

Order PROCELLARIIFORMES

A rather distinct group of some 80–100 species of pelagic seabirds, ranging in size from huge to tiny and in habits from aerial (feeding in flight) to aquatic (pursuit-diving for food), but otherwise with similar biology. About three-quarters of the species occur or have been recorded in our region. They are found throughout the oceans and most come ashore voluntarily only to breed. They are distinguished by their hooked bills, covered in horny plates with raised tubular nostrils (hence the name Tubinares). Their olfactory systems are unusually well developed (Bang 1966) and they have a distinctly musky odour, which suggest that they may locate one another and their breeding places by smell; they are attracted to biogenic oils at sea, also no doubt by smell. Probably they are most closely related to penguins and more remotely to other shorebirds and waterbirds such as Charadriiformes and Pelecaniiformes. Their diversity and abundance in the s. hemisphere suggest that the group originated there, though some important groups occurred in the northern hemisphere by middle Tertiary (Brodkorb 1963; Olson 1975).

Structurally, the wings may be long in aerial species and shorter in divers of the genera *Puffinus* and *Pelecanoides*, with 11 primaries, the outermost minute, and 10–40 secondaries in the Oceanitinae and great albatrosses respectively. The tail varies in length, being forked in *Oceanodroma*, forked to pointed in other forms, usually with 12 rectrices but up to 16 in fulmars. The tarsi are light and cylindrical in aerial forms; strong and laterally compressed with legs set far back in aquatic ones. The front toes are webbed; hind toe small or absent. The proventriculus is long and glandular; the gizzard small and twisted; and the small intestine often spiral in *Pterodroma*, presumably to aid absorption of the unusual lipids in their food. Chicks are helpless and covered in down, with two coats except in some Oceanitinae. Some larger species have a darker immature plumage, and the female is often darker than the male in the great albatrosses. The male is usually larger than the female, though smaller in the Oceanitinae and some other small species. Otherwise there is little difference in appearance with sex or age, except that young birds may have more pronounced pale or dark edges to the feathers. Many have simple counter-shaded markings that often appear to have given rise to uniformly dark or, less often, to pale derivatives; some species in most groups are dimorphic or polymorphic. The more complex groups have often developed distinctive markings of the extremities.

Breed more or less colonially on offshore islands, coastal cliffs, or on hills and deserts inland, where they perform complex vocal and aerial displays. The nest is a simple scrape or cup in a burrow or natural hole, sometimes under vegetation. The s. albatrosses build large cone-shaped nests in the open; may be lined with any debris available in the area. Smaller species visit it only at night, though larger ones and those breeding on remote islands may come to nests in the open by day. Parents incubate for spells of several days in turn and generally leave the chick alone soon after it hatches, only returning at long intervals to feed it by regurgitation. In consequence the chick is vulnerable to introduced predators and some species are now greatly reduced and at least two are now extinct. Some species also periodically liable to have unsuccessful breeding seasons. Many young or even old birds may be wrecked ashore and die when they meet bad weather or suffer shortage of food on migration or in the winter. Though it has been claimed that they are also vulnerable to all sorts of pollution, the evidence is weak (Bourne 1976). There is at present anxiety about the effect of some fishing methods, such as long-lining, which may be endangering species such as the great albatrosses.

All species feed at sea on a variety of fish, cephalopods and small marine invertebrates, either socially or alone; larger species may scavenge all sorts of offal or prey on other birds. Most, except perhaps *Pelecanoides*, can digest the complex lipids formed by some marine animals (Clarke & Prince 1976), and may eject them to soil the plumage of their enemies with lethal results (Swennen 1974). Some species can digest wax (Obst 1986). Many now take wastes from whaling and fishing operations (Fisher 1952). All have long life-cycles in proportion to their size; they disperse on fledging and then prospect for nest-sites for 2–12 years in their youth. They usually lay a single large white egg annually; though a successful breeding cycle may be completed in less than a year in at least one tropical species, *Puffinus lherminieri*, it may take 2 years in larger southern ones. Before laying, the birds court for weeks or months, then go to sea for feeding. Incubation lasts 6–8 weeks, and fledging 2–9 months. Once the fat chick fledges it fends for itself, even in species that immediately make a long migration, sometimes to the opposite hemisphere.

