

XXVII.—*The Distribution and Nidification of the Tubinares in the North Atlantic Islands.* By DAVID A. BANNERMAN B.A., M.B.O.U., F.R.G.S.

(Plate XVII.)

THE following paper is an attempt to determine the local range of the several species and subspecies of Petrels, Shearwaters, and Fulmars which occur in the north Atlantic Islands; also to get together all the data which have been published with reference to the nesting-seasons in the various islands, and to give, in as concise a form as possible, a review of all the work done in the past relating to the Tubinares in the islands under discussion.

Besides many valuable papers written in English, many contributions have been made by French, German, Italian, Spanish, and Portuguese writers. Every one of these papers I have had carefully translated, and I hope that I have not overlooked any paper having an important bearing on the subject. A complete list of the various authors and works consulted is appended on page 446. For the most part I have only made use of papers when the writers have personally visited and made observations in the north Atlantic Islands. It is needless to add that without these papers it would have been utterly impossible to arrive at any conclusions regarding either the distribution or nesting-habits of the various birds. I should like particularly to acknowledge and call attention to the immense value of Padre Schmitz's "Diary Notes" on the Petrels inhabiting the Madeira Group of islands. This ornithologist has kept, for a period of over sixteen years, a concise and accurate record of the birds—particularly the Petrels—which have come to his notice during his residence in the island of Madeira, and has acquired a most valuable collection of birds, which is exhibited in his museum at Funchal.

The following members of the Order Tubinares come under our notice in the present paper :—

1. *Thalassidroma pelagica* (Linn.). The Storm-Petrel.
2. *Oceanodroma leucorhoa* (Vieill.). Leach's Fork-tailed Petrel.
3. *Oceanodroma castro* (Harcourt). The Madeiran Fork-tailed Petrel.
4. *Oceanites oceanicus* (Kuhl). Wilson's Petrel.
5. *Pelagodroma marina hypoleuca* (Moquin-Tandon). North Atlantic Frigate-Petrel.
6. *Puffinus gravis* (O'Reilly). Great Shearwater.
7. *Puffinus kuhli flavirostris* (Gould). Yellow-billed Atlantic Shearwater.
8. *Puffinus kuhli edwardsi* Oust. Cape Verde Islands' Shearwater.
9. *Puffinus puffinus puffinus* (Brünn.). Manx Shearwater.
10. *Puffinus assimilis baroli* Bonap. Atlantic Allied Shearwater.
11. *Puffinus lherminieri boydi* Mathews. Boyd Alexander's Shearwater.
12. *Æstrelata mollis feæ* Salvad. Fea's Soft-plumaged Petrel.
13. *Bulweria bulweri* (Jard. & Selby). Bulwer's Petrel.
14. *Fulmarus glacialis glupischa* Stejneger. Pacific Fulmar.

These fourteen birds may be classed as follows :—

Numbers 3, 5, 7, 8, 9, 10, 11, 12, and 13 are all regular breeding birds in one or more of the north Atlantic Archipelagos.

Number 1 has only been known to breed on one occasion, and is best included with numbers 2, 4, and 6, which are more or less rare visitors ; while number 14 is founded on a single record, and is unlikely to be again met with so far from its natural habitat.

Geographical Features.

Without exception, all the islands dealt with in this paper are volcanic in origin, and in many instances are surrounded by a great depth of water, particularly is this the case with the Azores. There is not space here to give an account of the physical features of the different groups, but each merits close attention. According to Sir Charles Lyell, the Madeira and Canary Groups date from the Miocene period, which is an important factor to remember when dealing with the present distribution of the Ornis.

By referring to the map (Plate XVII.), which has been specially prepared by Mr. H. Milne, draughtsman of the Royal Geographical Society, it will be seen exactly which groups are included under the heading of the north Atlantic Islands ; it is particularly intended to show the relationship of the various groups of islands to one another, and depicts the Azores, Madeira Group, Salvages, Canary and Cape Verde Archipelagos. Facing the map is a list (p. 441) of the above-mentioned groups with a table of the various islands of which they are composed, showing exactly which species of the Order Tubinares breeds on, or has been recorded from, each individual island. From this table it will be seen that in each archipelago the Petrels and Shearwaters resort to the smallest uninhabited islands upon which to rear their young, practically neglecting the larger islands.

I have also prepared a second table (p. 443) by which it can be seen at a glance whether any particular species breeds in, or is only recorded as a visitor from, each group of islands. Reference to the first table must be made when information is desired of a particular island in any group.

Distribution.

The correct geographical distribution of members of the Petrel family is exceedingly difficult to determine. Professor Newton, writing on the Petrels in the 'Dictionary of Birds,' went to the root of the matter when he remarked " . . . it is only now beginning to be clear that until we know the breeding-place or places of each species—and some seem to be extremely restricted in this respect—we shall know very little to the point about their geographical distribution."

It is becoming more generally recognised every day that Petrels and Shearwaters do not travel such immense distances as they have formerly been credited with doing. For in the case of many species their range probably revolves round the particular locality to which they resort during the breeding-season. This may be said of *O. castro*, *P. m. hypoleuca*, *P. a. baroli*, *P. l. boydi*, and, in fact, the large

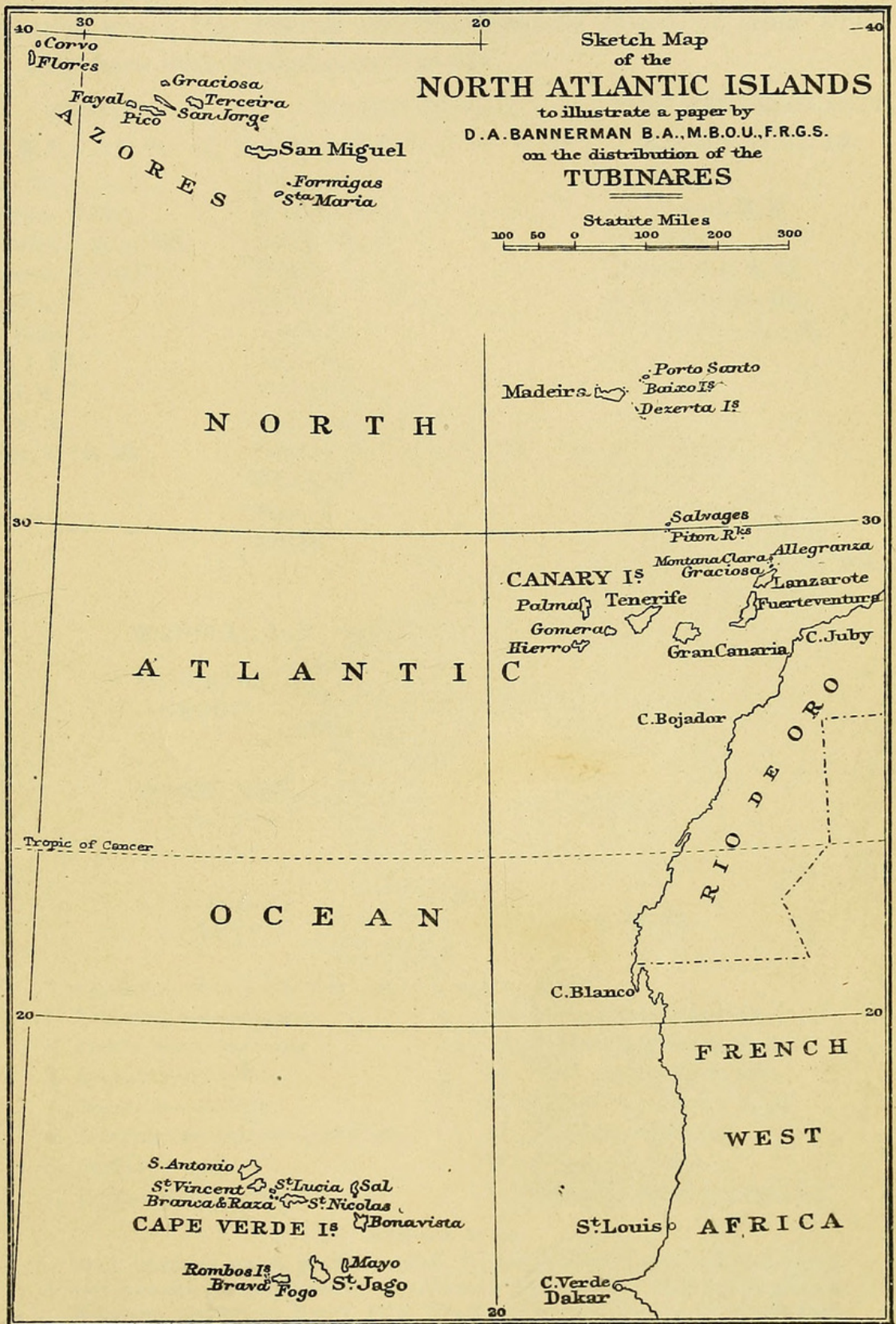


TABLE showing the particular Islands in the North Atlantic Ocean upon which the Petrels and Shearwaters Breed, or from which they have been recorded as Visitors.

AZORES.	CANARY ISLANDS.	CAPE VERDE ISLANDS.
2, 3, 4, 5, 7, ? 9, 10, ? 13.	1, 2, 3, 4, 5, 6, 7, ? 9, 10, 13.	2, 3, 5, 8, 11, 12, 13.
Santa Maria, 3, 7.	Allegranza, 7, ? 9.	St. Antonio.
Formigas Rocks.	Montaña Clara, 1, 7, 10, 13.	St. Vincent, 2, 8.
São Miguel, 2, 3, 10.	East Rock, 7.	St. Lucia.
Graciosa, 3, 7, 10.	West Rock, 7.	Branca, 3, 5, 8, 11.
Terceira, 7.	Graciosa, 7, ? 10.	Raza, 3, 8, 11, 13.
São Jorge, 7.	Lanzarote, 7.	St. Nicholas, 3, ? 12.
Pico, 7, 10.	Lobos, 7.	Sal.
Fayal, 4, 7.	Fuerteventura, 7.	Bonavista.
Corvo, 13.	Gran Canaria, 2, 3, 7, 10.	Mayo.
Flores, 7, ? 9, 10.	Tenerife, 1, 2, 4, 5, 7, 9, 10, 13.	St. Jago, 11.
	Palma, ? 9.	Fogo, 11, 12.
	Gomera.	Brava, 8.
	Hierro.	Rombos Is. { Grande. Luiz Carneiro. Cima, 3, 5, 11.

MADEIRA, 1, 2, 3, 4, 5, 6, 7, 9, 10, 12, 13, 14.

DESERTAS GROUP. { Chao Isl.
Deserta Grande. } 1, 3, 7, 9, 10, 12, 13.
Bugio Isl.

PORTO SANTO GROUP. { Porto Santo.
Cima Isl.
Baixo Isl.
Ferro Isl. } 3, 7, 9, 10, 12, 13.

SALVAGE IS. GROUP. { Great Salvage.
Great Piton. } 3, 5, 7, ? 9, 10, 13.
Little Piton.

The numbers refer to the following fourteen species :—

- | | |
|--|---|
| 1. <i>Thalassidroma pelagica</i> . | 8. <i>Puffinus kuhli edwardsi</i> . |
| 2. <i>Oceanodroma leucorhoa</i> . | 9. <i>Puffinus puffinus puffinus</i> . |
| 3. <i>Oceanodroma castro</i> . | 10. <i>Puffinus assimilis baroli</i> . |
| 4. <i>Oceanites oceanicus</i> . | 11. <i>Puffinus lherminieri boydi</i> . |
| 5. <i>Pelagodroma marina hypoleuca</i> . | 12. <i>Æstrelata mollis fæx</i> . |
| 6. <i>Puffinus gravis</i> . | 13. <i>Bulweria bulweri</i> . |
| 7. <i>Puffinus kuhli flavirostris</i> . | 14. <i>Fulmarus glacialis glupischa</i> . |

EXPLANATION.

Plain numbers denote that the species to which that number refers is found breeding on the group of islands, or particular island, against which it is placed.

Numbers printed in heavy type denote that the species to which that number refers is recorded from the group of islands, or that particular island, against which it is placed, but that the bird *does not breed* so far as we know.

A ? placed before a number denotes that there is either unsatisfactory or contradictory evidence concerning the species to which that number refers. Each species is fully dealt with separately and should be consulted for details.

majority of Petrels and Shearwaters which breed in the north Atlantic Islands, and which are hardly ever recorded outside their own particular sphere until we draw near to another breeding-station, perhaps at the other side of the world. Even in such a comparatively small radius as is included in the accompanying map, the distribution of individual species is very striking. For instance, *O. castro* and *Æ. m. fœæ* each breed in the Madeira Group and in the Cape Verde Archipelago, but do not, so far as we know, breed on the Canary Islands, which lie between them. Another similar case is *P. m. hypoleuca* breeding on the Salvage Islands and on the Cape Verde Islands, but not on the Canary Group. Surely this points to very circumscribed distribution at the present day, else why should not *P. m. hypoleuca* have taken up its abode on Montaña Clara, an uninhabited island of the eastern Canary Islands suited in every way to its requirements? The reason why so many of the Petrels inhabiting the Atlantics have their nearest allies in the Pacific Ocean is certainly hard to explain, particularly as there are no links or geographical subspecies in the regions between. Bulwer's Petrel (*B. bulweri*) inhabits, in addition to the north-east Atlantic, the Hawaiian Islands, and, as far as we know, the bird does not breed anywhere in the western part of the Atlantic.

