

## Order CHARADRIIFORMES

A large, diverse assemblage of small to medium-large (12–75 cm long) limicoline, pratincoline, aquatic or terrestrial birds. Cosmopolitan from Arctic to Antarctic regions; in all sorts of maritime, freshwater and open terrestrial habitats (including deserts) with a few (woodcocks and snipes) even using dense forests. Once known as Limicolae or Laro-limicolae (e.g. Mayr & Amadon 1951); colloquially, the assemblage (excluding alcids, skuas, gulls, terns and skimmers) is often referred to as waders (especially in Britain) or shorebirds (especially in North America).

About 350 species in 19 families, though taxonomic treatments vary. Following families recognized (mostly based on recent reviews of Order [Sibley *et al.* 1988; Sibley & Ahlquist 1990; Sibley & Monroe 1990]):

|                  |  |
|------------------|--|
| Thinocoridae     | seed-snipes; four species, S. America.   |
| Pedionomidae     | Plains-wanderer; monotypic, Aust.  |
| Scolopacidae     | sandpipers, snipes and allies; c. 85 species, cosmopolitan.                              |
| Rostratulidae    | painted snipes; two species, s. America and Old World.                                   |
| Jacaniidae       | jacanas; seven species, pantropical.   |
| Chionididae      | sheathbills; two species, Antarctica and subantarctic islands.                           |
| Burhinidae       | thick-knees, stone-curlews; nine species, widespread in Old World and two in Neotropics. |
| Haematopodidae   | oystercatchers; c. 11 species, worldwide in tropics and temperate regions.               |
| Recurvirostridae | avocets and stilts; about seven species, worldwide in tropical and temperate regions.    |
| Ibidiorhynchidae | Ibisbill; monotypic, central Asia.   |
| Charadriidae     | plovers and lapwings; c. 60 species, cosmopolitan.                                       |
| Pluvianellidae   | Magellanic Plover; monotypic, S. America.  |
| Dromadidae       | Crab Plover; monotypic, Arabian region.  |
| Glareolidae      | pratinoles, coursers, and Egyptian Plover; c. 15 species, widespread in Old World.       |
| Stercorariidae   | skuas and jaegers; about seven species, mostly in Arctic and Antarctic regions.          |
| Rhynchopidae     | skimmers; three species, pantropical.  |
| Laridae          | gulls; c. 47 species, cosmopolitan.  |
| Sternidae        | terns; c. 42 species, cosmopolitan.  |
| Alcidae          | auks; c. 20 species, Arctic and temperate regions of n. hemisphere.                      |

Apparently monophyletic. Pteroclididae (sandgrouse) probably sister-group of Charadriiformes (e.g. Fjeldså 1976, 1977; Sibley & Ahlquist 1990; BWP), though whether best placed within Charadriiformes or in separate order is debated. Flamingoes (Phoenicopteridae) and divers (Gaviidae) have also been treated as Charadriiformes (Olson & Feduccia 1981; Fjeldså 1976, 1977) but DNA–DNA hybridization studies (Sibley & Ahlquist 1990) inconsistent with these theories. Affinities to other orders still controversial; DNA–DNA hybridization has suggested closest links are to large waterbirds, such as storks, herons and allies, Pelicaniformes, Procellariiformes, penguins, grebes, divers (Gaviidae) and also Falconiformes. All these were combined in huge order Ciconiiformes by Sibley & Ahlquist (1990).

Taxonomy and relationships reviewed in Sibley & Ahlquist (1990), Christian *et al.* (1992) and BWP (and references therein). Recent reviews have included: patterning of downy young (Jehl 1968; Fjeldså 1976, 1977), osteology (Strauch 1978; Mickevitch & Parenti 1980; Olson & Steadman 1981), DNA–DNA hybridization (Sibley *et al.* 1988, Sibley & Ahlquist 1990) and electrophoresis of tissue proteins (Christian *et al.* 1992). The studies of allozymes, DNA–DNA hybridization and the most recent osteological study of the entire order (Strauch 1978) have agreed in finding two or three well-knit, monophyletic assemblages within the Charadriiformes: scolopacids and allies (Thinocoridae, Pedionomidae, Scolopacidae, Rostratulidae, Jacaniidae) and charadriids and allies (Chionididae, Burhinidae, Haematopodidae, Recurvirostridae, Ibidiorhynchidae, Charadriidae, Pluvianellidae, Dromadidae, Glareolidae, Stercorariidae, Rhynchopidae, Laridae, Sternidae, Alcidae); Strauch (1978) treated Alcidae as separate lineage, but skeletons may be so highly modified for foot-propelled diving that they do not reflect relations well (Sibley & Ahlquist 1990); gulls and allies have also been regarded as a separate lineage (Christian *et al.* 1992) or as allied to charadriids (e.g. Sibley & Ahlquist 1990). Further relationships within the Order discussed in introductions to families.

