facilitate swimming and chasing prey underwater. The larger species, especially Wedge-tailed and Buller's Shearwaters and those in the genus *Calonectris,* have broader wings and longer tails, are much more manoeuvrable, and take much of their food on the wing or by shallow plunge-diving. Many of the shearwaters feed around fishing boats. Shearwaters that breed in temperate areas dig burrows and visit colonies by night, but a few in the tropics nest on the surface and are present at colonies by day.



A version of the smaller, Manx-like, brown or black-and-white *Puffinus* shearwater occurs throughout the world's temperate and tropical oceans, nesting on many oceanic islands and archipelagos and on islands on continental shelves. They have provided taxonomists with many hours of amusement, caused much constructive discussion and bitter controversy, and even generated a little in the way of research funds. One set of labels on a brownish, rather faded and admittedly intermediate looking specimen (in a well-known museum that should perhaps remain nameless) had no fewer than seven pencilled amendments culminating in '*atrodorsalis*?'.

Once everyone, more or less, agreed that there was a relatively easy-to-identify Manx-type group of species, discussion moved on to centre around what became known as the Little/Audubon's Shearwater complex. The 'Little' end of the spectrum was characterised by black upperparts, a short tail, white undertail, smallish bill and steep forehead; the 'Audubon's' end by brown upperparts, long tail, dark undertail, biggish bill and sloped forehead. It was the intermediates, notably from the Atlantic islands, plus poorly studied representatives from far-flung Pacific and Indian Ocean islands, distant from the centres of taxonomic debate in Europe and the USA, that caused the controversy. Recent molecular studies, especially those by Austin *et al.* (2004), suggest that this emphasis on the characters differentiating Little from Audubon's was misleading, as were many of the island species and subspecies, and that the group was better looked upon as three biogeographic groups – from the North Atlantic, Southern Oceans including Australasia, and the tropical Indian and Pacific Oceans respectively. Intriguingly, one of the consequences of this research is that Little Shearwater characteristics (black upperparts, short tail etc.) appear to have evolved separately and convergently in the northern and southern hemispheres, and are not an indication of a close relationship.

The Little/Audubon group. Left – Little characteristics; centre – intermediate; right – Audubon's. Genetic studies have shown that these morphometric characteristics do not truly reflect specific status.

We agree with many of Austin *et al.*'s (2004) recommendations; see the main text for details. We have decided to include a total of 10 species from the former Little/Audubon's Shearwater complex. Together with the Manx-type group this makes 16 smaller *Puffinus* shearwaters, and 28 species of shearwaters in total (three in *Calonectris* and the rest in *Puffinus*).

IDENTIFICATION

Away from their breeding grounds, from the shore or at sea, the usual view of an albatross or petrel is fleeting and in flight. Things get a little easier if members of the species are attracted to ships, and an outing on a fishing boat or, even better, a pelagic birding trip will bring many species in close enough to allow excellent views of birds in flight and on the water. This is especially true of many of the albatrosses and a fair number of the shearwaters, but many of the storm-petrels and gadfly petrels, especially those from warmer seas, are rarely attracted to ships and remain elusive. In the main text we mention those species that are attracted to boats and to 'chum', that enticing concoction of oily, smelly, fishy stuff thrown off the back of boats by pelagic birders to attract seabirds close enough to allow identification.

In this guide we concentrate on the identification of birds in flight. This section deals with some of the problems and pitfalls associated with assessing a bird at sea. Identification of many albatrosses and petrels is not easy and there is no simple substitute for comparative experience. The best observers often identify a bird by jizz, a term birders use to describe the general impression created by a bird's outstanding features, shape and relative proportions. It can be looked upon as the 'arty' side of birding. It is the aspect of a bird that allows an experienced birder to identify a species from a brief glance out of the corner of their eye without quite knowing how they do it. Equally, it allows the less scrupulous to mumble 'jizz' and claim an identification based on the most fleeting of glimpses and on the slightest of pretexts.

PHOTOGRAPHS AND VIDEO

There is no doubt that photography, and especially the recent rapid rise of digital technology, has contributed enormously to our knowledge of seabird identification; it would have been much more difficult to produce the illustrations for this book without hundreds of reference photographs. Looking over the day's crop of photos and videos in the evening has even led to the discovery of rare and unusual species that were not noticed at the time among all the activity around the boat. The first indication that the New Zealand Storm-petrel was not long-extinct came from the discovery in this manner of an otherwise unnoticed, white-rumped storm-petrel in a set of photographs.

On the other hand, photographs (especially single ones) can be very misleading. Most birders realise that a single shot can capture a bird in an uncharacteristic pose; this is especially true of seabirds in flight and many birders are now aware of the problems of assessing size in photographs. Not only is there often nothing that can be used as a reference point in a closely cropped view of a bird, but photos taken through a telephoto lens create the impression that objects further away are larger than they actually are. Telephoto images are now so commonplace that we automatically compensate for this compression of perspective, but look closely at many