The only possible explanation of the peculiar range of Bulwer's and other Petrels whose different colonies are often separated by vast areas, is to be looked for in the great antiquity of the order to which they belong, and to the enormous changes which have taken place in the distribution of land and water on the surface of the earth. The question is too complex to be more than alluded to in this paper, but it seems to be a much neglected study. In all the comprehensive works dealing with "Petrels" which have appeared, I can find no attempt at an explanation of the present geographical distribution which many species enjoy.

In former days the Petrel family must have had a very extended range, which is yearly becoming more circumscribed. The birds which at one time ranged universally from the north Atlantic to the south Pacific are now becoming

TABLE showing Distribution and Nidification Records of Tubinares in the North Atlantic Islands.

	AZORES.	MADEIRA.	DESERTAS.	PORTO SANTO.	SALVAGES.	CANARY IS.	CAPE VERDE IS.
1. <i>Thalassidroma pelagica</i> .....	.....	Visitor.	Visitor. Has bred on one occasion.	.....	.....	Visitor.	.....
2. <i>Oceanodroma leucorhoa</i>	Rare visitor.	Rare visitor.	.....	.....	.....	Occasional visitor.	Visitor.
3. <i>Oceanodroma castro</i>	Breeds.	Breeds.	Breeds.	Breeds.	Breeds.	Rare straggler.	Breeds.
4. <i>Oceanites oceanicus</i>	Rare visitor.	Very rare visitor.	.....	.....	.....	Very rare straggler	.....
5. <i>Pelagodroma marina hypoleuca</i> .	Accidental visitor.	Accidental visitor.	.....	.....	Breeds.	Accidental visitor.	Breeds.
6. <i>Puffinus gravis</i> .....	.....	Very rare straggler	.....	.....	.....	Very rare straggler	.....
7. <i>Puffinus kuhli flavirostris</i>	Breeds.	Breeds.	Breeds.	Breeds.	Breeds.	Breeds.	.....
8. <i>Puffinus kuhli edwardsi</i> .....	.....	.....	.....	.....	.....	.....	Breeds.
9. <i>Puffinus puffinus puffinus</i>	Said to breed.	Breeds.	Breeds.	Breeds.	Said to breed.	Visitor. Said to have bred, evidence unreliable.	.....
10. <i>Puffinus assimilis baroli</i>	Said to breed sparingly.	Breeds.	Breeds.	Breeds.	Breeds sparingly.	Breeds.	.....
11. <i>Puffinus lherminieri boydi</i> .....	.....	.....	.....	.....	.....	.....	Breeds.
12. <i>Æstrelata mollis fææ</i> .....	.....	Breeds.	Breeds.	Recorded Baixo Is. Doubtful if breeds.	.....	.....	Almost certainly breeds.
13. <i>Bulweria bulweri</i>	Said to breed 1855. No record since.	Breeds.	Breeds.	Breeds.	Breeds.	Breeds.	Very rare straggler.
14. <i>Fulmarus glacialis glupischæ</i> .....	.....	Accidental visitor. One record only (<i>Harcourt</i>).	.....	.....	.....	.....	.....

isolated in often widely distant localities. Intermediate colonies may be totally wiped out, for it has often been proved that all the Tubinares have a highly-developed homing-sense and become strongly attached to the particular breeding-station to which they resort. The birds will return year after year to the same small island no matter to what extent they are subjected to persecution from man, rats, mice, mongooses, or the other innumerable enemies with which ground-nesting birds have to contend. Padre Schmitz records an unusual agent of destruction when, in a certain year, all the young *P. k. flavirostris* were found dried up in their holes on the Salvage Islands suffocated by the sirocco.

In addition to *B. bulweri*, we have the interesting case of *Oceanodroma castro*, which breeds in the north Atlantic Islands and almost certainly in the Hawaiian and Galapagos Groups in the Pacific. Birds from the Atlantic and Pacific are quite indistinguishable from one another, although there are hundreds of miles between them and *no intermediate colonies exist*. Both these cases point to a discontinuous distribution.

A different example is afforded by the White-faced or Frigate-Petrel. The Frigate-Petrel of the north-east Atlantic has become so differentiated from the typical race as to be readily distinguished by the longer bill and the lighter colouring of the upper parts, and should be known as *P. m. hypoleuca*.

Two noteworthy examples of curious distribution are the Little Shearwaters, *Puffinus assimilis baroli*, inhabiting the Azores, Madeira, and Canaries, and *Puffinus lherminieri boydi*, which is confined to the Cape Verde Group. These are dealt with more fully on pages 477 and 483.

It is unfortunate in determining geographical races that it is impossible to fix the parent race. This must not be confused with the typical species, which, as everyone knows, is the term applied to the first member of the species known to have received a name. Necessarily this is not always the most ancient species from which other so-called geographical races have sprung.

In giving the "Distribution beyond the North Atlantic Islands" in each of the fourteen species dealt with, I have particularly made use of:—

Godman's 'Monograph of the Petrels';

Vol. xxv. of the 'Catalogue of Birds';

Vol. ii. of Mathews' 'Birds of Australia';

Jourdain's Distribution Notes in the 'British Bird Book,'
vol. iv; and

The 'Hand-list of British Birds' by Hartert and others.

I have not gone into the life-history of these Petrels and Shearwaters, as their habits, so far as we know them, have been fully dealt with in various papers published in 'The Ibis,' as well as in several large works, such as Godman's 'Monograph of the Petrels,' Mathews' 'Birds of Australia,' the 'British Bird Book,' &c. The latter deals only with the species which breed in, or have straggled to, English waters, but reference is made to several species included in the following pages. I have particularly mentioned this work as in it Mr. Pycraft makes a statement which is not borne out by my experience of these birds. He writes, when speaking of Petrels in general, "All are strictly marine species, never leaving the extreme edge of the coast, never straying out of sight or sound of the sea." If Mr. Pycraft will study the nesting-habits of *Puffinus kuhli flavirostris*, *Puffinus puffinus puffinus*, or *Estrelata mollis* *feæ*—to mention only three species which inhabit the north Atlantic Islands—he will soon be convinced that such a general statement needs correction. All the three members of the Petrel family here mentioned often nest a long way from the sea, flying sometimes into the very heart of a mountainous island, where they rear their young amongst the highest peaks. An even better example of the long distance which a Petrel sometimes travels from the sea is afforded by the Blue Mountain Petrel (*Estrelata jamaicensis*) in the island of Jamaica, now, unfortunately, almost, if not quite, extinct. Having spent some time in these mountains I can speak with certainty of the great distance from the sea which

this bird would have to travel, for it is said to have bred "on the highest tops of the mountains" in this range. *Estrelata hasitata* is another well-known example in the Caribbean Sea. In fact, it would appear that the members of the genus *Estrelata* are particularly addicted to nesting as "far from the sight and sound of the sea" as they can get!

The following is a list of the ornithological works consulted which deal with the Petrels and Shearwaters of the north Atlantic Islands, arranged in alphabetical order according to the authors :—

- ALEXANDER, BOYD. (*Cape Verde Islands*.)
Ibis, 1898, pp. 74-118, 277-285.
- BANNERMAN. (*Canary Islands and Madeira*.)
Ibis, 1912, pp. 557-627; 1914, pp. 38-90, 228-293.
Private note-books.
- BARING and OGILVIE-GRANT. (*Salvage Islands*.)
Zoologist, 1895, pp. 401-417.
- BERTHELOT. (*Canary Islands*.)
See WEBB.
- BOCAGE, BARBOZA DU. (*Azores and Cape Verde Islands*.)
Jorn. Acad. Sci. Lisboa, 1866, pp. 89-92; 1875, pp. 113-120;
1898, pp. 140-150; 1902, pp. 206-210.
- BOLLE. (*Canary Islands and Cape Verde Islands*.)
Journ. für Orn. 1854, pp. 447-462; 1855, pp. 171-181; 1856,
pp. 17-31; 1857, pp. 258-292, 305-359.
- CABRERA. (*Canary Islands*.)
Catálogo de las Aves del Archipiélago Canario, 1893.
- DALGLEISH. (*Ilho de Baixo, Porto Santo, and Madeira*.)
Proc. Roy. Phys. Soc. Edinburgh, xi. 1892, p. 27.
Ibis, 1890, p. 386.
- DROUET. (*Azores*.)
Faune Açoréenne, 1861.
- FEA. (*Cape Verde Islands*.)
Boll. Soc. Geogr. Ital. ser. 3, vol. xi. 1898, pp. 358-368, 537-552;
ser. 3, vol. xii. 1899, pp. 7-26, 163-174, 302-312.
- GODMAN. (*Azores, Madeira, Desertas, and the Canary Islands*.)
Ibis, 1866, pp. 88-109; 1872, pp. 158-177, 209-224.
Natural History of the Azores, 1870.
Monograph of the Petrels, 1907-1910.
- HARCOURT. (*Madeira*.)
Ann. & Mag. Nat. Hist. 2nd ser. vol. xv. 1855, pp. 430-438.

- HARTERT. (*Canary Islands and Azores.*)
Nov. Zool. 1901, pp. 304-334.
- and OGILVIE-GRANT. See OGILVIE-GRANT.
- and ROTHSCILD. See ROTHSCILD.
- HARTWIG. (*Madeira.*)
Ornis, vii. 1891, pp. 182-187.
Journ. für Orn. 1893, p. 11.
Orn. Monatsber. 1893, p. 45.
- HEINEKEN. (*Madeira.*)
Edinburgh Journ. Sci. new ser. i. 1829, pp. 229-233.
- JOURDAIN. (*General Remarks on the Tubinares.*)
Bull. B. O. C. 1907, xix. p. 37.
The British Bird Book.—Petrels (part.), vol. iv. 1913.
- KOENIG. (*Madeira and Canary Islands.*)
Journ. für Orn. 1890, pp. 257-488.
- LOWE, P. R. (*Azores, Madeira, Canary Islands, and Cape Verde Islands.*)
Private note-books and diaries kept during several cruises amongst the above-mentioned islands (1906-7).
- MATHEWS, G. M. (*General work on the Tubinares.*)
Birds of Australia, vol. ii. 1912-13. (Includes several of the north Atlantic forms.)
- MEADE-WALDO. (*Canary Islands.*)
Ibis, 1889, pp. 1-13, 503-520; 1890, pp. 429-438; 1893, pp. 185-207.
- MOQUIN-TANDON. (*Canary Islands.*)
See WEBB.
- MORELET. (*Azores.*)
L'Histoire Naturelle des Açores, 1860.
- NICOLL. (*North Atlantic Islands.*)
Ibis, 1904, pp. 32-67; 1906, pp. 666-712.
Three Voyages of a Naturalist, 1908.
- OGILVIE-GRANT. (*Azores, Madeira, Porto Santo, Desertas, and Salvage Islands.*)
Ibis, 1890, pp. 438-445; 1896, pp. 41-55; 1898, pp. 313-314.
- and BARING. See BARING.
- and HARTERT.
Nov. Zool. xii. 1905, pp. 80-128.
- OUSTALET. (*Cape Verde Islands.*)
Ann. Sci. Nat. Zool. ser. 6, xvi. 1883, art. 5, pp. 1 & 2.
- POLATZEK. (*Canary Islands.*)
Orn. Jahrb. 1909, pp. 1-24, 117-134.
- PYCRAFT. (*General work on British Tubinares.*)
The British Bird Book.—Petrels (part.), vol. iv. 1913.
- REID. (*Canary Islands.*)
Ibis, 1888, pp. 73-83.

ROTHSCHILD and HARTERT. (*On the genus Puffinus.*)

Nov. Zool. vi. 1899, pp. 194-197; ix. 1902, pp. 415-418.

Bull. B. O. C. xxvii. 1911, p. 43.

SALVADORI. (*Madeira and Cape Verde Islands.*)

Ann. Mus. Civ. Genova, ser. 2, vol. xx. 1899, pp. 285-310.

Ibis, 1900, pp. 298-303; 1904, p. 166.

SCHMITZ. (*Madeira, Porto Santo, Desertas, and the Salvages.*)

Ornithologische Jahrbuch, 1893, pp. 141-147; 1894, pp. 19-20,

205-206; 1896, pp. 197-201; 1897, pp. 244-248; 1899, pp. 1-34,

41-66, 186-187; 1900, pp. 218-221; 1902, pp. 130-135; 1903,

pp. 206-211; 1905, pp. 66-70, 219-226; 1906, pp. 139-204;

1908, pp. 36-48; 1910, pp. 104-107.

* Zeitschrift für Oologie, 1907, pp. 54-58, 70-72; 1909, pp. 181-182, 188-189.

Ornithologische Monatsberichte, 1908, p. 4.

SIMROTH. (*Azores.*)

Archiv für Naturgeschichte, 1888, pp. 184-201.

THANNER. (*Canary Islands.*)

Ornithologische Jahrbuch, 1913, pp. 189-193.

WEBB, BERTHELOT et MOQUIN-TANDON. (*Canary Islands.*)

Ornithologie Canarienne, 1841.

A careful study of all the available literature on the subject of the north Atlantic Petrels has convinced me that much still remains to be learnt. Further research in almost every group of islands with which we are dealing is absolutely necessary if we are to thoroughly understand the distribution and nesting-seasons of these ocean wanderers. The Madeiran group is certainly the best "worked" up to the present, but the other islands are not by any means thoroughly explored in this respect, and would well repay visiting.