Because the Order comprises so many species and adaptations are so diverse, few characters shared by all species; those that are shared are mostly anatomical features of the skull, e.g. most or all have schizorhinal nostrils, schizognathous palates, well-developed vomer, lachrymals fused with ectethemoid and pre-frontal bones, well-developed supra-orbital grooves; see Olson & Steadman (1981) for more information on osteological characters. Wings usually have 11 primaries, with p10 longest and p11 minute; 15–24 secondaries; diastataxic except in *Scolopax minor*, as far as is known. Usually 12 tail-feathers. Necks usually rather long with 15–16 cervical vertebrae. Oil-gland bilobed and tufted. Syrinx, tracheo-bronchial; two carotids (type A-1 of Glenny 1955); caeca present. Legs usually rather long; hind toe small or lacking in most but all toes greatly elongated in Jacaniidae. Feathers with small thin afterfeathers. Normally two moults annually: complete post-

breeding and partial pre-breeding; some jacanas and alcids have flightless periods when moulting remiges. Young, downy, usually with intricate cryptic patterns on upperparts of three chief types: pebbly, spotted and striped, matching characters of habitat (Fjeldså 1976, 1977): precocial, nidifugous usually, self-feeding or not depending greatly on parents.

Thirteen families recorded in HANZAB region, with 54 species breeding, 41 occurring as regular non-breeding migrants and c. 38 as accidentals or probable accidentals. Scolopacidae, Stercorariidae, Laridae and Sternidae will be dealt with in Volume 3 of HANZAB.

#### REFERENCES

- Christian, P.D., *et al.* 1992. *Aust. J. Zool.* 40: 291–302.
- Fjeldså, J. 1976. *Vidensk. Medd. dansk. Natur. Foren.* 139: 179–243.
- 1977. *Guide to the Young of European Precocial Birds*. Scarv Nature Productions, Tisvildeleje.
- Glenny, F.H. 1955. *Proc. US natn. Mus.* 103 (3346): 525–621.
- Jehl, J.L., Jr. 1968. *Mem. San Diego Soc. nat. Hist.* 3.
- Mayr, E., & D. Amadon. 1951. *Am. Mus. Novit.* 1496.
- Mickevich, M.F., & L.R. Parenti. 1980. *Syst. Zool.* 29: 108–113.
- Olson, S.L., & A. Feduccia. 1981. *Smithson. Contrib. Zool.* 323: 1–24.
- , & D.W. Steadman. 1981. *Smithson. Contrib. Zool.* 337: 1–25.
- Sibley, C.G., & J.E. Ahlquist. 1990. *Phylogeny and Classification of Birds of the World*. Yale Univ. Press, New Haven.
- , & B.L. Monroe. 1990. *Distribution and Taxonomy of the Birds of the World*. Yale Univ. Press; New Haven.
- , *et al.* 1988. *Auk* 105: 409–423.
- Strauch, J.G., Jr. 1978. *Trans. zool. Soc. Lond.* 34: 263–345.

## Family LARIDAE skuas, jaegers, gulls and terns

A large assemblage of small to very large charadriiform seabirds. We recognize four subfamilies within the Laridae following Mayr & Amadon (1951), AOU (1983).<sup>1</sup>