Tendency for failed breeders and non-breeders to begin moult before successful breeders. Five strategies of wing-moult in breeding adults: (1) In albatrosses, remiges replaced in staffelmauser interrupted while breeding; in nearly all other species, primaries moulted outwards; possibly simultaneously in some diving-petrels. (2) In most subantarctic and temperate species, moult begins soon after breeding and is completed shortly before next breeding season. (3) In most tropical species, moult aseasonal, between breeding attempts; resumption of breeding apparently depends on when moult completed. (4) In trans-equatorial migrants, wing-moult delayed until they reach non-breeding quarters, where it is completed; moult rapid but no satisfactory evidence for flightlessness. In

some species, body-moult also in winter quarters; in others, at breeding grounds. (5) In some species of high latitudes, rapid moult completed in summer when they breed; some begin moult long before breeding finished.

The history of the classification of the Order is very confused, as is seen by comparing Timmermann's (1965) discussion of their Mallophagan parasites with that by Klemm (1969) of their leg muscles and that by Harper (1978) of their proteins, but it is now widely agreed that the Order is best divided into four families: Diomedidae or large to huge aerial albatrosses; Procellariidae or medium-sized, mainly aerial but sometimes aquatic, petrels, shearwaters and prions; Hydrobatidae or small to tiny, aerial storm-petrels; and Pelecanoididae or small aquatic diving-petrels.

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Family PROCELLARIIDAE fulmars, petrels, prions, shearwaters

The family Procellariidae represents the main radiation of medium-sized 'true petrels', characterized by having united nostrils with a median septum and the outer functional primary at least as long as the next. It tends to be dominant among the birds of the Southern Ocean, though in the n. hemisphere the Charadriiformes are more numerous. The giant-petrels *Macronectes* have also developed as large scavengers and predators, showing some convergence in appearance and behaviour with the Diomedidae. The Procellariidae may be divided into four main groups with some intermediate species, which makes it hard to draw distinctions between them.

(1) The fulmars *Macronectes*, *Fulmarus*, *Thalassoica*, *Daption* and *Pagodroma* consist of seven species of surface predators and filter-feeders of rather varying structure and appearance (Voous 1949) that breed in high latitudes but may migrate along cool currents into much lower ones. *Fulmarus* appears to have colonized the n. hemisphere in the Tertiary. Six of the seven species are essentially confined to our region.

(2) The gadfly-petrels *Pterodroma* are a large series of some 30 agile species; 16 breed in our region and another six occur rarely or rather rarely. Their short sturdy bills are adapted for seizing soft prey at the surface, and their twisted intestines, for digesting marine animals with an unusual biochemistry, which are also found throughout the warmer oceans (Imber 1985). They show complex markings of face and wings that must serve as interspecific recognition-marks (Murphy & Pennoyer 1952). Some species placed in this group have an intermediate structure and intergrade with all other groups distinguished here: *Pterodroma (Lugensa) brevirostris*, which moves S in winter, has distinctly big eyes like *Pagodroma*; *Halobaena caerulea* has a plumage similar to that of prions; *Bulweria* has some structural resemblance to shearwaters. At present it is difficult to determine their precise relationships.

(3) The prions *Pachyptila* are a specialized group of six (perhaps five) very numerous species, all in our region, that show a progressive adaptation of a small, agile, cryptically coloured, fulmarine form for filter-feeding on zooplankton. There has been dispute over their classification (Cox 1980; Harper 1980) but the arrangement discussed by Fleming (1941) seems best except that the Broad-billed Prion *P. vittata* appears to intergrade with Salvin's Prion *P. salvini* through *macgillivrayi* of Ile St Paul; so they may be better treated as subspecies of the same species.

(4) The shearwaters *Procellaria*, *Calonectris* and *Puffinus* include some 20 agile species with long bills adapted to catch prey more or less under water throughout the warmer seas (Kuroda 1954); 13 species breed in our region, some migrating into the n. hemisphere; six others are chance or perhaps regular visitors. From the fossil record (Brodkorb 1963; Olson 1975); they seem to have been particularly common in the great Tethys Ocean of the middle latitudes of the n. hemisphere in the Tertiary, so this development of aquatic habits may have occurred there without competition from penguins with a subsequent return S by the more successful forms.