1. *Thalassidroma pelagica*. Storm-Petrel.

Type locality—Coast of Sweden (*Hartert*).

Procellaria pelagica Linn. Syst. Nat. 10th ed. i. 1758, p. 131; Godman, Monograph of Petrels, p. 1, pl. i.

Breeding range in the North Atlantic Islands.

Desertas (Madeira Group). ? Canary Is.

* This is not a complete list of Padre Schmitz's writings in the Z. f. O.

Range beyond the North Atlantic Islands.

Eastern portions of north Atlantic south to west Africa, also western Mediterranean.

General Conclusions.

T. pelagica is not a very common bird in these seas, although it is pretty regularly distributed. There is only one record of its having bred on any of the north Atlantic Islands, although I strongly suspect it of breeding occasionally on one or two of the more isolated islets. It has not been recorded as yet from the Azores, Salvages, or the Cape Verde Islands, the latter group being rather far south, although there is one skin in the British Museum from the Gold Coast and another obtained by Mr. Willoughby Lowe, 30 miles north of the equator off the African coast.

Breeding range in the Madeira Group.

The only evidence that the Storm Petrel has ever bred in this group is furnished by three eggs belonging to this species (*ex* Tristram Coll.) now in the British Museum, which are said to have been taken on the 'Desertas' in the year 1849, probably by Dr. Frere.

Padre Schmitz has apparently never heard of any eggs being taken during his residence in the island, and has seldom met with the bird. He records what he believes to have been three examples of *T. pelagica*, seen near Deserta Grande on the 24th of September, 1905. He also mentions having received a letter from Dalgleish in which that gentleman writes, "*P. pelagica* has been seen near Madeira."

In the first two 'Lists' published by Harcourt, that ornithologist includes *T. pelagica* with the remark "Doubtful" against this species. In his third List he has apparently established the Storm-Petrel as an accidental visitor to Madeira, for he records it without any remark. It was also mentioned from Madeira by Drouet, in 1861.

Breeding range in the Canary Islands.

There is no actual record of the Storm Petrel *breeding* in the Canary Group, although the following experience leads

me to suppose that it does so very occasionally on the uninhabited islets or rocks. While staying on Montaña Clara from June 7-14, 1913, we procured a Storm-Petrel from a hole in a cave on June the 9th (Ibis, 1914, pp. 78, 263). The bird was a male, and the testes were enormously developed. Taking into consideration that eggs have been found in the Madeira Group, it seems reasonable to suppose this bird intended nesting on Montaña Clara.

Webb and Berthelot write in 1841: "It appears that this species is found from time to time on the coasts of the Canary Islands." Bolle in 1857 notes that "*T. pelagica* Vig. is the Storm-Petrel most frequently found in the Canary Seas." Drouet mentions it in his list. Meade-Waldo in 1893 found it always about the islands, but did not discover it breeding.

Cabrera possessed a specimen which had been caught in Tenerife, and remarked that it occurred fairly frequently, but was rare in certain seasons.

Polatzek considered it a rare visitor to the Canaries, but he does not appear to have spent much time at sea.

2. *Oceanodroma leucorhoa*. Leach's Fork-tailed Petrel.

Type locality—France.

Procellaria leucorhoa Vieillot, Nouv. Dict. d'Hist. Nat. nouv. ed. xxv. 1817, p. 422.

Oceanodroma leucorrhoea (Vieill.); Godman, Monograph of Petrels, p. 8, pl. iv.

Range in the North Atlantic Islands.

A casual visitor. Recorded from the Azores, Madeira Group, Canary Islands, Cape Verde Islands.

Range beyond the North Atlantic Islands.

North Pacific and north Atlantic roughly south to the Equator. Willoughby Lowe obtained specimens off Sierra Leone. There are several in the British Museum obtained off the Liberian coast.

Record of occurrences in the North Atlantic Islands.

Azores.—Occasionally taken in this group; Ogilvie-Grant records two specimens. Godman did not meet with it.

Madeira Group.—Evidently a very rare wanderer to the Madeira Islands. Schmitz obtained his first genuine example of this species on the 9th of November, 1906. According to the same writer, Harcourt included it in one of his lists of non-breeding birds from Madeira on the authority of Sir William Jardine, and carefully distinguished it from *O. castro*, which is mentioned at the same time. Drouet mentions having seen this Petrel in Madeira in 1861.

Canary Islands.—Meade-Waldo believed this species to be an occasional visitor in winter; he did not see it at any other time of the year. There is a specimen in the British Museum which he obtained in Tenerife on the 23rd of February. Nicoll saw many *O. leucorhoa* just before sighting Gran Canaria on the 12th of November. Von Thanner's statement that this species breeds on Montaña Clara rests on utterly unreliable evidence.

Cape Verde Islands.—Neither Boyd Alexander nor Fea mention having seen this Petrel amongst the islands. Dr. Lowe, however, has several notes in his diaries referring to *O. leucorhoa* during his cruise amongst the Cape Verdes. The first entry, dated January 13th, 1906, is as follows:—
“Followed by many small Petrels, apparently all *O. leucorhoa*. Later, 10 P.M. (same date): apparently going through an increasing crowd of Petrels, or else they have been attracted by the lights of the yacht, for I secured four birds (*O. leucorhoa*) which fell on the deck more or less exhausted. During the night twenty or more Petrels boarded us. Arrived St. Vincent, Cape Verde, at 7 A.M., January 14th.”

3. *Oceanodroma castro*. Madeiran Fork-tailed Petrel.

Type locality—Desertas (Madeira Group).

Thalassidroma castro Harcourt, Sketch of Madeira, 1851, p. 123.

Thalassidroma jabe-jabe Bocage, Journ. Acad. Sci. Lisboa, 1875, p. 120 : Cape Verde Is.

Cymochorea cryptoleucura Ridgway, Proc. U.S. Nat. Mus. iv. 1882, p. 337 : Hawaiian Is.

Oceanodroma castro (Harcourt) ; Godman, Monograph of Petrels, p. 15, pl. v.

Breeding range in the North Atlantic Islands.

Azores, Madeira Group, Salvage Is., Cape Verde Is.

Range beyond the North Atlantic Islands.*

South Atlantic—St. Helena (breeding).

Pacific Ocean—Hawaiian Islands and Galapagos Islands.

For accidental wanderings, see Godman's 'Monograph of Petrels.'

Although the island of St. Helena does not come within the scope of this paper, it may be of interest to state what is known of the occurrence of *O. castro* on that island. To begin with, Godman, in the 'Monograph,' writes: "It has been found in the neighbourhood of St. Helena, where a specimen was obtained by Governor Janisch." This specimen and another adult obtained in the same year (1876) are now in the British Museum, while there are also two other skins in the National Collection obtained on Egg Is., St. Helena, by J. T. Cunningham, on March 23, 1910. One of these birds is an adult, but the other is a juvenile *just out of down*, which was, as Mr. Cunningham informs me, taken from the nest-hole. Now, in a book entitled 'St. Helena,' by J. C. Melliss, published in 1875, in which is given a list of the birds of this island, we find only two members of the Petrel family mentioned: one is *Procellaria glacialis*, while the other is "*Thalassidroma melanogaster* ?—Mother Carey's Chicken. A small species of Petrel frequenting the sea around the

* Up to the present there are not any records of the eggs of *O. castro* having been taken in the Pacific Islands. It is most probable, however, that it will be found breeding in both the Hawaiian and Galapagos Archipelagos.

island, but not very abundant; lays in November." What more likely than that this so-called *T. melanogaster*—an inhabitant of the Australian Seas and south Indian Ocean—is in reality *Oceanodroma castro* (Harcourt) *breeding in St. Helena in November.*

General Conclusions.

The very extraordinary range of this species has excited the curiosity of every naturalist who has turned his attention to the geographical distribution of the Procellariidæ. In the north Atlantic it is a remarkable fact that up to the present there is no reliable record of its having bred on any of the islands of the Canary Archipelago, although it breeds in every other group of the north Atlantic islands from the Azores to the Cape Verde Islands, and as far south as St. Helena.

In the groups with which this paper deals it will be seen by referring to the appended schedule that *Oceanodroma castro* may be found engaged in nesting duties *in every month of the year.*

It appears, therefore, that this Petrel has two main breeding-seasons—at any rate, in the Madeira Group, which are the only islands upon which consecutive notes have been made extending throughout the entire year and, in this case, for a number of years. The only alternative which presents itself is that *O. castro* breeds indiscriminately "whenever the spirit moves it," which is a theory I cannot bring myself to believe!

Undoubtedly the bird is somewhat erratic in its breeding-season, which accounts for the prolonged period in which eggs and young birds may be found.

In studying this problem we must bear in mind two important factors :

1. The breeding-season varies considerably in each separate group of islands, and in some cases even in each individual island of the same group, and because we find the birds breeding in the Desertas in June, it

does not necessarily follow that we shall discover them at their breeding-station in the Azores at the same time.

2. That in a single island there may be two distinct seasons in which birds lay their eggs. This is particularly the case on Porto Santo.

From this we may deduce that the several nesting-colonies of these birds breed entirely independently of one another, although they each may, and probably do, keep to a definite season, as well as to a particular island or part of an island.

As the Madeira Group has been better "worked" than any of the other Atlantic islands, I have based my deductions very largely on Padre Schmitz's Diaries, which have appeared from time to time in the 'Ornithologische Jahrbuch.'

Records connected with the Distribution and Breeding-Season of *Oceanodroma castro* in the North Atlantic Islands.

- | | | |
|-------|----------|---|
| Jan. | 14. | Two adults boarded yacht 50 miles S.E. of St. Vincent on our way to Santiago (Cape Verde Is.): P. Lowe. |
| | 29. | Two down-covered young taken (Madeira Group): Schmitz. |
| Feb. | 13. | Down-covered young (Porto Santo): Schmitz. One egg taken (Desertas): Dalgleish. |
| | 24. | Three young obtained, one just hatched (Porto Santo): Schmitz. |
| March | 16. | Ten adults, four young-in-down, seven eggs (Rombos Is., C. V.): Alexander. |
| | 25. | One down-covered young (Madeira Group): Schmitz. |
| April | 6. | One young bird, almost full-fledged (Madeira Group): Schmitz. |
| | 21. | One adult obtained, birds not yet breeding (Great Salvage): O.-Grant. |
| | 25. | One adult obtained, birds not yet breeding (Praya Is., Azores): O.-Grant. |
| May | 5. | Adults, young, and eggs (Bianca, C. V.): Alexander. |
| | 1-29. | None met with (Azores): O.-Grant. |
| | 22 & 23. | Numbers seen nearing S. Miguel (Azores): P. Lowe. |

- June 1. Birds not yet breeding, one adult picked up dead (Villa Islet, Azores): O.-Grant.
 6. Two fresh eggs obtained (Madeira Group): Schmitz.
 13. Two fresh eggs obtained (Madeira Group): Schmitz.
 Mid-June. Fifteen eggs well incubated (Baixo Is., Porto Santo): Schmitz.
 18. One egg (Porto Santo): Schmitz.
 21. Few eggs, mostly incubated (Madeira Group): Schmitz.
 23. One egg obtained (Baixo Is., Porto Santo): Schmitz.
 24. Two eggs obtained (Porto Santo): Schmitz.
 25. Four eggs obtained (Desertas): Schmitz.
 26. Birds breeding (Madeira): Schmitz.
 July 17. Two birds brought from Porto Santo: Schmitz.
 August 1. One fresh and one incubated egg found (Madeira Group): Schmitz.
 17. Adult birds obtained (Madeira): Schmitz.
 22. One young-in-down (Desertas): Schmitz.
 Sept. 1. Down-covered young (Porto Santo): Schmitz.
 12. Birds obtained (Porto Santo): Schmitz. Birds captured by Snr. Camara apparently come ashore to breed (Villa Islet, Santa Maria, Azores): O.-Grant.
 21. *O. castro* first seen at sea (between Lisbon and Madeira): Schmitz.
 October. The first eggs collected (Porto Santo): Schmitz.
 11. Two adults collected (Raza, C. V.): Alexander.
 End of Oct. Not breeding, but very abundant (Raza, C. V. Is.): Fea.
 Nov. 1-6. Ten adults obtained (Raza, C. V.): Fea.
 —. Eggs more or less incubated (Porto Santo): Schmitz.
 27. Very few seen at sea nearing the Desertas: P. Lowe.
 End of Nov. This is the time to be recommended for egg-hunting (Madeira Group): Schmitz.
 Dec. 13. Downy young and eggs (Cima Is., Porto Santo): Schmitz.
 20. One egg (Porto Santo): Schmitz.
 23. Thirteen eggs slightly incubated (Porto Santo): Schmitz.

Breeding range in the Azores.

We have so little information with regard to the Petrels and Shearwaters which breed in the Azores, that it is not possible to determine whether *O. castro* has more than one breeding-season in the year on this group. Only two expeditions of note have been made to these islands by

ornithologists—the first by Godman, who spent a month in the spring of 1865 exploring the islands, and the second by Ogilvie-Grant, who remained in the group from February 26 until June 2, 1903. Godman did not meet with the bird at all, and does not include it in his list*. Ogilvie-Grant, however, established the species without doubt as an inhabitant of the Azores, and obtained an adult male on Praya Island (Graciosa) on April 25, while he also identified a bird of this species in the Ponta Delgada Museum, marked Ponta Delgada, San Miguel. While yet another specimen was “picked up dead on June the 1st at Villa Islet, Santa Maria.”