**Stercorariinae** Skuas and jaegers; about six species; cosmopolitan.

**Larinae** Gulls; c. 47 species; cosmopolitan.

**Sterninae** Terns; c. 42 species; cosmopolitan.

**Rynchopinae** Skimmers; three extralimital species, pan-tropical.

Taxonomic rank given to above groups varies greatly. Considered four families within suborder Lari (e.g. Campbell & Lack 1985; BWP), or four tribes within subfamily Larinae (e.g. Sibley *et al.* 1988; Sibley & Ahlquist 1990; Sibley & Monroe 1990). Others have divided Lari into three families (Stercorariidae, Laridae and Rynchopidae) with gulls and terns usually considered subfamilies within Laridae (e.g. Wetmore 1960; Judin 1965; Hackett 1989; Peters). Moynihan (1959) divided the group into two subfamilies, Stercorariinae, containing the skuas, and Larinae, containing gulls, terns and skimmers in three tribes. Study of skeletal and external morphology of suborder 'Lari' (our Laridae) was mostly unable to cluster gulls and terns satisfactorily and found group surprisingly uniform (Schnell 1970a,b). Despite lack of agreement on taxonomic ranking of above groups, monophyly of Laridae is not in doubt. Studies of biochemistry (Christian *et al.* 1992), DNA–DNA hybridization (Sibley & Ahlquist 1990), downy young (Fjeldså 1977) and skeletal morphology (Strauch 1978; Mickevich & Parenti 1980; Chu 1995) generally agree in finding close relation with Glareolidae (pratincoles) and Dromadidae (Crab Plover *Dromas ardeola*). DNA–DNA hybridization suggests Alcidae (auks) also closely related (Sibley & Ahlquist 1990), though this contradicted by studies of skeletal morphology (e.g. Strauch 1978; Chu 1995).

Body-form varies greatly, from small and slender in some gulls and terns, to robust and thickset in skuas, jaegers, some gulls and a few terns. Differences in size between sexes slight; males usually larger but females larger than males in Stercorariinae. Wings usually long, narrow and pointed, but broader and more rounded in some; 11 primaries; p10 longest, p11 minute; 17–24 secondaries. Tail has 12 rectrices; shape varies: in Stercorariinae, central rectrices project beyond rest of tail and greatly elongated in adult breeding plumages of *Stercorarius*; in most Sterninae and Rynchopinae, outer rectrices elongated and tail forked; in Larinae, usually square. Bill, varies, though usually rather short and stout, with prominent gonydeal angle; rather fine in some Larinae and Sterninae; tip pointed in Sterninae, decurved in strong hook in Stercorariinae. Bill highly modified for unique foraging methods in Rynchopinae (Zusi 1962). Lack cere, except in Stercorariinae. Nostrils schizorhinal and perforate, with no median septum. Legs, short and stout; attached near centre of body; tibiae partly bare; tarsi, short and typically scutellate in front. Four toes; hindtoe, short, raised, sometimes rudimentary or absent; front toes, fully webbed (webs somewhat incised in some). Claws, moderately long, strong, laterally compressed. Caeca ranges from large (Stercorariinae) to poorly developed (Rynchopinae, Sterninae). Supra-orbital salt-glands well developed.

Plumages mainly browns, black, white and greys. Colours of bare parts often striking and often showing marked variation with both season and age. Adults moult twice annually: (1) a post-breeding (pre-basic) moult to non-breeding plumage, which is complete (with apparent exception of *Larus sabini*); and (2) a pre-breeding (pre-alternate) moult to breeding plumage, which is almost always partial (but see *Larus pipixcan* and *L. sabini*); some terns also undergo one or two pre-supplemental moults of inner primaries. Primaries moult outwards.

Hatch in natal down, which is replaced by juvenile plumage; downy young precocial but more dependent on

<sup>1</sup> This treatment differs from the arrangement presented in the introduction to the Charadriiformes in Volume 2 of HANZAB (p. 648), where these four subfamilies were listed as families. Recent major studies in avian classification (particularly by Sibley and co-workers) and the publication of a revised species list of Aust. birds (Christidis & Boles 1994) since the preparation and publication of Volume 2, have brought much rearrangement. In this and subsequent volumes of HANZAB, taxonomy, nomenclature and arrangements of species follow Christidis & Boles (1994) (though they do not present subfamilial taxonomy). Their sequence of families of Charadriiformes occurring in HANZAB region is: Pedionomidae, Scolopacidae, Rostratulidae, Jacanidae, Chionidae, Burhinidae, Haematopodidae, Recurvirostridae, Charadriidae, Glareolidae and

Laridae. However, work on Volume 2 was too advanced to follow their sequence and taxonomy fully. The Scolopacidae are out of place in the arrangement of subfamilies in Volumes 2 and 3; other families follow the order of Christidis & Boles (1994).

### Plate 23

Oriental Pratincole *Glareola maldivarum* (page 366)

1 Adult breeding; 2 Adult non-breeding; 3 Juvenile;  
4, 5 Adult

Australian Pratincole *Stiltia isabella* (page 373)

6 Adult; 7 Downy young; 8 Juvenile;  
9 First immature non-breeding;  
10, 11 Adult

parental feeding than other Charadriiformes. Post-juvenile (first pre-basic) moult complete or partial, varying within and between families; moults of subadults complicated and vary between subfamilies (see subfamily accounts). Generally slow to mature, attaining adult plumage when 2–4 years old and first breeding at 2–4 years (smaller gulls and terns) to 4–9 years (many skuas and larger gulls and terns); some may breed in first year (e.g. *Sterna albifrons*).