General features of the family are: body, ovate, or elongate in shearwaters; wings, long and narrow, 11 primaries, p10 longest, p11 minute; 20-29 secondaries, short, diastataxic; tail, short, 12 feathers; bill, heavy (*Macronectes*), slender (shearwaters), broad (prions) or stubby (gadfly-petrels), hooked, formed of several horny plates; nostrils in dorsal tube of varying length; legs set far back, laterally flattened but round in gadfly-petrels; three toes, webbed, hind toe vestigial, raised. Oil-gland feathered. Peculiar musky odour. Sexes similar, male usually larger than female. Plumage, black or grey above, white below, or all dark; light and dark morphs in some species. Juveniles and immatures usually like adults.

Cosmopolitan throughout the oceans, essentially pelagic; more abundant in cool or cold waters rich in plankton and mostly away from ice. Swim well but usually aerial except when feeding or resting. Fly with alternate swooping and flapping action close to the surface but often arcing high in some gadfly-petrels. Gait on land, a shuffling crouch, being unable to walk properly with feet set so far back; generally avoid open areas on land, being thus vulnerable to predators. Nest colonially; for the most part in burrows and cavities in all sorts of terrain, sometimes far from the sea and in mountainous areas but some species, e.g. *Macronectes*, nest on open ground. Hole-nesters usually nocturnal at colonies, when often extremely vocal, though generally silent at sea. Migratory and dispersive. Some species divide the year between s. and n. hemisphere, often migrating in large flocks that may settle on the sea in huge dense rafts. Feed mostly on fish, cephalopods and crustaceans obtained by flight-feeding, plunge-diving, surface feeding, surface-diving and underwater pursuit; hydroplaning (Murphy) is a characteristic method used particularly by prions.

Probably all defend small nesting territories to which they return regularly while undisturbed; certainly so in some hole- and burrow-nesting forms. Agonistic and sexual behaviour of nocturnal, hole-nesting species very poorly known but generally seem to have little specialization for visual displays. Tactile actions such as allopreening and billing used but olfactory and vocal communication is probably important. Breeding is usually seasonal, generally with synchronized laying, often after a pre-laying exodus but some may not nest annually; some have shorter

cycles or nest continually. For the most part, little attempt to make substantial nests. Eggs, ovate, mat, white. Clutch-size, invariably one; single-brooded; no replacement laying. Incubation by both sexes in alternate spells of 1–11 days. Single median brood-patch. Incubation period, 45–55 days. Eggshells probably always trampled in nest. Young, semi-altricial, nidicolous; hatched in down. Rarely left alone in nest for first 1–2 weeks. Cared for and fed by incomplete regurgitation by both parents. Nestling period generally shorter in cliff- and ledge-nesting species than in hole-nesters. Young attain greatest weight, often well above that of adult, some days before fledging, by which time weight has been reduced to about the same as an adult, but no clear evidence that young are totally deserted for last few days in nest. Adults and young of most species liable to eject stomach-oil in defence. Young independent at fledging. Maturity reached at minimum of 3–4 years, in some 6–12 years.

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Puffinus puffinus Manx Shearwater

COLOUR PLATE FACING PAGE 657

Procellaria puffinus Brunnich, 1764, *Orn. bor.*: 29 — Faeroe Islands and Norway.

The English name 'puffin' (here Latinized) is applied to the alcid *Fratercula arctica*. Its transfer to the scientific names of the shearwaters seems to have arisen from a mistake of Ray's, who, seeing in the Tradescants' Museum some young shearwaters from the Isle of Man, prepared in like manner to young Puffins, thought they were the birds mentioned by Gesner (*Hist. Avium*: 1561), as remarks inserted in the Willughby's *Ornithologia* (p.251) prove, for the specimens described by Ray were as clearly shearwaters as Gesner's were Puffins (Newton & Gadow, *Dict. Birds*, 1896).

POLYTYPIC Six subspecies in North Atlantic, Mediterranean and ne. Pacific Oceans. Nominate *puffinus* (Brünnich, 1764) breeds North Atlantic; *newelli* Henshaw 1900, breeds Hawaii; *auricularis* Townsend, 1890, breeds Revillagigedo Is, off Mexico; *yelkoan* (Acerbi, 1827), breeds e. Mediterranean; *mauretanicus* Lowe, 1921, w. Mediterranean; *opisthomelas* Coues, 1864, breeds islands W of Baja California.