Mr. Ogilvie-Grant remarks that “at this season (beginning of June) the birds had not commenced to breed, and all their nesting-holes on that breeding-station were empty. The fishermen knew the bird well, and Senhor João S. G. da Camara kindly promised to procure specimens later on and forward them to England in spirits. This he did, the birds having been obtained in September.” These specimens were obtained on Villa Islet, Santa Maria. It does not appear, therefore, that *O. castro* resorts in the spring to breed in the Azores, but it is quite possible that the birds arrived at their breeding-holes late in June, after Mr. Grant had left the group. A great deal more evidence is required before we can make any satisfactory deductions.

Dr. P. R. Lowe, during his visit on the 22nd of May, 1907, notes that *O. castro* was noticed in numbers, when 230 miles west of S. Miguel. The following day (May 23) the birds followed the yacht until within sight of Ponta Delgada.

Breeding range in the Madeira Group.

Oceanodroma castro breeds on all the islands of this group without exception, including as it does, Madeira, the three islands of the Desertas, and Porto Santo, with their outlying rocks and small islets.

An examination of the appended table which I have

* ‘Ibis,’ 1866, p. 88; also Nat. Hist. of Azores.

drawn up, will show that it is very difficult to determine exactly when the breeding-season commences. Padre Schmitz, whose excellent bird diaries cover a period of over seventeen consecutive years (1893-1910) for these islands alone, has furnished us with sufficient data to attack the problem with some chance of arriving at a successful conclusion.

The island of Porto Santo is unquestionably the one most favoured by this Petrel upon which to breed, and to this island the majority of Padre Schmitz's notes refer.

Either young-in-down or the eggs have been actually taken in the Madeira Group in each of the following months:—January, February, March, April, June, August, September, October, November, and December; while it will be seen, by glancing at the dates in the above-mentioned schedule, that either incubation of eggs or the rearing of the young takes place in this group of islands in every month of the year save, perhaps, May.

At first sight it would appear, therefore, that *O. castro* has no fixed time in which to breed in this group, but a closer study of the facts has induced me to believe that the bird *has two main breeding-seasons*. I do not necessarily mean by this that the same birds breed twice in the year, although there is no apparent reason why they should not. It will be seen that June is the first month in the year when nesting may be said to have become general; the next month in which any quantity of *fresh* eggs appear to have been collected is October; in November the eggs found were mostly incubated; in December the young are in various stages of development while late birds still have eggs, which accounts for young-in-down being sometimes found as early in the year as February and March.

We then have two distinct seasons; the first commencing in June and extending through July, August and September, the second commencing in October and extending through November and December—the late birds of the first season “overlapping” the early ones of the second.

In 1899, Padre Schmitz advanced the theory that the

principal breeding-seasons of the Madeiran Fork-tailed Petrel were in December and June. He subsequently (Orn. Jahrb. 1900, p. 218) came to the conclusion that this Petrel did not keep to any definite breeding-season at all; since then I have not seen any opinions on this subject expressed in print.

The query naturally arises, "Why do not all these Petrels breed at the same time of the year, at any rate in the one island where the conditions are exactly the same?"

The equable and temperate climate of the Madeira islands probably plays no small share in the matter, the birds are in no hurry to leave their shores and need live in no fear of being suddenly "driven south" through stress of weather. Again, Porto Santo is the known breeding-station of at least six different species of Petrel and Shearwater, and it may be imagined that the birds must have their work cut out to find suitable nesting-holes, especially when, in the month of June, all the larger crevices and miniature caves are filled to overflowing with *Puffinus kuhli flavirostris*.

According to different observers *O. castro* is non-migratory—that is to say, it is to be found throughout the year in the neighbourhood of Madeira. And even when it has reared its young it probably does not wander very far afield.

Breeding range in the Salvage Islands.

Oceanodroma castro was discovered on the Salvage Islands by Mr. Ogilvie-Grant when he paid a short visit to these wave-washed islets in the spring of 1895. Unfortunately, these Petrels had not yet come ashore to breed, and Mr. Grant only succeeded in capturing a single specimen on Great Salvage Island on the 21st of April. A number of birds were, however, seen by day in the vicinity of the islands. Mr. Grant learnt from the pilot of his boat that *O. castro* breeds commonly on the Little Piton, but circumstances prevented his landing on this member of the group. Schmitz includes it in his list of breeding birds of the Salvages on the authority of Señor Constantino de Noronha.

Range in the Canary Islands.

Mr. Nicoll states that he saw large numbers of *O. castro* on November 12 just before reaching Gran Canaria during the cruise of the 'Valhalla,' but it is not mentioned by anyone else, with the exception of Polatzek, who gives it on hearsay, with no real evidence whatsoever: I do not believe *O. castro* ever occurs in the Canaries except as a rare straggler.

Breeding range in the Cape Verde Islands.

Boyd Alexander found the Madeiran Fork-tailed Petrel breeding in the Archipelago on both of his successful visits to the Cape Verde Islands in 1897. In his first expedition, which extended from February 10 until the end of May, *Oceanodroma castro* was discovered first on the Rombos Islands, a group of small uninhabited islets 5 miles to the north of Brava. Apparently of this small group only one—Cima Island—is inhabited by the Petrels, and there *O. castro* was found breeding on March 16, "many of which had young, while most of the eggs were well incubated."

Two months later, when exploring the island of Branca, Boyd Alexander again came upon this Petrel breeding in the first week of May. He notes that they had young, and obtained five eggs of this species on the island.

The second expedition was made in October of the same year, and on this occasion two weeks, from the 7th to the 22nd of October, were spent on the island of Raza, which lies next to Branca. Two specimens of *O. castro* were obtained on the 11th inst., but no mention is made of their breeding during this month. The only known breeding-season therefore in the Cape Verde Islands are the spring months, March, April, and May.

L. Fea, who spent a considerable time in the Cape Verde Islands and has published the valuable results of his expedition in the Boll. Soc. Geog. Ital. ser. 3, 1898-9, has given an account of this bird, which Count Salvadori has published (*cf.* Ann. Mus. Civ. Genova, vol. xx. 1899, pp. 301-2). Fea particularly mentions the island of

S. Nicolas in connection with this bird, but does not say whether he found it breeding there. He also obtained ten birds on Raza between the 1st and the 6th of November, but they did not appear to be breeding.

The birds were not breeding on Cima Island at the time of Fea's visit in August.

Dr. P. R. Lowe met with the bird on January 14th, fifty miles south-east of St. Vincent, on his way to Santiago.

4. *Oceanites oceanicus*. Wilson's Petrel.

Type locality—Southern Oceans.

Procellaria oceanica Kuhl, Beiträge z. Zool. 1820, p. 136.

Oceanites wilsoni Keyserling u. Blasius, Wirbelth. Eur. 1840, pp. xciii, 238.

Oceanites oceanicus (Kuhl); Godman, Monograph of Petrels, p. 41, pl. xii.

Range in the North Atlantic Islands.

A casual visitor, never approaching very close to land; recorded within a radius of 30 miles from the Azores, Madeira Group, and Canary Islands.

Range beyond the North Atlantic Islands.

Found in all seas except the north Pacific.

Record of occurrences in the North Atlantic Islands.

Azores.—Not mentioned by Morelet or by Drouet in their works on the Azores. First noticed by Godman, who saw numbers at sea about 30 miles west of Fayal; skins obtained at this time (May 21, 1865) are now in the British Museum. Godman knew nothing of the species breeding in the archipelago, but thought that they remained throughout the year. Bocage includes this Petrel in his list (1866), and Simroth, writing in 1888, mentions that *O. oceanicus* follows the American ships until they are within sight of Flores in the Azores.

Ogilvie-Grant did not meet with this species during his expedition to the islands in 1903.

Madeira Group.—Padre Schmitz's remarks on this Petrel sum up its distribution in the Madeira Group better than anything else. He notes, "These birds do not approach the shore closely Dalglish writes, *O. oceanicus* has been seen near Madeira."

Canary Islands.—Wilson's Petrel is mentioned by several writers on this group, but very few appear to have actually seen the bird. Meade-Waldo observed them occasionally at all seasons, particularly on May 15, 1888, off Garachico, Tenerife. There is a specimen in the British Museum obtained by Lort Phillips in May, "south of the Canaries."

5. *Pelagodroma marina hypoleuca*. North Atlantic
Frigate-Petrel.

* Type locality—Tenerife (Canary Is.).

Thalassidroma hypoleuca Moquin-Tandon, in Webb, Berthelot et Moquin-Tandon, Orn. Canarienne, 1841, p. 45.

Pelagodroma marina (Lath.) ; Godman, Monograph of Petrels, p. 53. (The bird figured in the 'Monograph,' pl. 15, is said to be from New Zealand seas = *P. m. maoriana* Mathews)

Range in the North Atlantic Islands.

Salvage Is., Cape Verde Is. ; accidental in the Azores, Madeira Group, and Canary Is.

Range beyond the North Atlantic Islands.

Has occurred as a straggler off North America and the British Isles. Represented by allied forms in Australian and New Zealand seas.

* It is unfortunate that Moquin-Tandon gives "Les Parages de Ténériffe" as the habitat of this species, which must perforce become the type locality. The bird is, curiously enough, only an accidental wanderer to the Canarian Seas. Its true home is the Salvage Islands, though it also breeds on the Cape Verde Group.

General Conclusions.

Former workers on the north Atlantic Islands have, almost without exception, referred to the species under discussion as *Pelagodroma marina* (Latham). The type locality of Latham's bird is 37° S. lat. and is accepted for the Australian bird. Moquin-Tandon, in Webb and Berthelot's 'Orn. Canarienne,' gives a full description of the bird from the Canarian Seas, which he named *Thalassidroma hypoleuca*. It differs from *P. m. marina* (Latham) in its uniform lighter colouring on the upper parts, especially on the mantle; but particularly in the size of the bill, which is much longer.

From the very few records from its breeding-haunts available for comparison, it appears that *P. m. hypoleuca* breeds in the northern limits of its breeding range at the end of April, while in its southern limit (the Cape Verde Group) it commences laying early in March.

Range in the Azores.

P. m. hypoleuca is evidently only a very rare straggler to these islands, as we have only one authentic record of its having been seen there. This is a skin in the Ponta Delgada Museum which was identified by Mr. Ogilvie-Grant.

Range in the Madeira Group.

Very few records are forthcoming of this Petrel being found in the Madeira Group, which, considering the near proximity of the Salvage Islands, is somewhat extraordinary, and only tends to show how small is the circumference of its range. Padre Schmitz's notes establish this Petrel as a visitor only, to Madeira itself. He records a female which, on the 19th of February, 1908, was driven to the neighbourhood of Madeira in a sandstorm that darkened the sun; the bird fell exhausted on the deck of a steamer. Canon Tristram observed the North Atlantic Frigate-Petrel near Madeira, and Bolle met with it during a voyage from Lisbon to Madeira.

Breeding range in the Salvage Islands.

Mr. Ogilvie-Grant found this Petrel breeding in large colonies on Great Salvage Island between the 24th and 29th of April. He notes that on April 27 the most advanced eggs were only half incubated. No young birds were obtained. Many adults and 22 eggs were collected, which are now in the British Museum. Mr. Grant was informed by the pilot of his tug that numbers of these birds breed on the Little Piton.

Dr. P. R. Lowe mentions that the Salvage Islands have been visited by ornithologists in April, May, and October, and confirms Mr. Grant's statement that the end of April is the breeding-season of *P. m. hypoleuca*.

Canon Tristram saw numbers of these Petrels on March 17 when twenty miles east of the Salvages.

Range in the Canary Islands.

The records of this Petrel being taken in the Canary Islands are not by any means numerous, although this is the type locality of *P. m. hypoleuca*, the shores of Tenerife being given as the habitat of this Petrel in Webb, Berthelot and Moquin-Tandon's work '*Ornithologie Canarienne*.' Drouet mentions it from the Canaries. Meade-Waldo found this Petrel to be "not common," and noted that some were caught by the fishermen every spring. Savile Reid records an example which was brought to him alive in Tenerife on the 20th of March. Captain Shelley, who identified this specimen, informed him that it had already been obtained "once or twice" in the Canarian Archipelago. I have not met with it myself in the Canary Islands. The only two Canarian examples in the National Collection were obtained, one by Meade-Waldo in Tenerife, 20. v. 89, and the other by Savile Reid, which is the specimen mentioned above. Cabrera had a specimen in his collection procured at Tegina on the coast of Tenerife. Bolle never met with it

on any of his frequent journeys amongst the islands, although he is erroneously quoted as having done so. On the other hand, Bolle himself quotes Berthelot as saying that he had observed *Thalassidroma hypoleuca* constantly all around the waters of the Canary Islands. There is no evidence of its ever having bred in the Archipelago.

Breeding range in the Cape Verde Islands.

Breeds on one of the Rombos Islands and on Branca.

This species was found breeding in the Cape Verde Islands by Boyd Alexander, and since his expedition in 1897 we have received no further details concerning its distribution in the islands. Alexander discovered it first on the small island of Cima in the Rombos Group, where he landed on the 15th of March, 1897. He found it breeding in considerable numbers, the eggs being in an advanced stage of incubation. Many birds and eggs were obtained which are now in the British Museum Collection. Apparently the bird does not resort to the largest island of the Rombos Group to breed, as Alexander did not find a single bird on this island. It is not found on the island of Brava. The skins in the National Collection labelled "Brava, Rombos Is., March '97," were all collected on the Rombos Islands and not on Brava, as can be seen by consulting the report of the expedition ('Ibis,' 1898). Brava is not, strictly speaking, a member of the Rombos Group.