Inhabit wide range of marine and freshwater habitats from Tropics to polar regions; many species strongly migratory, especially those breeding at high latitudes, e.g. South Polar Skua *Catharacta maccormicki* and Arctic Tern *Sterna paradisaea*, which migrate between polar regions. Most nest in terrestrial colonies near water (see subfamily accounts); some species highly pelagic in non-breeding season. Use wide range of foraging methods (see subfamilies; for discussion of feeding methods, see General Introduction).

See subfamily accounts for summaries of social organization and breeding.

## REFERENCES

- AOU. 1983. *Check-list of North American Birds*. Am. Orn. Union, Lawrence, Kansas.
- Campbell, B., & E. Lack. 1985. *A Dictionary of Birds*. Poyser, Calton, England.
- Christian, P.D., et al. 1992. *Aust. J. Zool.* 40: 225–33.
- Christidis, L., & W.E. Boles. 1994. *RAOU Monogr.* 2.
- Chu, P.C. 1995. *Condor* 97: 174–96.
- Fjeldså, J. 1977. *Guide to the Young of European Precocial Birds*. Skarv Nature Pubs, Strandgården, Tisvildileje.
- Hackett, S.J. 1989. *Condor* 91: 73–90.
- Judin, K.A. 1965. *Fauna USSR, Aves. Ser. 1*, 2, ns 91. Acad. Sci., Moscow & Leningrad.
- Mayr, E., & D. Amadon. 1951. *Am. Mus. Novit.* 1496.
- Mickevich, M.F., & L.R. Parenti. 1980. *Syst. Zool.* 29: 108–13.
- Moynihan, M. 1959. *Am. Mus. Novit.* 1928.
- Schnell, G.D. 1970a. *Syst. Zool.* 19: 35–57.
- 1970b. *Syst. Zool.* 19: 264–302.
- Sibley, C.G., & J.E. Ahlquist. 1990. *Phylogeny and Classification of Birds*. Yale University Press, New Haven.
- , & B.L. Monroe Jr. 1990. *Distribution and Taxonomy of Birds of the World*. Yale University Press, New Haven.
- , et al. 1988. *Auk* 105: 409–23.
- Strauch Jr, J.G. 1978. *Trans. zool. Soc. Lond.* 34: 263–345.
- Wetmore, A. 1960. *Smithson. Misc. Coll.* 139 (II): 1–37.
- Zusi, R.L. 1962. *Publ. Nuttall orn. Club* 3.

## Subfamily STERCORARIINAE skuas and jaegers

Medium to large (50–65 cm) predatory and scavenging seabirds. About six species in two genera: (1) *Catharacta* (skuas) comprises three or four species (but their taxonomy complex, see below), mostly of Subantarctic and Antarctic; two species occur HANZAB region; (2) *Stercorarius* (jaegers) comprise three species that breed in n. hemisphere and migrate to s. hemisphere for boreal winter; all three are non-breeding migrants to HANZAB region. Morphological and behavioural studies often agree in finding these genera to be distinct (Devillers 1978; Furness 1987; Christidis & Boles 1994), but Olson (1985) found no osteological basis for recognizing two genera, and recent preliminary study of mitochondrial DNA (Peter et al. 1994) found unexpected similarity between *S. pomarinus* and *C. skua*; further biochemical research needed. Relationship between skuas and other Laridae unclear; morphological studies generally suggest closest to Larinae (e.g. Strauch 1978; Furness 1987; Chu 1995) while studies of behaviour (Moynihan 1959) and DNA–DNA hybridization (Sibley & Ahlquist 1990) suggest they are equally related (sister-group) to all other Laridae. Major review of biology, morphology and taxonomy in Furness (1987).

The genus *Catharacta* comprises six closely related forms (all but one of which breeds in s. hemisphere), and boundaries between species and subspecies difficult to define: *skua* breeds North Atlantic; *lonnbergi*, circumpolar, breeding subantarctic islands and Antarctic Pen.; *hamiltoni* breeds Tristan Grp and Gough I., South Atlantic Ocean,

and it is probably this form that occurs Iles Amsterdam and St Paul, Indian Ocean; *antarctica* breeds Falkland Is and Patagonia; *chilensis* breeds coastal Chile and Patagonia; and *maccormicki* is circumpolar on Antarctic Continent, continental islands and South Shetland Is. Both *maccormicki* and *chilensis* usually treated as separate monotypic species. Other four usually treated as one or two species, but treatment complicated by nomenclatural priorities: the three s. circumpolar taxa *antarctica*, *lonnbergi*, and *hamiltoni* almost always treated as subspecies of a single species, and North Atlantic *skua* treated as separate species or fourth subspecies with s. taxa. If all four treated as one species, *skua* has nomenclatural priority (thus *C. skua* with four subspecies); if treated as two species, *C. skua* monotypic, and *C. antarctica* has three subspecies. (The specific name used for s. hemisphere