FIELD IDENTIFICATION Length 30–38 cm; wingspan 78–79 cm; weight 350–575 g. Medium-sized shearwater with long slender bill, small head, long slender wings held straight or slightly flexed in flight, and short slightly wedge-shaped tail. Closely similar to Fluttering *P. gavia* and Hutton's *P. huttoni* Shearwaters but with sharper demarcation of black upperparts from white underparts giving neater, more black-and-white appearance. Sexes alike. No seasonal variation. Juvenile inseparable. Only nominate *puffinus* known from our area.

DESCRIPTION ADULT. Entire upperparts uniform black (wearing to brown-black), with little or no white on sides of rump. Black of cap extends below eye; sharply demarcated from white of lower cheeks, chin and throat, along nearly straight line from base of upper mandible to behind ear-coverts; white of cheeks extends up behind dark ear-coverts, forming small clear-cut crescent-shaped patch (hard to see at distance); behind white crescent, dark of hindneck extends broadly downwards to form broad greyish black patch on sides of upper neck and breast. Rest of underbody, white except for occasional dark spots on lower flanks, solid black thigh-patch, and dark outer webs of lateral under tail-coverts which combine with greyish black undersides of rectrices to form narrow dark rim round undertail. Axillaries, white or lightly marked with grey. Underwing mainly white with sharply defined blackish margins and tip. Remiges, greyish black, forming narrow dark trailing-edge and large dark tip, sharply demarcated from white of lining. Lining mostly white with narrow greyish-black to black leading-edge (narrower than trailing-edge) sharply demarcated from white of lining and ending in small blackish pre-axillary notch at base of leading-edge; leading margin between carpal joint and base of outermost primary, solid dark or interrupted with white. Amount of dark on rest of innerwing lining varies: often indistinct narrow diagonal line of dark mottling extending from just inside carpal, across lesser coverts to white subhumeral; on others, dark on lesser coverts shows as irregular black patch behind elbow, isolated from dark leading-edge or fusing with margin to form black wedge at elbow; subhumeral and coverts, always white forming clean white wing-pit. Bill, black with grey base to lower mandible; long and slender, with tubed nostrils inconspicuously raised over basal quarter of upper mandible. Iris, brown. Legs and feet, pale flesh with rear of tarsus, outer toe and base of middle toe, black; webs, pale pink with black markings.

SIMILAR SPECIES Very difficult to separate from Fluttering and Hutton's Shearwaters without experience of all three species. Important distinguishing features of Manx: (1) black of cap extending only just below eye-level where sharply defined from white cheeks, and fairly clear white crescent behind ear-coverts (not in Fluttering and Hutton's) gives more neatly defined black-and-white head pattern; dark patch on sides of upper neck and breast does not join in midline of throat or foreneck as in most (but not all) Fluttering; collar of Hutton's always more complete, often encircling throat and foreneck merging with typically off-white chin and upper throat to give strongly hooded appearance never approached by Manx. (2) Much cleaner black-and-white appearance of underwings: leading-edge, darker blackish, slightly broader, more sharply defined; dark on rest of innerwing lining confined to diagonal line from carpal to subhumeral, or to black patch just behind or fusing with elbow, leaving wing-pit clean white. Palest Fluttering also have diagonal line, though brownish and extending across wing-pit to base of trailing-