The next island upon which Alexander discovered this Frigate-Petrel was Branca, situated a considerable distance from the Rombos Islands, which he visited during the first week in May. He discovered that all the birds had young but did not obtain any eggs. The birds probably commenced breeding at the same time as those of the Rombos Island colony.

In Bocage's paper on the birds of the Cape Verde Islands, merely quotes Alexander. Salvadori does not mention the species in his report of the Fea Collection, while Fea himself

mentions it in his geographical report as not breeding on Cima Island, during his visit in August and September.

6. *Puffinus gravis*. Great Shearwater.

Type locality—Greenland.

Procellaria gravis O'Reilly, Voy. Greenland, 1818, p. 140.

Puffinus major Faber; Hartwig, Orn. Monatsber. 1893, p. 45.

Puffinus gravis (O'Reilly); Godman, Monograph of Petrels, p. 90, pl. 25.

Range in the North Atlantic Islands.

Accidental straggler to Madeira and Canary Islands.

Range beyond the North Atlantic Islands.

Said to breed in the Tristan da Cunha Group, and has a wide distribution over the Atlantic Ocean.

Record of occurrences in the North Atlantic Islands.

The only example of the Great Shearwater which has been actually taken in these seas was sent to Hartwig from Madeira by Padre Schmitz. This bird was pronounced to be *P. cinereus* by Hartwig in a letter sent to Schmitz, but Dr. Reichenow informs me that it is really referable to *P. gravis*. The specimen, which was recorded by Schmitz on the authority of Hartwig as *P. major*, is, I am also informed by Dr. Reichenow, not *P. major* but *P. kuhli* (probably *P. kuhli flavirostris*). It was obtained by a fisherman in the first half of December 1892 on the east point of the Island of Madeira, near Ponta S. Lourenço. It probably more often appears in these seas than is generally supposed, as it must pass close to the Atlantic islands on its way north. There should be no difficulty in recognising this Shearwater at sea from the countless hundreds of *P. k. flavirostris* by its distinct brown cap and by its much browner appearance. Although not generally recognised, *P. k. flavirostris* is a decidedly larger bird.

Cabrera particularly mentions this bird in his list of species found in the Canaries as well as "*Puffinus cinereus* Kuhl and *Puffinus anglorum* Kuhl." He says it is only found in company with these two species.

7. *Puffinus kuhli flavirostris* (Gould). Yellow-billed
Atlantic Shearwater.

Type locality—Cape Seas, 36° 39' S., 10° 3' E.

Procellaria flavirostris Gould, Ann. & Mag. Nat. Hist. xiii. 1844, p. 365.

Puffinus kuhli (Boie) ; Godman, Monograph of Petrels, p. 94 (part.), pl. 26.

Breeding range in the North Atlantic Islands.

Azores, Madeira Group, Salvage Is., Canary Is.

Range beyond the North Atlantic Islands.

Probably has a wide range in the Atlantic Ocean. Replaced by allied races in the Mediterranean Seas and in the Cape Verde Islands ; possibly also on the eastern American coast.

General Conclusions.

There does not appear to be much difference in the breeding-season of *Puffinus kuhli flavirostris* in the various groups of islands. The birds appear to arrive at the end of February or beginning of March in the neighbourhood of each separate breeding colony, and begin nesting at the end of May and beginning of June in all the islands. The birds leave the nesting colonies with their young at the end of October and beginning of November, and are absent about four months. As will be seen by the range given above, *P. k. flavirostris* breeds on almost every individual island in all the groups of the North Atlantic with the exception of the Cape Verde Group, where its place is taken by an allied race. It is undoubtedly the most numerous of all the Shearwaters and Petrels which inhabit this part of the North Atlantic Ocean.

**Records connected with the Breeding and Distribution of
Puffinus kuhli flavirostris in the North Atlantic Islands.**

- Feb. Birds appear end of Feb. (Madeira): Schmitz.
- March 4. Very few birds arrived in breeding-haunts (Villa Islet, Sta. Maria, Azores): Ogilvie-Grant.
19. Hundreds of Shearwaters off Tenerife: Reid.
- April 7. Birds not yet arrived to breed (Graciosa, E. Canary Is.): Meade-Waldo.
18. Hundreds on the high seas (Madeira Group): Schmitz.
- Mid-April. Birds not yet arrived in breeding-holes (Flores, Azores): O.-Grant.
- 24-29. Birds paired, no eggs (Salvage Is.): O.-Grant. Birds probably arrive at breeding-haunts in April (Eastern Canary Islands): Bannerman.
- May 4. Birds paired, no eggs (Deserta Grande): O.-Grant.
- 27-31. Birds just commenced laying (Graciosa, E. Canary Is.): Bannerman.
30. About 12 birds sitting, many nesting places still empty (Cabras Is., Terceira, Azores): O.-Grant.
- End of May. Birds breeding (Azores): Godman.
- June. Almost all the eggs found this month (Madeira Group): Schmitz.
1. Large colony arrived, nearly all with fresh eggs (Villa Islet, Sta. Maria, Azores): O.-Grant.
- 1-7. Majority of birds have just laid (Graciosa, E. Canary Is.): Bannerman.
- 7-14. All birds sitting on fresh eggs (Montaña Clara Isl., E. Canary Is.): Bannerman.
- 8-15. Most favourable for finding eggs (Madeira Group): Schmitz.
- 9-14. All birds on fresh eggs, no young as yet (Allegranza, E. Canary Is.): Bannerman.
20. Eggs obtained (Anaga Rocks, Tenerife): Brit. Mus. Coll.
23. Many birds nesting, some of the birds sitting, some eggless (Baixo Is., Porto Santo): Schmitz.
- July. Young are hatched early in this month (E. Canary Is.): Bannerman.
- Aug. 5. Fishermen commence collecting Pardelas, which are then said to be well-grown (E. Canary Is.): Bannerman.
- Sept. 1. Latest date on which bird-in-down found between 1895-1899 (Madeira Group): Schmitz. Down-covered young taken (Porto Santo): Schmitz.
15. Adults obtained (Gran Canaria): Nicoll.

- Oct. 1-31. Many birds at sea (Gran Canaria) : Bannerman.
 17. Two down-covered young (Porto Santo) : Schmitz.
 28. Twenty-one birds found (Cape S. Lourenço, Madeira) :
 Schmitz.
- End of Oct. Birds disappear (Madeira Group) : Schmitz.
- Nov. 1-15. Many birds frequent Confital Bay (Gran Canaria) :
 Bannerman.
 17. Last date birds seen (Gran Canaria) : Bannerman.
 25. Many seen on the water in flocks off Gran Canaria :
 Lowe.
 All birds said to leave this month (E. Canary Is.) :
 Bannerman. All birds have left the Madeira Group :
 Schmitz.

Breeding range in the Azores.

Mentioned by every writer from Drouet onwards who has ever studied the avifauna of this group. According to the various accounts *P. k. flavirostris* breeds on all the islands and is particularly numerous in the central group. Apparently the birds only begin to arrive at their breeding haunts early in March, and even as late as May 30 there are many nesting-places still empty. Godman, however, found the birds breeding at the end of May. It would seem that the various colonies do not all commence nesting-operations at the same time. By the middle of June all the birds have laid. Mr. Ogilvie-Grant's account of these birds in the Azores is by far the best published, but he had, unfortunately, left the island before the young were hatched.

Breeding range in the Madeira Group.

Breeds on all the islands and rocks of this group. Particularly abundant on the Desertas and the island of Porto Santo.

They appear in Madeira at the end of February and beginning of March, and although hundreds are seen at sea in the neighbourhood of the islands throughout April, they do not seem to commence laying in this month. By May 4 many birds are paired, and doubtless a few early layers are to be found soon after this date. Padre Schmitz considers the middle of June the best season for finding their eggs, although

on the 23rd of this month some of the birds on Baixo Is. were found to have not yet laid. Nesting continues through July and August, and Padre Schmitz has a note that he obtained young-in-down as late as October 17—an exceptionally late record. At the end of October the birds disappear from the Madeira Group until the end of February.

Breeding range in the Salvage Islands.

This is the particular home of the Yellow-billed Shearwater, which constitutes the chief wealth of these uninhabited rocky islets. According to Padre Schmitz over 20,000 of these unfortunate birds used to be taken year after year on the Salvages, the men employed in this industry leaving Madeira about the first week in September and returning with their spoils at the end of November. Of recent years the numbers have diminished by a few thousand, but enormous quantities, I understand, are still taken annually. Berthelot in 1841 and Bolle in 1857 give the catch as 30,000 in a good year, while in 1903 the numbers had dropped to 17,000 according to Schmitz. Mr. Ogilvie-Grant, who spent six days there from April 24–29, found the birds all paired, but not a single egg was discovered. The breeding-time is given by Schmitz as May, June, and July; by the end of May the majority have laid. Incubation lasts just four weeks more or less, but long before the eggs are laid the old birds are busy about their nest-holes.

Breeding range in the Canary Islands.

This species is by far the commonest of the Petrel family in the Canary Islands. It probably breeds on all the islands, but particularly on the outlying eastern islets of Lobos, Graciosa, Montaña Clara, and the East and West Rocks. I have paid particular attention to the habits of this Shearwater in the Canary Islands and published the results in 'The Ibis,' 1912, p. 574; 1914, pp. 66–70; and Bull. B. O. C. xxxiii. 1913, pp. 56, 57.

Other well-known breeding-places in the islands are Gran Canaria and the Anaga Rocks, off Tenerife.

The main body of *Puffinus k. flavirostris* arrives in the vicinity of the Canary Islands at the beginning of March; Savile Reid noticed many hundreds, off Tenerife, on the 19th of this month. A short itinerary of my recent expedition in May and June of last year (1913) will show the results arrived at:—

Isla Graciosa, May 27-31. Birds all paired in nesting-holes, but no eggs.

„ June 1-7. Birds just beginning to lay.

Montaña Clara, June 7-14. Birds all have eggs.

West Rock, June 11. Every bird sitting on an egg.

Allegranza, June 9-14. Birds all sitting; eggs perfectly fresh.

As already noted, the majority of the birds arrive in the group at the beginning of March, but Meade-Waldo, who visited Graciosa on the 6th of April, reports that the Shearwaters had not yet arrived in their breeding-holes. They frequent their nesting-holes, as the fishermen say, “to clean them” during the latter part of April and beginning of May, but no eggs are laid, at the earliest, until the end of the latter month. By the second week in June nesting seems to be in full swing and continues through July, when the young are hatched. The fishermen start taking them on August 5th, when they are said to be very good to eat. In September many more are taken and boiled down for oil. I was told that all the large Shearwaters left the islands in November. Dr. Bolle thought that they left earlier, but I have myself seen many in Gran Canaria between November the 1st and 17th. The main body certainly goes out to sea at this time and the birds are not in any numbers near the islands between the end of November and the end of February, although a few may often be seen during December and January.

8. *Puffinus kuhli edwardsi*. Cape Verde Island Shearwater.

Type locality—Branca, C. V. Is.

Puffinus edwardsi Oustalet, Ann. Sci. Nat. (6) xvi. 1883, Art. v. p. 1.

Puffinus maria Boyd Alexander, Ibis, 1898, pp. 92, 108, 109.

Breeding range in the North Atlantic Islands.

Cape Verde Archipelago.

Range beyond the North Atlantic Islands.

There are no records of *P. k. edwardsi* having been taken outside the Cape Verde Group of islands.

Range in the Cape Verde Islands.

Branca, Brava, Raza, St. Vincent.

P. k. edwardsi was originally described by Oustalet from the island of Branca ; since then it has been found on Brava and Raza by Boyd Alexander as well as on the first-mentioned island.

Recently I have received an adult male which was captured in Salamança Bay, St. Vincent, on the 27th of October, 1913. I have not been able to discover whether this Shearwater breeds on St. Vincent. Probably it does not.

The only islands upon which *P. k. edwardsi* has actually been found nesting are the islands of Brava and Raza, which, as Boyd Alexander remarks, may be considered the true home of this species. It doubtless will also be discovered breeding on Branca.

The first eggs are laid in September, as far as we know.

Alexander, in his list of the Birds of Brava, wrote that "On March 7th, while in the vicinity of the harbour, two boys brought us four specimens of this new Shearwater. They had obtained them from the holes of a rock out at sea and along the coast. We also noticed a few individuals on our way to Rombos Islands flying over the water, but to our surprise none inhabited the rocks of these islands. They appear to confine their habitat to the Brava coast. We met with this species again on Raza, where it is much more numerous." The four specimens obtained on Brava are in the British Museum.

Leonardo Fea, who visited Brava in July and August 1898, obtained specimens of *P. k. edwardsi* on the northern

coast of this island and on the outlying rocks. All were adults and are described by Count Salvadori (Ann. Mus. Civ. Genova, vol. xx. 1899, p. 302).

On April 28 Alexander visited the island of Raza for the first time, where he found these Shearwaters in holes under boulders and in hollows in the cliffs; the birds were then paired, sitting in their holes in couples. Apparently they had not yet commenced laying as no eggs were obtained, although Alexander appears to have been on the island until the first week in May. After leaving Raza the neighbouring island of Branca was visited by the expedition. Alexander notes that *P. k. edwardsi* also inhabits this island, although he does not appear to have obtained specimens from there. On October 7 of the same year (1897) Boyd Alexander again visited Raza and found that *P. k. edwardsi* had young; he then remained two weeks on this island and reports that the eggs are laid in September. During this latter visit 3000 of these Shearwaters were captured by the fishermen and prepared for food.