### Plate 24

- |  |  |
|--|--|
| Great Skua <i>Catharacta skua</i><br>(page 388)  | Pomarine Jaeger<br><i>Stercorarius pomarinus</i> (page 438)          |
| 1 Adult on breeding grounds, austral summer; 2 Downy young; 3 Juvenile   | 8 Adult female breeding, light morph; 9 Juvenile, intermediate phase |
| South Polar Skua<br><i>Catharacta maccormicki</i><br>(page 412)  | Arctic Jaeger<br><i>Stercorarius parasiticus</i> (page 448)          |
| 4 Adult pale morph, in worn plumage at breeding grounds, austral summer; 5 Adult dark morph, in fresh plumage at breeding grounds, austral summer; 6 Downy young; 7 Juvenile | 10 Adult breeding, light morph; 11 Juvenile, intermediate phase      |
|  | Long-tailed Jaeger <i>Stercorarius longicaudus</i> (page 459)        |
|  | 12 Adult breeding, light morph; 13 Juvenile, intermediate phase      |

forms has little biological implication beyond whether *skua* has differentiated sufficiently to be considered a species; *Catharacta* clearly radiated in s. hemisphere and *skua* is a recent offshoot from a s. ancestor [Furness 1987; cf. Brooke 1978].) Here we treat *skua*, *antarctica*, *lonnbergi* and *hamiltoni* as subspecies of *C. skua* and recognize *maccormicki* and *chilensis* as separate species (following Devillers 1977, 1978; Furness 1987; Christidis & Boles 1994; BWP; NZCL). Forms of *Catharacta* mostly allopatric; some hybridization occurs in all areas of contact between breeding forms. For fuller discussion of hybridization, variation and taxonomy in *Catharacta*, see Great (Subantarctic) Skua: Geographical Variation.

Body, robust and thickset, especially in *Catharacta*. Females larger than males: females 11–17% heavier during breeding season, and wings 1–4% longer, but differences slight or absent in other linear measurements. Wings, long; narrow and pointed, with angled carpal joint in *Stercorarius*; broader, straighter and blunter in *Catharacta*; 11 primaries; p11 minute; 17–20 secondaries. Tail, short, slightly wedge-shaped to rounded in *Catharacta*; 12 rectrices; central pair (t1) project slightly in *Catharacta* and most plumages of *Stercorarius*; greatly elongated in adult breeding plumages of *Stercorarius*, forming long tail-streamers (the shapes of which are diagnostic of species); tail-streamers often broken off (or intentionally bitten off) during breeding season. Bill, short, heavy and powerful, with strongly hooked tip to upper mandible and prominent gonydeal angle; superficially gull-like, but rhamphotheca complex, with four distinct sheaths on upper mandible: (1) sheath of lateral edge; (2) strongly curved distal sheath (unguis), smoother and more rounded than tip of bill of gulls; and (3) pair of separate, soft, thin dorsal plates covering nostrils, forming distinct cere (absent in all other Laridae). Head, rounded; neck, thick and strong. Coracoids do not overlap. Sternum has one notch on each side. Legs, short, superficially gull-like, but with very short bare part on tibia. Tarsi, short; scutellate in *Stercorarius*; with single row of scutes at front and reticulate scaling elsewhere in *Catharacta*; scales hard (soft and fleshy in other Laridae). Four toes; hindtoe, short, raised; front toes, fully webbed. Claws, moderately long, strong, laterally compressed, strongly hooked and sharp; combination of strongly hooked claws and fully webbed toes unique among birds. Oil-gland feathered. Caeca present, large, much longer than in Larinae. Supra-orbital salt-glands, well developed. Down occurs on both pterygiae and apteria.