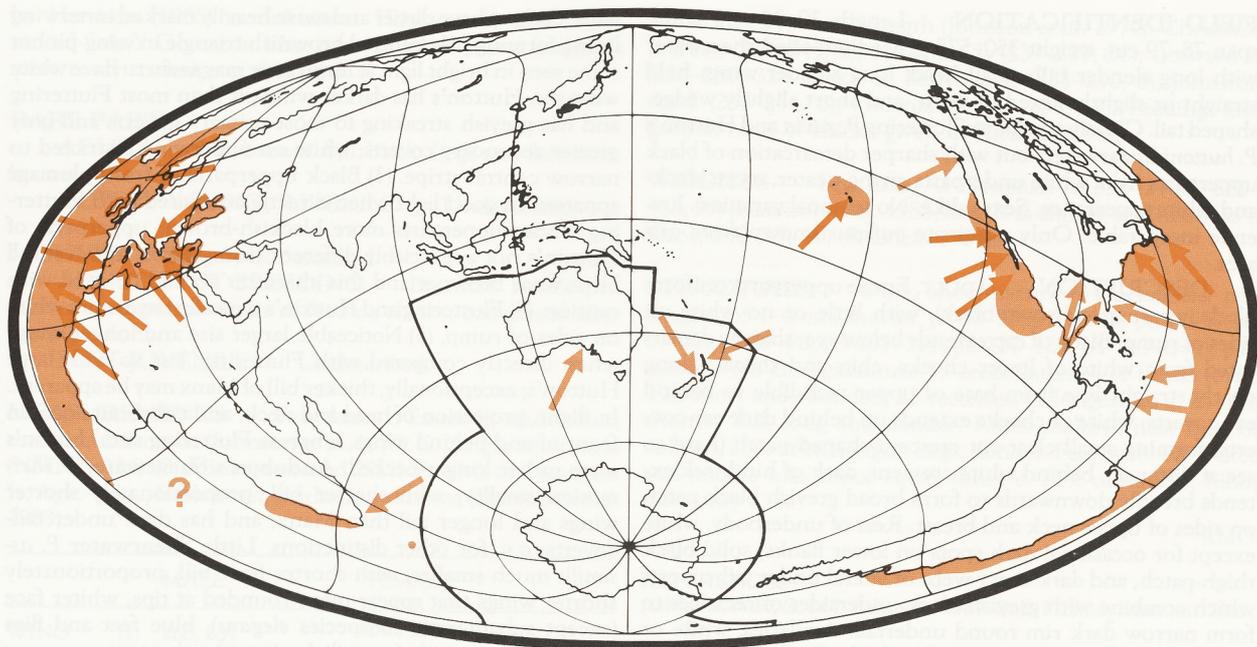
edge; darkest have dirtier and more heavily marked innerwing lining forming pale-centred brownish triangle in wing-pit but some seen in bright light at long range may seem to have white wing-pit. Hutton's has darker wing-pit than most Fluttering and has greyish streaking to most primary coverts and grey greater secondary coverts; white on underwing restricted to narrow central stripe. (3) Black upperparts of fresh plumage apparent in good light when directly compared with Fluttering whose upperparts more blackish-brown; upperparts of Hutton's not appreciably different from Manx; however, all birds wear browner and this character should be used with caution. (4) Fluttering and Hutton's typically have more white on sides of rump. (5) Noticeable larger size and longer wings when directly compared with Fluttering, less so with large Hutton's; exceptionally, thicker bill of Manx may be apparent. In flight, projection of head and neck, and tail about equal in front of and behind wings, whereas Fluttering and Hutton's seem rather longer-necked. **Audubon's Shearwater** *P. lherminieri* smaller, with shorter bill, proportionately shorter wings and longer tail than Manx, and has dark under tail-coverts; *q.v.* for other distinctions. **Little Shearwater** *P. assimilis* much smaller, with shorter finer bill, proportionately shorter wings that appear more rounded at tips, whiter face (except subantarctic subspecies *elegans*), blue feet and flies closer to water with faster flickering wing-beats.

Breed in n. Atlantic, migrate to s. Atlantic, Aug.–Feb. Flight in low to moderate winds consists of rapid, stiff-winged shallow flapping alternating with periods of gliding and banking low over sea, much as Fluttering Shearwater. Stronger shearwatering in high winds, banking up to 10 m above sea-level with only occasional brief burst of flapping, recalling flight-pattern of Short-tailed *P. tenuirostris* and Sooty *P. griseus* Shearwaters in similar conditions. Feed from surface while swimming, dive readily; also plunge occasionally. Do not normally follow ships but attend trawlers. Away from breeding areas, occur in small groups except in favoured feeding areas. Occasionally call at sea near breeding colonies but apparently silent elsewhere at sea.

HABITAT Marine, pelagic: in subarctic and subtropical waters of North Atlantic and ne. Pacific Oceans and in Mediterranean; Atlantic breeding birds spend non-breeding season in tropical and subtropical waters along South American and s. African coasts, occasionally ranging S into subantarctic waters to 50°S (Cooke & Mills 1972; Brown *et al.* 1975). Favour waters of continental shelf, usually avoiding inshore zone (BWP); cross pelagic waters rapidly during migration (Thomson 1965). In s. hemisphere, concentrations observed at upwellings (Cooke & Mills 1972) and boundaries of cool and warm water masses (Brown *et al.* 1975). Breed in ne. Atlantic, Mediterranean and ne. Pacific. Mainly on inshore islands; less often on oceanic islands or on rocky coasts; nest on tops and slopes of islands, promontories, mountains near sea. In flight, keep within 10 m of surface, gaining lift from airflow over sea. Form rafts on sea surface (BWP). Feed from on or below sea surface; deep-diving (Besson 1973).