9. *Puffinus puffinus puffinus* (Brünn.). Manx Shearwater.

Type locality—Faroës.

Procellaria puffinus Brünnich, Orn. Bor. 1764, p. 29.

Nectris anglorum Kuhl, Beitr. Zool. 1820, p. 146.

Puffinus arcticus Faber, Prodr. Isl. Orn. 1822, p. 156.

Puffinus anglorum (Kuhl); Godman, Monograph of Petrels, p. 104, pl. 28.

Breeding range in the North Atlantic Islands.

Azores, Madeira Group, Salvages and Canary Islands (very doubtful).

Breeding range beyond the North Atlantic Islands.

Islands off the coast of Great Britain.

For accidental wanderings see Godman's 'Monograph of Petrels.'

General Conclusions.

A glance at the following records will show that this Shearwater is not by any means universally distributed amongst the several groups of islands. In fact its breeding range is probably quite local. In the Azores we find that it is decidedly a rare, though probably a regular, breeding bird. In the Madeira Group it breeds on all the large islands, and this may be considered its stronghold in the north Atlantic. Records from the Salvages are not by any means satisfactory, nor are those from the Canary Group, while in the Cape Verde Islands this bird is altogether absent.

Puffinus p. puffinus leaves the islands during the winter months—departing in October or November and returning again at the end of February or early in March. The breeding season commences almost at once and continues until August, which is the latest month in which young-in-down have been taken. May and June are evidently the principal breeding months.

Records connected with the Distribution and Breeding-habits of *Puffinus p. puffinus* in the North Atlantic Islands.

Jan.	Birds not seen during this month (Madeira Group): Schmitz.
Feb.	Birds are not seen from beginning of November until end of this month (Madeira Group): Schmitz.
March	1-15. Birds several times heard flying over from the sea to the mountain (Madeira): Schmitz. Eggs that have been found from 1890-1899 all date from the end of March (Madeira Group): Schmitz.
	14. Two adults received, 2 eggs also taken (Madeira): Schmitz.
	15. Adult on shore, Orotava (Tenerife): Reid.
	19. Hundreds of Manx Shearwaters off Orotava (Tenerife): Reid.
	1-31. None seen during expedition (Azores): O.-Grant.
April	6. Downy-young obtained (Desertas): Schmitz.
	23. Two adults from Curral (Madeira): Schmitz.
	24-29. None seen in the (Salvages): O.-Grant.
	1-30. None seen during expedition (Azores): O.-Grant.
April.	Bird obtained (Santa Maria, Azores): skin in Brit. Mus.

- May 3. Downy young obtained (Porto Santo) : Schmitz.
 5. Downy young obtained (Desertas) : Schmitz.
 No date. Two birds obtained, female contained eggs in advanced stage (Flores, Azores) : Godman.
 15. Many off Garachico (Tenerife) ; Meade-Waldo.
 1-31. None seen during expedition (Azores) : O.-Grant.
 Fairly numerous, apparently breeding (Azores) : Godman.
- June 4. Downy-young obtained from the Curral (Madeira) : Schmitz.
 22. Two adult and two juvs. obtained 1000 metres above sea-level (Madeira) : Schmitz.
 23. Numbers of eggs seen, 11 taken, all fresh (Baixo Isl. off Porto Santo) : Schmitz. Three young obtained in the Curral (Madeira) : Schmitz.
- June. Seen in considerable numbers (Desertas) : Godman.
 Bird obtained (Tenerife, W. Canary Is.) : Gomez.
- July 4. Downy young found (Curral, Madeira) : Schmitz.
 7. Almost adult bird-of-the-year obtained from Curral (Madeira) : Schmitz.
 15. Bird caught (Desertas) : Schmitz.
 16. Bird obtained Curral (Madeira) : Schmitz.
- Aug. 11 & 12. Downy young obtained (Desertas) : Schmitz.
 11. Downy young bird well advanced (Madeira Group) : Schmitz.
- Nov. Birds are not seen from beginning of this month till end of February (Madeira Group) : Schmitz.
- Dec. Birds not seen during this month (Madeira Group) : Schmitz.

Breeding range in the Azores.

Reports of the Manx Shearwater in the Azores are somewhat conflicting. Godman, who spent a considerable time in the group in 1865, procured two females containing eggs in an advanced stage at Flores in May ; and he notes that this Shearwater was "not so numerous as *P. major*" (= *P. k. flavirostris*, which is exceedingly plentiful). When Ogilvie-Grant visited the Azores in 1903 he wrote, "though constantly on the look-out for it amongst the hosts of *P. k. flavirostris*, we never saw or procured a single specimen." Major Chaves, a resident in the islands well acquainted with the bird-life, considers it a rare visitor to the Azores. The earliest writers, Morelet

and Bocage (1866), both mention this Petrel in their list of birds inhabiting the Azores, while Drouet does not refer to it. Simroth simply remarks that "*P. anglorum* brütet in Klippenhöhlen." It is apparent from these accounts that *Puffinus p. puffinus* is found very sparingly in this Archipelago and that its distribution, even amongst the islands of the Azores, is very local, and possibly confined to the extreme western group.

Breeding range in the Madeira Group.

Puffinus p. puffinus breeds on all the main islands of this group. According to Padre Schmitz the birds leave the islands in winter and are not seen from the beginning of November until the end of February. In March, then, they arrive, and the 14th of that month is the earliest record which I can find of eggs having been taken in Madeira, where it is interesting to note they breed in the Curral over 1000 metres above the level of the sea, as well as in several other localities in the interior of the island. The breeding-season appears to be at its height in Madeira, on the Desertas and in Porto Santo, during the month of June, while young-in-down have been obtained as late as the 11th and 12th of August, but it must be noted that in this case Padre Schmitz believes the birds to be the product of a second brood. Perhaps the first eggs had been taken. July seems to be the end of the breeding-season from the records available.

Apparently the birds remain in the neighbourhood in September, but all disappear at the end of October until the following spring.

Breeding range in the Salvage Islands.

The evidence that *Puffinus p. puffinus* occurs regularly in this group is very meagre, and rests on the report of a former owner of these rocky islets. This gentleman assured Padre Schmitz that the Manx Shearwater bred on the Salvages. Ogilvie-Grant did not meet with any of this species during his visit from 24-29 April 1895.

Breeding range in the Canary Islands.

I consider it very doubtful whether this Shearwater breeds at the present day in the Canary Islands. All the evidence which I can gather on this score is decidedly in the *negative*. The first evidence of its occurrence in the Canary Islands is given by Webb, Berthelot, and Moquin-Tandon in their historical work 'Ornithologie Canarienne.' These authorities give as its habitat "Dans l'île déserte d'Alegranza," and in an observation say "Des mariniers de Lancerotte nous rapportèrent cette espèce vivante, prise dans l'île d'Alegranza, où elle habite toute l'année." Bolle, writing in 1854, includes the species as an inhabitant of Alegranza, but in 1857, after he had apparently paid a visit to the island himself, he omits it from his final list. Savile Reid saw hundreds of *P. puffinus* on the sea off Tenerife on the 19th of March, 1887. Floericke, writing in 1905, makes the astounding statement that "*P. anglorum* is the form most numerous on the sandy eastern islands. . . . It breeds most frequently on the Desertas." This statement is absolutely incorrect—in fact, I do not believe Floericke can have ever set foot either on the Desertas or eastern islands, at any rate at the time the Petrels were breeding. It is a thousand pities that such misleading statements are published. Unfortunately, Polatzek, a careful and reliable observer, in 1908 quotes Floericke's notes on this species. Meade-Waldo considered that it did not come to land but was sometimes common on the water in winter.

Dr. Le Roi has been good enough to inform me that there is an adult bird of this species from Tenerife in the Museum Koenig at Bonn, but without any further data attached. The bird which Dr. Koenig speaks of (J. f. O. 1890, p. 462) from Palma no longer exists in the museum, but was destroyed some time ago; it was presented to Dr. Koenig and said to have been obtained at Palma.

My strongest reason for considering that *Puffinus p. puffinus* does not nest at the present day on any of the Canary Islands, is that I have myself spent a considerable time in the

islands, and have never once seen this Shearwater in the summer months. Moreover, I have remained in the eastern group in May and June, and during my last expedition the islands of Allegranza, Montaña Clara, and Graciosa were thoroughly explored, living as we did in tents on each island in the midst of hundreds of Petrels. During this trip, at a time when *P. p. puffinus* is usually breeding, we did not see or hear of a single example, although specially on the lookout for it, particularly on Allegranza.

10. *Puffinus assimilis baroli*. Atlantic Allied Shearwater.

Type locality—Desertas, near Madeira.

Puffinus baroli Bonaparte, Consp. Gen. Av. 1856, p. 204.

Puffinus godmani Allen, Auk, 1908, p. 339.

Puffinus obscurus atlanticus Rothschild & Hartert, Bull. B. O. C. xxvii. 1911, p. 43.

Puffinus bailloni Bonap. ; Godman, Monograph of Petrels, p. 138.

Puffinus assimilis baroli Bonap.; Bannerman, Ibis, 1914, p. 264.

Breeding range in the North Atlantic Islands.

? Azores, Madeira Group, Salvage Is., Canary Is.

Range beyond the North Atlantic Islands.

Confined to the islands mentioned above. Represented by allied forms in several widely separated localities in the Pacific and Indian Oceans.

As considerable confusion has taken place in the past with regard to the correct name to be used for this Shearwater, I have gone very carefully into the matter and have given a detailed review of the nomenclature employed by former writers on this bird, in 'The Ibis,' 1914, pp. 264-266.

P. assimilis baroli is the only form of the *P. assimilis*-group of Shearwaters which is found beyond the Pacific or Indian Oceans, and the reason why it is so far removed geographically from the other members of this blue-backed group is certainly a very difficult point to determine.

I have already touched on this question in the early part of my paper, and shown that the geographical distribution of the Tubinares—even in the comparatively small area embraced by this paper—is probably the most imperfectly understood of all the genera of birds.

The *P. assimilis*-group of Shearwaters is distinguished from the *P. lherminieri*-group by the following characters:—In the first place the upper parts are slaty-blue-black (not brown), the bill is comparatively shorter, and the wing much shorter; while both the inner web of the primary quills and the under tail-coverts are mostly white. Mr. Mathews has treated very fully this question in his ‘Birds of Australia,’ vol. ii., and I strongly recommend anyone working on this difficult group to consult his exhaustive work.

I have in the following pages discussed at some length, under the heading of the separate groups of islands, the breeding-season of this Shearwater. It will be seen that there is considerable diversity with regard to the nesting-time of this species, not only amongst the various groups but often amongst the individual islands of one group. For this reason I have not “summed up” the conclusions at which I have arrived, as I am by no means certain that there is sufficient data available to form any definite opinion on this vexed question.

Records of the Distribution and Breeding-habits of
Puffinus assimilis baroli in the North Atlantic Islands.

- | | | |
|------|-----|---|
| Jan. | 17. | Birds observed for the first time this year (Madeira Group) : Schmitz. |
| Feb. | 9. | Several birds received and a few eggs collected, for the most part fresh (Porto Santo) : Schmitz. |
| | 10. | Many eggs received, none much incubated (Porto Santo) : Schmitz. |
| | 13. | Four more eggs obtained (Porto Santo) : Schmitz. |
| | 15. | Seventeen eggs obtained, nearly all fresh (Island off Porto Santo) : Schmitz. |
| | 20. | Obtained a fine series of perfectly fresh eggs (Madeira Group) : Schmitz. |

- Feb. 27. Three birds collected (Porto Santo): Schmitz
 29. Seven adult birds caught on their eggs (Madeira Group): Schmitz.
 No date. An adult bird taken (Orotava, Tenerife): Webb & Berthelot.
 End. Breeds at this time (Canary Group): Meade-Waldo.
- Mar. Beginning. Breeds (Canary Group): Meade-Waldo.
 15. Adult bird on shore (Orotava, Tenerife): Reid.
 16. Adult with young just hatched (Tenerife): Meade-Waldo.
 17. One egg received, probably from a late brood (Porto Santo): Schmitz.
 Very unusual to find a fresh egg in this month (Madeira Group): Schmitz *.
- April 3. Egg taken (Tenerife): Meade-Waldo.
 6. Birds not yet breeding (Graciosa, Canary Is.): Meade-Waldo.
 10. Obtained 6 down-covered young, of which one may be three days old, two ten days, and three fifteen days old (Porto Santo): Schmitz.
 11. Young just hatched and nestlings a few days old (Porto Santo): O.-Grant.
 26. One adult obtained (Praya Isl., Graciosa, Azores): O.-Grant.
 Young-in-down taken (Orotava, Tenerife): Meade-Waldo.
 24-29. Many downy young in various stages and one fresh egg (Great Salvage): O.-Grant.
- May 3. Received a fine down-covered young (Madeira Group): Schmitz.
 4. Adult birds obtained, not yet breeding (Deserta Grande): O.-Grant. 1890.
 4. Birds have bred, some of the young in almost adult plumage (Porto Santo): O.-Grant. 1890.
 5. Egg received from Desertas: Schmitz.
 7. Nestlings and adult birds of the year found (Porto Santo): O.-Grant.
 15. Many seen off Garachico (Tenerife): Meade-Waldo.
 20. A down-covered young caught (Fera Isl., Madeira Group): Schmitz.
 27-31. Birds bred and left the island (Graciosa, Canary Is.): Bannerman.