Sexes similar in plumage. Bare parts not brightly coloured, unlike Rynchopinae and many Larinae and Sterninae. Iris, black-brown. Bill, dull brown to black. Legs, blue-grey to black. In most *Catharacta*, plumages dark brown, with varying red and yellow tints; great individual variation in plumages within populations (though variation associated with wear, age and season poorly understood). South Polar Skua *C. maccormicki* and all *Stercorarius* polymorphic, with dark morphs (very rare in Long-tailed Jaeger *S. longicaudus*) and varying light morphs (including so-called intermediate morph, which often recognized for convenience); ratios of morphs vary geographically in some species. White bases of primaries form conspicuous patches in wing of all species, but less conspicuous in *Stercorarius*. Light morph *Stercorarius* have white in underbody of adults and subadults. Similarity of plumages between species and great individual variation complicates field identification. Adults moult twice annually: a complete post-breeding (pre-basic) moult and a partial pre-breeding (pre-alternate) moult; both occur mainly while migrating or in non-breeding areas. Young hatch with long soft woolly down, mostly uniform greyish-brown but slightly paler on belly, tips of wing-pads and around and in front of eyes; chicks of *C. maccormicki* very pale all over. Although precocial, chicks dependent on parents for some time. Bill, legs and feet of juveniles paler than in adult and area of black increases with age in *Stercorarius*. Juveniles strongly barred below in *Stercorarius* (unique among Laridae) but not *Catharacta*, one of main reasons for generic separation (Brooke 1978; Furness 1987). Juvenile plumages of *Stercorarius* polyphasic; coloration of juvenile plumage not necessarily related to colour of immature or adult plumage (hence use of phase in accounts, q.v.). Immatures of *Stercorarius* recognized by barred underwing-coverts; gradually attain adult plumage through a series of immature plumages; length of central rectrices increases with age until adult plumage attained. Transition to adult plumage also gradual in *Catharacta*, but immatures difficult to age and subadult moults poorly known. Minimum age of first breeding probably 4–8 years old in *Catharacta* (Furness 1987); c. 4 years old in *Stercorarius*; in Arctic Jaeger *S. parasiticus*, average age of first breeding appears to vary with morph (see Arctic Jaeger: Plumages).

*Catharacta* breeds s. hemisphere, except for outlying population (*C.s. skua*) breeding in North Atlantic. *Stercorarius* circumpolar breeders in high latitudes of n. hemisphere. Migratory, but non-breeding range of all species poorly known. Marine in non-breeding season, in pelagic or (less often) coastal waters. *Stercorarius* migrate S in boreal winter to poorly known wintering areas in Pacific, Indian and Atlantic Oceans. Migrations of *Catharacta* more varied and poorly known, but at least South Polar Skua long-distance trans-equatorial migrants, and almost all leave breeding colonies in non-breeding periods; some Great (Subantarctic) Skua stay near breeding islands in non-breeding periods.

Opportunistic predators, scavengers and, notably, kleptoparasites, though importance of kleptoparasitism varies greatly between species. Feed on land and at sea, taking a variety of carrion, small mammals, eggs and young of seabirds, burrowing petrels, land birds and fish, crustaceans, molluscs, offal and garbage. At times, approach or follow boats, feeding on offals or scraps thrown overboard or stealing food from other seabirds. Pomarine Jaeger and some populations of Long-tailed Jaeger depend almost exclusively on lemmings during breeding season. At sea, food

taken mostly by dipping, surface-diving, pattering and aerial pursuit; also piracy. On land, use a variety of methods, including direct attacks, stealing and scavenging. Feeding behaviour of South Polar Skua influenced by presence of Great (Subantarctic) Skua in areas where both species breed (see South Polar Skua: Food). Some individuals defend feeding territories or type-A territories.

Behaviour well studied. Established pairs normally monogamous, with pairs re-forming at start of each breeding season on traditional territories. However, Pomarine Jaegers do not retain same mates or territories but roam nomadically and breed opportunistically and Great (Subantarctic) Skuas in some locations, including HANZAB region, breed in trios as well as pairs (e.g. Bonner 1964; Burton 1968a,b; Young 1978; Hemmings 1989). Trios usually consist of two males and a female (Hemmings 1989). Trios not recorded for South Polar Skua. Nests well-spaced and territories vigorously defended. Clubs a feature of large colonies, generally where non-breeding birds gather to rest together or to practice displays and behaviours. Most jaegers and skuas have same patterns of displays, though only jaegers use a distraction display as well as diving at intruders near nest. During most activities, *Catharacta* typically display white patches in wings by stretching wings vertically. Jaegers and skuas have fewer displays than gulls, and displays generally aggressive, with fewer appeasing postures than gulls. Fight often. Main types of aggressive behaviours involve Upright (equivalent to Upright of gulls), Oblique, Bent, and Long Call Complex. Most conspicuous display, Long Call Complex, combines Oblique and Bent displays with Wing-raising and Long Call; involved in territorial advertisement and in agonistic and sexual encounters. Long Call Complex differs between taxa of skua. Tail-raising important display between prospective mates; performed on ground within territory and displays central rectrices (which are diagnostic of age and species in jaegers). In established pairs, Scoop-making or Scraping may begin only a couple of days after a pair reforms. Young precocial and, if undisturbed, semi-nidifugous; fed by both parents, food being given in bill or regurgitated onto ground. Dependent on food from parents for long period. When food short, usually only one chick fledged by each successful pair; second-hatched chick, younger by 1–2 days, often killed by sibling. Chicks of all species show cryptic behaviour when predators present. Adults show alarm by calling or attacking, sometimes swooping and striking intruder. Only Arctic Jaeger has full distraction-lure display, though Pomarine and Long-tailed Jaegers less often use an incomplete distraction-lure type display. No such displays by *Catharacta* species. Often bathe in fresh water, though will bathe communally in seawater where no freshwater sites. Interspecific hybridization occurs between *Catharacta* species (see above, accounts, and Great Skua: Geographical Variation).