DISTRIBUTION Breed in colonies in n. hemisphere on islands and coasts of Canada, USA, Britain and Mediterranean. Outside breeding season, occur at sea off Brazilian and Argentinian coasts from 10°S to 50°S (Murphy), and w. African coast, with small numbers in South African seas to 35°S (Sinclair & Rose 1982). Vagrant to A'sia.

AUST. Single confirmed record of nominate *puffinus*:



one, beachcast, Venus Bay, SA, 1961 (Spencer 1962). Possible sightings: off Sydney, NSW, Sept. 1984 (Carter 1988) and 1–15 km S of Gabo I., Vic., Dec. 1976 (Barton 1977).

NZ One beachcast, Pukerua Bay, 26 June 1972 (Kinsky & Fowler 1973); one beachcast, Waikarae Beach, 25 Jan. 1985 (Tennyson 1986); both nominate *puffinus*.

MOVEMENTS Trans-equatorial migrant, most individuals moving between breeding areas in North Atlantic and wintering grounds in South Atlantic; rarely recorded in breeding range Nov.–Jan. S. passage of adults begins July, juveniles following in Sept.; return movement to breeding areas late Feb.–early Apr., with influx of older immatures about May. Large winter concentrations, especially Oct.–Dec., occur off e. coast of South America between 10°S and 40°S, exceptionally S to 50°S (Brown *et al.* 1975). The few recoveries in Jan.–early Feb. have been near South Africa, which suggests counter-clockwise movement round South Atlantic (Sinclair & Rose 1982). Immature birds in second calendar year not known to visit colonies and some may overwinter in s. hemisphere (Sinclair & Rose 1982). Three records from A'asian region: bird banded as chick on 9 Sept. 1960 at Skokholm, Wales, recovered at Venus Bay, SA, in c. Nov. 1961 (Spencer 1962) and unbanded birds found beachcast Wellington, NZ, June and Jan. (see Distribution).

PLUMAGES Nominate *puffinus*.

ADULT, JUVENILE (Definitive basic). Age of first breeding 5–9 years (Brooke 1978a). **HEAD AND NECK.** Top of head, black (c89), sharply cut-off from white chin and throat below eye, at about level of gape. Hindneck, black (c89); sides of neck, mottled black (c89) and white, with white crescent curving behind ear-coverts, best defined when bill pointed downwards. **UPPERPARTS,** sooty black (c89) when fresh, becoming brown-black (119) and perhaps browner with wear. **UPPERWING,** sooty black, also fading. **UNDERPARTS,** mostly white. Sides of upper breast, mottled black-brown (c119). Flanks usually have a few blackish brown (119) spots. Axil-

laries, long, almost reaching trailing-edge of wing; white with tips varyingly mottled or suffused dark grey (83). Thighs, black (c89). Lateral under tail-coverts, varyingly mottled black (c89) at tip and on outer web. **UNDERWING.** Remiges, dark grey with lighter gloss in direct light. Marginal coverts, dark grey brown with white tips. Lesser coverts and median coverts at junction of humerus, grey-brown with partly concealed white bases. Other under wing-coverts, white; innermost secondary under wing-coverts, grey-brown at tips with darker shafts.

BARE PARTS Based on BWP and photos in Lindsey (1986).

ADULT, JUVENILE Iris, dark brown (219). Bill, dark grey (83), ramicorn, paler, merging to whitish at base, cutting edge tinged green. Claws, outer and hind side of tarsus, outer toe, and distal half of middle toe, blackish (82). Rest of feet and legs, flesh pink (light 7), brighter in juveniles.

MOULTS Nominate *puffinus*.