* This last record is a very old one, 1899; doubtless Padre Schmitz has changed his opinion since this was published.

- June 1-7. None seen on Graciosa, Canary Is.: Bannerman.
 7-14. Ten young birds taken in every stage of plumage, from the downy nestling to the fully fledged bird; also two fresh eggs (Montaña Clara, Canary Is.): Bannerman.
- June. Considerable numbers seen (Desertas): Godman.
- July 2. One egg taken (Madeira Group): Schmitz.
 29. A down-covered young obtained (Baixo Isl., Porto Santo): Schmitz.
- Sept. 12. Several living birds caught (Porto Santo): Schmitz.
- Nov. 22. Heard a number of birds round lighthouse (Cima Isl., Porto Santo): Schmitz.
- Dec. 22. A number of birds in cliffs (Cima Isl., Porto Santo): Schmitz.

Breeding range in the Azores.

The Atlantic Allied Shearwater was first recorded from the Azores by Godman, who, in 1865, when he visited the group, heard of it on the island of Flores. He notes that it had reared its young and gone again before he reached Flores, nor did he meet with it on any of the other islands. Godman arrived in this group on the 21st of March. This bird is said to arrive about the month of March and to breed in the cliffs, but it would appear to do so much earlier from Godman's experience. Bocage includes it in his list (1866), likewise Simroth (1888). It is curious that Ogilvie-Grant did not find *Puffinus a. baroli* breeding in the Azores, as he was in the group from February 26 till June 2 and visited all the islands. The only specimen which he obtained alive was an adult male caught on Praya Island, Graciosa, on the 26th of April. A skin of a bird in the Ponta Delgada Museum had been obtained from San Miguel. Major Chaves informed Ogilvie-Grant that this Shearwater was not uncommon in the Azores.

Breeding range in the Madeira Group.

The Atlantic Allied Shearwater breeds on all the islands of this group. According to an early account, given by Padre Schmitz, the birds disappear from the Desertas and

Porto Santo in the middle of the summer. He states in the same account that this is the only bird which breeds solely in winter, and that it is unusual to find a fresh egg in March, still more so in April. Padre Schmitz subsequently records young-in-down during the month of May, while several have also been taken in April, so that his views on this point have probably changed since he wrote in 1899. A study of the records on the appended schedule show that the majority of the birds probably do leave the islands during the height of the summer, although it is obvious that odd birds occasionally breed in the summer months, as the record on July 29 from Porto Santo testifies. Schmitz found the birds had arrived on Cima Island towards the end of November, but on one occasion (1900) he observes that the birds are seen for the first time on January 17. This is probably an unusually late date for their first appearance, November being much nearer the mark. Most of the birds appear to lay early in February, and by June the majority of young birds are fully fledged—the earliest record of an adult bird of the year seems to be May 7. Padre Schmitz has recorded an exceptionally late down-covered young from Baixo Isl. (Porto Santo) on July 29; by this date it is probable that the main body of adults and young of the year have left the islands not to return until November. *P. a. baroli* does not commence breeding simultaneously on the various islands of the Madeira Group, as Mr. Ogilvie-Grant has already clearly proved, for during his visit to Deserta Grande on May 4, 1890, he found that these Shearwaters had not yet bred, while at Porto Santo, which is only about forty miles distant, this species had not only bred but some of the young were in nearly adult plumage.

Breeding range in the Salvage Islands.

Mr. Ogilvie-Grant obtained downy young in various stages on Great Salvage between the 24th and 29th of April. Only one egg, almost fresh, was taken.

Breeding range in the Canary Islands.

P. a. baroli breeds on Tenerife, Gran Canaria, Montaña Clara, and in very small numbers on Graciosa. It is first mentioned by Webb & Berthelot, who record a bird from Orotava, Tenerife, taken in February 1829. Savile Reid mentions a bird picked up on the shore at Orotava, on the 15th of March. In Tenerife also Meade-Waldo obtained an adult bird on the 16th of March with the hatching-spot on its breast. It was said to have had a young one just out of the egg. An adult bird was taken on the 3rd of April sitting on an egg, and young birds-in-down on the 26th of April at Orotava. On the 15th of May many of these Shearwaters were seen off Garachico in company with other species.

Meade-Waldo visited the island of Graciosa on the 6th of April, but did not find any Petrels on the island at this time of year. Godman in the 'Monograph' states that Meade-Waldo found eggs of this species on Graciosa at the end of February and the beginning of March. This is not the case; Godman evidently misunderstood Meade-Waldo's account of his visit. Meade-Waldo states that this species breeds at the end of February and the beginning of March, but he is obviously referring to Tenerife, where the majority of his notes were made.

Meade-Waldo also found a pair breeding near Arucas in Gran Canaria. Polatzek records it from Tenerife and the small northern islets.

During my expedition last year (1913) I found that *Puffinus assimilis baroli* had almost finished breeding on Montaña Clara between the 7th and 14th of June. About ten birds were taken in every stage of plumage, from the fluffy nestling to the adult bird of the year, with a few filaments still adhering to the flanks. Only two eggs were procured, which, however, were almost fresh on the 8th of June. A complete account of this nesting colony is given in 'The Ibis,' 1914, p. 79. We did not find any sign of these birds on Allegranza at the same time of year, but during our ten days'

stay on Graciosa, from May the 27th till June the 7th, a small but deserted colony was pointed out by the fishermen, who assured me that the birds had already bred and departed. They told me that these Shearwaters came in March and had left Graciosa before the end of May, but that I should still find a few on Montaña Clara; this, sure enough, turned out to be the case, for we had not been on this island a day before the fishermen brought me several birds, which is proof enough that they knew which species they were talking about!

From the few definite dates which we have, it appears that the bird breeds at different times on the different islands—February, March, and April being the usual months in Tenerife and perhaps on Graciosa, while, strange to say, on Montaña Clara, which is only distant from Graciosa about one-and-a-quarter miles, the birds seem to breed slightly later. This bears out my theory, already expressed; that the several nesting colonies breed quite independently of one another. There are no records of this bird being seen in the Canary Islands during the summer.

11. *Puffinus lherminieri boydi*. Boyd Alexander's
Shearwater.

Type locality—Cape Verde Islands.

Puffinus lherminieri boydi Mathews, Birds of Australia, vol. ii. 1912, p. 70.

Puffinus assimilis Gould; Alexander, Ibis, 1898, p. 98.

Puffinus sp., Salvadori, Ann. Mus. Civ. Genova, vol. xx. 1899, p. 303.

Breeding range in the North Atlantic Islands.

Confined to the Cape Verde Islands.

Range beyond the North Atlantic Islands.

The extent of the range of this Shearwater beyond the Cape Verde Archipelago is not known. It probably does not wander very far. It is represented in the Bahamas, West Indies, and Bermudas, by typical *Puffinus lherminieri*

lherminieri and by allied forms in various localities in the Pacific and perhaps also in the Indian Ocean.

The Shearwater inhabiting the Cape Verde Islands has generally been united with the form inhabiting the other islands of the North-East Atlantic, which is now known as *Puffinus assimilis baroli* Bonap. Boyd Alexander, who obtained a fine series in the Cape Verde Group, considered them intermediate between *Puffinus assimilis assimilis* Gould and *Puffinus obscurus obscurus* (Gm.), but although he pointed out the existing differences, he finally united his birds with *Puffinus a. assimilis*, which was the name then used for the form inhabiting the Madeira and Great Salvage Groups. The following year the same problem was tackled by Salvadori, who rightly came to the conclusion that the species could not possibly be referred to *Puffinus assimilis assimilis*. He considered, however, that the Cape Verde Dusky Shearwater should be assigned either to *Puffinus auduboni* Finsch (= *P. l. lherminieri* Lesson), or to *Puffinus tenebrosus* Pelz., and inclined to the belief that the description of the latter species exactly fitted the bird from the Cape Verdes. In thinking that this Cape Verde race might be *P. auduboni* he came very near the mark. Recently, Messrs. Mathews and Iredale have gone into the question again, and the former has expressed his opinions in the 'Birds of Australia' and has named the Cape Verde bird *Puffinus lherminieri boydi*, considering it to be a subspecies of *Puffinus lherminieri lherminieri* Lesson. In this I absolutely concur. The *P. lherminieri*-group is characterised mainly by having the upper parts of a distinct brown shade (as opposed to the slaty-blue back of the *P. assimilis*-group), by the comparatively longer bill and much longer wing, by the under tail-coverts being mostly dark, and by the dark inner webs to the primary quills. A comparison of *P. lherminieri boydi* with *P. assimilis baroli* will fully bear out these remarks; there is little to choose in the length of the bill in these two particular subspecies with which we are dealing, although this character is said to hold good throughout the other members of the group.

Breeding range in the Cape Verde Islands.

Boyd Alexander's Shearwater breeds on Cima Island, in the Rombos Group, and on Branca, where Alexander found it in 1897. It inhabits, and probably also breeds on, the islands of St. Jago, Raza, and Fogo, where it was discovered by Fea (see account by Salvadori). Alexander obtained a series of birds and five eggs of this Shearwater on Cima Island on the 15th of March, while on Branca, which he left on May 5th, all the birds had young and numbers were seen at sea. Signor Fea obtained an adult male on St. Jago on the 21st of May, two males on the Rombos Islands on the 22nd of September, three birds, male and female, on Raza between the 31st of October and 4th of November, and a female on Fogo on the 10th of June. Count Salvadori does not, however, mention that Fea found it breeding on any of the islands mentioned from which specimens were obtained; Signor Fea wrote that his visit to the Rombos Is. was a failure and that none of the Petrels or Shearwaters were breeding.

12. *Æstrelata mollis* *fea* Salvadori. Fea's Soft-plumaged Petrel.

Type locality—S. Nicolas, Cape Verde Islands.

Æstrelata fea Salvadori, Ann. Mus. Civ. Genov. ser. 2, vol. xx. 1899, p. 305.

Æstrelata fea Salvadori; Godman, Monograph of Petrels, p. 201.

Breeding range in the North Atlantic Islands.

Madeira Group (restricted locally), Cape Verde Islands.

Range beyond the North Atlantic Islands.

Not recorded as breeding anywhere but in above localities. Noted south to lat. 11° 10' N., one day's sail from Sierra Leone. Replaced by the typical species, *Æ. mollis mollis*, in the south Atlantic, Pacific, and Indian Oceans.

Note.—I have not thought it necessary to include the complete synonymy of this Petrel in this paper. The bird

has been mentioned by Harcourt, Dalgleish, Hartwig, Schmitz, and Ogilvie-Grant from the Madeira Group, and by Salvadori, Fea, and Boyd Alexander from the Cape Verde Islands. A short synonymy is given in Godman's 'Monograph,' p. 201.

General Conclusions.

Æstrelata mollis feæ is one of the most interesting, and certainly the most rare, of all the Tubinares inhabiting the North Atlantic Islands. For many years it was confounded with *Æstrelata m. mollis* Gould, but in 1899 Count Salvadori examined the specimens obtained by Signor Fea in the Cape Verde Islands, together with examples from the Madeira Group, and showed that this form differed strikingly from the typical species. It breeds only in the Madeira and Cape Verde Groups, and eggs and young have, up till the present, been taken only in the first named.

Breeding range in the Madeira Group.

This rare Petrel has been recorded as breeding in Madeira itself and on Bugio Island—one of the Deserta Group. The bird is also recorded from Porto Santo and the Ilho de Baixo in the same group. The following is a short summary of specimens and eggs which have been procured.

June	12, 1906.	Three adult birds and first perfect fresh egg taken from a rocky promontory in the highlands of the island (Madeira).
	13, „	Another bird procured at the same place (skin in Brit. Mus.).
	28, 1890.	A specimen obtained by Schmitz.
July	12, 1891.	A bird obtained by Schmitz.
	14, 1909.	Two young birds obtained from Curral das Freiras.
	18, 1903.	From the mountain range between S. Antonio and Curral, Schmitz obtained four living <i>O. feæ</i> , 2 ♂, 2 ♀. It transpired later that they had bred there.
Aug.	6, 1891.	Bird obtained by Schmitz.
	12, 1895.	Bird obtained by Schmitz.
Sept.	12, 1892.	Bird obtained by Schmitz.
	27, 1895.	Bird obtained by Schmitz.

- Oct. 13, 1895. Schmitz received another bird from Bugio Island, Desertas.
14, 1894. The first and only well-incubated egg received by Schmitz from Bugio Island, Desertas. There were two eggs obtained, but one was broken.

All the birds or eggs in the above list were procured by, or came into the possession of, Padre Schmitz, who has formed such an excellent Museum at Funchal.

Besides the specimens noted in this list there are two birds obtained by Dr. Frere in 1853, and now in the Museum of Cambridge. These are mentioned in 'The Ibis,' 1890, p. 386, by Mr. Dalglish, who writes:—"In a small collection of skins lately received from Madeira I find a specimen which Mr. Salvin has identified as *Æ. mollis*. . . . This bird was taken on the Ilho de Baixo, off Porto Santo. . . . I understand that there are two specimens of the same bird in the Cambridge Museum, obtained some 35 years ago by Mr. Robert Frere near Madeira."