Breed seasonally. *Stercorarius* in high latitudes of n. hemisphere in boreal summer; *Catharacta* in austral summer (except outlying population *C. skua skua* breeding North Atlantic in boreal summer). In *Catharacta*, season broadly Sept.–Feb. but onset of laying varies with latitude, Sept.–Nov. in mid-latitudes, later in Antarctic (Young 1977). S. hemisphere *Catharacta* nest in or round penguin colonies; in sheltered snow-free areas on flat or sloping ground, in valleys, on small hills, moraines, cliff edges; *Stercorarius* on tundra and, in Arctic Jaeger, in moorland. Nest, a scrape or scoop in gravel, soil or vegetation, sometimes with rim; lined or unlined; nests sometimes more substantial. Colour of eggs vary from light grey, pale green or greenish blue to olive-brown or dark stone, with irregular blotches of light or dark brown, yellow-brown or purple. Usually two eggs per clutch, occasionally only one. Eggs laid at intervals of 2–8 days in *Catharacta*. Both sexes incubate, either beginning with first egg (e.g. South Polar Skua) or when clutch complete (Great Skua). Incubation period, 24–34 days, mostly 28–30 days. Hatching asynchronous. Young, semi-precocial. Both sexes feed and brood young. Chicks may leave nest within 24 h but chicks of South Polar Skua may stay in nest for up to 27 days. Parent regurgitates food onto ground then picks up pieces, which chick takes; older chicks catch food as it is being regurgitated or take food from ground. Age of first flight, 49–65 days. Young fed by parents after fledging though start feeding themselves at c. 7 weeks. May remain in parents' territory for 3–4 weeks after fledging.

## REFERENCES

- Bonner, W.N. 1964. *Br. Antarct. Surv. Bull.* 3: 41–7.  
 Burton, R.W. 1968a. *Br. Antarct. Surv. Bull.* 15: 9–28.  
 — 1968b. *Br. Antarct. Surv. Bull.* 16: 15–39.  
 Brooke, R.K. 1978. *Durban Mus. Nov.* 11: 295–308.  
 Christidis, L., & W.E. Boles. 1994. *RAOU Monogr.* 2.  
 Chu, P.C. 1995. *Condor* 97: 174–96.  
 Devillers, P. 1977. *Auk* 94: 417–29.  
 — 1978. *Gerfaut* 68: 374–417.  
 Farner, D.S., et al. (Eds) 1985. *Avian Biology*. 8. Academic Press, Lond.  
 Furness, R.W. 1987. *The Skuas*. Poyser, Calton, England.  
 Hemmings, A.D. 1989. *J. Zool., Lond.* 218: 393–405.  
 Moynihan, M. 1959. *Am. Mus. Novit.* 1928.  
 Olson, S.L. 1985. Pp 79–238 In: Farner et al. 1985.  
 Peter, H.U., et al. 1994. *J. Orn., Lpz.* 135: 320.  
 Pietz, P.J. 1985. *Condor* 87: 316–26.  
 Sibley, C.G., & J.E. Ahlquist. 1990. *Phylogeny and Classification of Birds*. Yale University Press, New Haven.  
 Strauch, J.G. Jr. 1978. *Trans. zool. Soc. Lond.* 34: 263–345.  
 Tinbergen, N. 1959. *Behaviour* 15: 1–70.  
 Young, E.C. 1977. *Ibis* 119: 191–5.  
 — 1978. *NZ J. Zool.* 5: 401–16.

*Stercorarius longicaudus*    **Long-tailed Jaeger**

COLOUR PLATES FACING PAGES 385, 417 & 488

*Stercorarius longicaudus* Vieillot, 1819, *Nouv. Dict. Hist. Nat.* 32: 157 — the north of Europe, Asia and America, restricted to northern Europe.