ADULT POST-BREEDING Pre-basic. Complete. Body-moult begins at breeding grounds July–Aug.; most moult assumed to occur on wintering areas. Wing-moult recorded as early as Sept.; primaries outwards, one outer primary growing at one time (Mayaud 1950). Moult completed Feb.–Apr. (Witherby *et al.* 1940; BWP). Non-breeders may moult earlier (Palmer 1962; Murphy). Moult sequence of subspecies *mauretanicus* given by Mayaud (1950).

POST-JUVENILE No information.

MEASUREMENTS Nominate *puffinus*. (1) Full grown, skins (BWP). (2) Breeding adults, live (Brooke 1978b).

| | MALES | FEMALES |
|------|---|--|
| WING | (1) 239 (3.66; 231–243; 19) (2) 240.1 (5.07; 47) | 235 (4.50; 226–242; 14) ** 240.6 (4.39; 47) |
| TAIL | (1) 74.7 (2.85; 70–79; 15) | 74.9 (2.89; 70–79; 9) |
| BILL | (1) 34.9 (1.30; 33–38; 16) | 34.3 (1.26; 31–36; 15) |

| | | | |
|--------|----------------------------|------------------------|----|
| | (2) 35.0 (1.41; 47) | 34.1 (1.13; 47) | ** |
| TARSUS | (1) 45.6 (1.46; 43-48; 16) | 44.4 (0.85; 43-46; 14) | ** |
| | (2) 45.7 (0.97; 47) | 44.7 (1.23; 46) | ** |
| TOE | (1) 49.5 (1.31; 48-52; 8) | 47.4 (1.60; 44-49; 8) | ** |

minimum depth at culminicorn about one-fifth length of bill. Nasal tubes, about one-fifth length of bill; oval nostrils point forwards and upwards, separated by broad septum. Tarsus, laterally compressed.

DIR

(3) Skins, unsexed (NMNZ, MV).

8TH P (3) 139.8 (2.87; 138-144; 4)

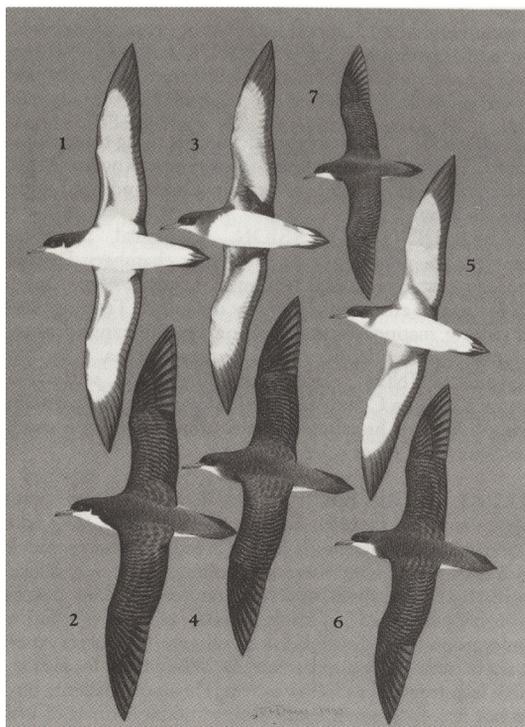
Measurements of other subspecies given by Bourne *et al.* (1988), who used same techniques as above, Jehl (1982), King & Gould (1976), Murphy (1952).

WEIGHTS Nominate *puffinus* in breeding season: pre-egg stage in Mar. when adults heaviest 478 (29.92; 430-575; 67; BWP). In June (about time when breeding birds at colony lightest) 424 (42.43; 350-535; 97; BWP). Weights tend to increase with age. More information in Brooke (1978a), BWP.

STRUCTURE Nominate *puffinus*. Wing, long and narrow. Eleven primaries, p11 minute, p10 longest, p9 0-5, p8 10-20, p7 22-34, p6 36-49, p5 58-77, p4 75-84, p3 88-96, p2 104-119, p1 114-135. Nineteen to twenty secondaries, four of tertial form, and c. five short humerals. Tail, slightly rounded; 12 feathers, t1 5-10 longer than t6. Bill, long and slender,

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Manx Shearwater *Puffinus puffinus*

1. Adult, ventral

2. Adult, dorsal

Hutton's Shearwater *Puffinus huttoni*

3. Adult, ventral

4. Adult, dorsal

Fluttering Shearwater *Puffinus gavia*

5. Adult, ventral

6. Adult, dorsal

7. Adult, dorsal, worn

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