The record from Porto Santo is given by Godman in the 'Monograph of Petrels,' and apparently does not refer to Dalglish's bird, as this is mentioned under Baixo Island.

Another record which I have not included in the summary has been communicated to me by Mr. P. R. Lowe, who examined, on the 24th of December, 1905, a specimen in down of this Fulmar as well as an egg in the collection of Padre Schmitz. Both had been procured on the island of Madeira itself. Mr. Lowe, unfortunately, has no note of the date upon which the egg and young had been taken, but it appears that this specimen has not been recorded in print.

I am not by any means certain that I have compiled a complete list of specimens of this bird taken in the Madeira Group, but it is interesting to note that all the records of this Fulmar having been seen in Madeiran waters date from the beginning of June until the end of October. There are very few notes of its breeding, but June and July seem to be the usual months in which the eggs are laid. One record on the 14th of October from the Desertas shows that

the bird occasionally extends its nesting season, unless, for some reason, this was a second brood.

Breeding range in the Cape Verde Islands.

Fea's Soft-plumaged Petrel is even a rarer bird in the Cape Verde Group than it is in the Madeira Islands, and although no eggs or young have been taken, it must undoubtedly breed there. In this archipelago it is restricted to the islands of St. Nicholas and Fogo, where Fea discovered it living on the former island "always at an altitude of 500 metres." This same traveller says it is to be found also on Fogo, *vide* Salvadori (Ann. Mus. Civ. Genov. ser. 2, vol. xx. 1899, p. 305). I gather from Fea's own account that he did not himself meet with the bird on Fogo, but constantly heard it spoken of by the natives of this island. Boyd Alexander did not come across this Petrel during his expeditions in 1897, but I have found an interesting note referring to this species in one of his private diaries, which I have been privileged to read. Under the date May 27th, while on a voyage down the west coast, he writes:—"Lat. 11° 10' N. 'Black' Petrels still following in numbers, this afternoon great numbers of Shearwaters (*Estrelata mollis*) suddenly appeared, they kept circling low over the water, soon all were left behind. May 28th. Arrived Sierra Leone." This entry is of particular interest, as it is the most southerly point that *O. m. feæ* has been noted, and is, moreover, the only occasion on which the bird has been seen in the month of May.

13. *Bulweria bulweri*. Bulwer's Petrel.

Type locality—Madeira Group.

Procellaria bulwerii Jardine & Selby, Illustr. Orn. ii. 1828, pl. 65.

Procellaria anjinho Heineken, Brewster's Edin. Journ. Sci. new series, i. 1829, p. 231: Madeira Group.

Puffinus columbinus Webb, Berthelot et Moquin-Tandon, Orn. Canarienne, 1841, p. 44 : Canary Group.

Bulweria bulweri (Jard. & Selby) ; Godman, Monograph of Petrels, p. 257, pl. 74.

Breeding range in the North Atlantic Islands *.

? Azores, Madeira Group, Salvage Is., Canary Is.

Breeding range beyond the North Atlantic Islands.

Pacific Ocean, Hawaiian Is. (French Frigate Isl., Laysan, Necker Isl., Bird Isl.).

For accidental wanderings and other probable breeding stations, see Godman's 'Monograph of Petrels.'

General Conclusions.

Bulweria bulweri breeds in the Pacific as well as in the north Atlantic Ocean. In the Pacific it appears to be confined chiefly to the Hawaiian Islands, another case of somewhat remarkable distribution.

It will be seen by glancing at the appended schedule that Bulwer's Petrel is not found inhabiting the north Atlantic Islands throughout the year. It appears to arrive at the earliest date in March and April, more commonly in May, and to commence laying early in June, but this varies considerably in the different groups of islands. The majority depart at the end of September.

Records of the Distribution and Breeding-habits of
Bulweria bulweri in the North Atlantic Islands.

Jan. & Feb.	No records from any of the N. Atlantic Islands.
March.	Said to arrive during this month in the Madeira Group : Heineken. None seen in the Azores by Ogilvie-Grant.
April 24-25.	Adults (Great Salvage).
29.	Not yet laying (Salvage Is.) : O.-Grant.
1-29.	None seen (Azores) : O.-Grant.

* Bocage records one example from Raza. The first and only record from the Cape Verde Islands.

- May 3. Birds arrived exceptionally early (Porto Santo) : Schmitz.
4. Adults not yet begun to breed (Deserta Grande) : O.-Grant.
4. Many birds arrived (Deserta Grande) : Schmitz.
- 4 & 7. Adults obtained (Porto Santo) : Schmitz.
15. Many seen off Garachico (Tenerife) : Meade-Waldo.
25. Adults obtained (Porto Santo) : Schmitz.
- 1-29. None were seen between these dates (Azores) : O.-Grant.
- May and the beginning of June are the most favourable months for finding the eggs of *B. bulweri* (Madeira Group) : Schmitz.
- June 7-14. Large numbers breeding, all with fresh eggs (Montaña Clara, E. Canary Is.) : Bannerman.
12. One egg (Tenerife, W. Canary Is.) : Gomez.
14. Bird caught on egg (Tenerife, W. Canary Is.) : Meade-Waldo.
14. Two adults obtained (S. Lourenco, Madeira) : Schmitz.
15. Two eggs (Desertas) : Schmitz.
18. Adults obtained (Tenerife, W. Canary Is.) : Gomez.
20. Eggs (Anaga Rocks, off Tenerife, W. Canary Is.) : Crowley Bequest to Brit. Mus.
20. Adults obtained (Madeira) : Jardine.
20. Two adults and one young-in-down (Tenerife, W. Canary Is.) : Gomez.
21. Adults obtained (Tenerife, W. Canary Is.) : Gomez.
22. Two eggs obtained (Porto Santo) : Schmitz.
23. Nine eggs obtained (Baixo Isl., Porto Santo) : Schmitz.
25. Three adults obtained (Tenerife, W. Canary Is.) : Meade-Waldo.
26. One egg obtained (Porto da Cruz, Madeira) : Schmitz.
- July 2. Eggs much incubated (Madeira Group) : Schmitz.
- Mid-July. Down-covered young may be met with (Madeira Group) : Schmitz.
- (No date). Eggs taken (Desertas) : Frere.
- (No date). One egg obtained (Desertas) : *Ex* Tristram Coll.
- (No date). One egg obtained (Desertas) : Brown.
- Aug. 4. The first down-covered young collected (Porto Santo) : Schmitz.
25. A down-covered young caught in harbour (Funchal, Madeira) : Schmitz.
- Sept. 1. Down-covered young obtained (Porto Santo) : Schmitz.
12. A down-covered young (Porto Santo) : Schmitz.

- Mid-Sept. Down-covered young may be met with (Madeira Group) : Schmitz.
Sept. 24. Many birds seen (Deserta Grande) : Schmitz.
Nov. All *B. bulweri* departed (Madeira Group) : Schmitz.

Breeding range in the Azores.

We have very little knowledge of *Bulweria bulweri* in the "Western Islands," as this group used commonly to be called.

The first occasion upon which *B. bulweri* was mentioned by old writers on this group was by Drouet, who remarked that it was an accidental visitor to Flores and Corvo (*cf.* Hartert, Nov. Zool. vol. xii. p. 97).

The most definite assertion that Bulwer's Petrel breeds in the Archipelago is made by Dr. Bolle in two papers on the Birds of the Canary Is. (J. f. O. 1855 & 1857). In these Bolle writes, "The native land of *B. bulweri* appears to be the Azores." At the time of writing he took it for granted that *B. bulweri* and *Puffinus columbinus* Berth. were distinct species, for he goes on to say, "Whether it (*B. bulweri*) or *columbinus* (so abundant in Corvo, and from which the inhabitants obtain such a good oil) belongs to the Azores is not known." Corvo is one of the smallest islands of the Azores, and is in the western group of the Archipelago.

Mr. Grant, who visited all the islands between February 26th and June 2nd, did not meet with it, which is not surprising as he only spent one day, April 14th, on Corvo, on which date the birds would not have arrived; neither is it mentioned by Godman, who, some years earlier, remained in the group from March 21st and explored all the islands.

In the National Collection there are two skins of adult birds labelled "Madeira/Azores, Dr. Frere," presumably obtained at sea between the said groups. The absence of further details concerning this species in the Azores only exemplifies the necessity of further research in those islands.

Breeding range in the Madeira Group.

Madeira with its accompanying islands is the true home of Bulwer's Petrel, which breeds, according to that excellent

observer, Padre Schmitz, and many other ornithologists, on every member of the group.

The bird was originally described in 1828 by Jardine & Selby from one of the islands of the Madeira Group—the following year Heineken named the same species *Procellaria anjinho* and gave an account of the bird in ‘Brewster’s Journal.’ In this he states that Bulwer’s Petrel arrives in this group in February and March. In June it begins to lay, and in July the young are hatched, while none are seen after September until the following year.

Padre Schmitz apparently does not agree that the bird arrives as early as February, for on May 23, 1907, he writes in his diary, “From Porto Santo I receive exceptionally early *B. bulweri*, which does not arrive, as a rule, until the end of the breeding-season of *P. o. bailloni* (= *P. a. baroli*), which is not yet over” *.

Harcourt found it very numerous on the Deserta Islands ; Ogilvie-Grant caught a number of adult birds on Deserta Grande on May 4, but they had not yet begun to breed. Godman found “considerable numbers breeding on the Small Deserta” in June, but does not record the actual date of his visit.

We may safely assert that Bulwer’s Petrel usually makes its appearance in the Madeira Seas early in May and apparently commences at once to breed. During June nesting is in full swing, and in July many young-in-down may be found. The season continues through August and into September, after which month the birds apparently disappear until the following spring.

Breeding range in the Salvage Islands.

Mr. Ogilvie-Grant was too early in his visit to these islands (from the 24th to the 29th of April) to find the eggs of this Petrel. The birds, however, had arrived on Great Salvage, and many were captured every night. They probably breed there in May and June, as is the case in the Madeira

* The majority of *P. a. baroli* have finished breeding in the Madeira Group by the middle of May. [D. A. B.]

Group. Padre Schmitz included the species as breeding on this group as early as 1893 on the authority of the owner of the island, at that time Senhor Constantino de Noronha. Mr. Jourdain has kindly called my attention to an apparently very late date when eggs were obtained on the Salvage Group, *i.e.* Oct. 23. Padre Schmitz recorded these eggs in the 'Zeitschrift für Oologie,' xvii. p. 55. The eggs were brought to him on October 23 by fishermen, who had taken them on the Salvages during the men's stay on that island. As far as I can see, these eggs may have been laid any time within three months of the date upon which the boat returned! The men who make these expeditions to the Salvage Group in search of Shearwaters always remain on the island a considerable time. All the eggs were addled, and I do not believe for a moment that they had been laid in October. Oologists must be careful not to include this as a date when fresh eggs of *B. bulweri* have been obtained.

Breeding range in the Canary Islands.

Bulwer's Petrel breeds commonly in this group, where it arrives in the spring and departs again in the autumn. Webb and Berthelot, and also Dr. Bolle, who quotes a conversation with Berthelot, say that it was very common in Allegranza. During my last expedition to the outlying islets of the eastern group, we did not meet with any *Bulweria bulweri* on Allegranza in June; however, on the neighbouring island of Montaña Clara it was exceedingly numerous (*vide* 'Ibis,' 1914, pp. 80 & 268).

In Tenerife it arrives in May, and on the 15th of that month Meade-Waldo saw many off Garachico. Savile Reid did not meet with any amongst the other Petrels and Shearwaters which he noted between the 1st of February and the middle of April. Bulwer's Petrel is entirely a night-flying species during the breeding-season, and hence may easily escape observation. It breeds on the Anaga Rocks off the most northerly point of Tenerife in June, also at Victoria and Santa Ursula on the main island. All the records of eggs from Tenerife are in the month of June—the only juvenile

specimen from this island in the Tring Museum is a very young chick obtained on the 20th of that month. During my stay on Montaña Clara, from June 7 to 14, many birds and eggs were unearthed. All the birds were sitting, and every one of the twenty eggs which I blew was perfectly fresh. From the above dates it will be seen that the breeding time of Bulwer's Petrel in the Canary Islands is the same as that in the Madeira Group.

14. *Fulmarus glacialis glupischa*. Pacific Fulmar.

Type locality—North Pacific.

Fulmarus glacialis glupischa Stejneger, Auk, i. 1884, p. 234.

Procellaria pacifica Aud.; Harcourt, Ann. & Mag. Nat. Hist. 2nd ser. vol. xv. 1855, p. 438.

Range in the North Atlantic Islands.

Madeira (straggler); one record.

Range outside the North Atlantic Islands.

Fulmarus g. glupischa is an inhabitant of both sides of the north Pacific Ocean according to the distribution given in Godman's 'Monograph.'

Record of occurrences in the North Atlantic Islands.

The single example of the Pacific Fulmar is recorded by Harcourt and included in his list of the Birds of Madeira. An undoubted straggler, this is the only record of the occurrence of the species in these seas. Unfortunately, no data are given, nor have I been able to trace the skin, if, indeed, it still exists.

I have somewhat reluctantly included this bird in my list as I cannot help thinking that the single specimen was possibly the Common Fulmar (*F. g. glacialis*). Had it not been that the bird was positively recorded by Harcourt as *Procellaria pacifica* Aud., I should have been inclined to omit it altogether.



Bannerman, David Armitage. 1914. "The Distribution and Notification of the Tubinares in the North Atlantic Islands." *Ibis* 2(3), 438–494.

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