Compounded from Latin *longus*, long, and *cauda*, tail.

**OTHER ENGLISH NAMES** Long-tailed Skua.

**POLYTYPIC** Nominate *longicaudus* Arctic and subarctic Scandinavia, E to delta of Lena R.; subspecies *pallescens* Løppenthin, 1932, Arctic Greenland, North America and Siberia, E of Kolyma R.

**FIELD IDENTIFICATION** Length 35–58 cm, including tail-streamers that project up to 18 cm in breeding adults; wingspan 92–105 cm; weight: male 280 g, female 310 g. Smallest and most lightly built jaeger, with short stout bill, small head, slim body with prominent chest and rather flat belly, long narrow wings and tail, and rather buoyant tern-like flight. Smaller, slimmer, more elegant and tern-like than Arctic Jaeger *Stercorarius parasiticus*. Adults dimorphic, with light and dark morphs. In breeding plumage, adult has diagnostic long, fine central tail-streamers that project beyond rest of tail; in non-breeding and immature plumages, some have diagnostic white-tipped or thread-like projections to tail-streamers. At all ages, only narrow pale strip along leading-edge of upperwing in flight. Sexes alike. Marked seasonal variation. Juvenile separable, distinguished from other juvenile jaegers by long central tail-projections with blunt-tips. Immatures separable.

**Description Adult breeding LIGHT MORPH:** Forehead, crown, sides of head to just below eye, nape, lores and feathering at gape, black, forming cap sharply demarcated from white rest of head and neck (which can be tinged yellow when fresh). Upperparts, pale blue-grey, darker on tips of outer primaries, and with diagnostic contrasting black secondary bar; shafts of two (occasionally three) outermost primaries, white, forming pale strip on leading-edge of upperwing in flight; distal third of tail, black, with prominent white shafts to outermost rectrices when tail spread; very long fine streamer-like central rectrices project beyond rest of tail (projection generally longer than distance from tip of rest of tail to base of wing) and whip or quiver in flight. Extent of grey on underbody varies: many have white breast merging into slate-grey belly and rest of underbody; in palest, grey confined to vent and undertail-coverts; in darkest, grey extends to breast. Underwing: dark blue-grey, with only thin pale strip along leading-edge. Undertail, black, grading to silvery white on basal half. Bill, black. Iris, dark brown. Legs and feet, bi-coloured: feet and tibia, black; tarsi mostly grey-blue, with varying black patches or spotting. **DARK MORPH:** Rare and poorly known (see Plumages). Said to be uniform dark grey, except for contrasting pale primary-shafts as in light morph. **Adult non-breeding LIGHT MORPH:** Differ from adult breeding by: Mantle and scapulars slightly browner, with pale scaling, contrasting with uniform blue-grey innerwing-coverts; pale scaling soon lost with wear; uppertail-coverts barred black-and-white, forming prominent pale area above dark tail at distance. Typically, head, grey-brown or dark brown, grading to pale brown or off-white on chin and throat, forming dusky hood, with prominent small dark eye-patch; separated from dark-brown breast-band by white collar (which, in some, is mottled brown on hindneck and sides of neck). In darkest birds, collar, cream, smaller, less prominent, so dark hood appears to merge with breast-band. In palest, head much paler, creamy or white, sometimes with dusky patch round eye or on ear-coverts or both and usually with narrower and sometimes incomplete dark breast-band. Rest of underbody, white, with varying dark-grey or brown barring on flanks, vent and undertail-coverts. Central rectrices much shorter, and often missing; typically slender, tapered and pointed, and may bend in wind; some show broader, pointed projections with diagnostic white or wire-like tip. Exceptionally, some birds in mid-austral summer in moult can appear uniformly grey and may be mistaken for dark morphs. In austral autumn, birds moulting to breeding plumage often have mostly or wholly grey uppertail-coverts, with incoming black cap, remnant breast-band and much

incoming grey on underbody grading to white on upper belly and lower breast; projecting central rectrices usually absent or short. Bare parts as breeding except base of bill often paler brown, contrasting with dark tip. **DARK MORPH:** Undescribed. **Juvenile** Much variation in colour and pattern of plumage. Three basic colour-forms, though variation continuous. General coloration of light and intermediate morphs, cold grey or grey-brown, with paler hindneck and belly; dark morph, almost uniformly black. **INTERMEDIATE (BARRED) PHASE:** Head and neck, grey-brown, with paler grey hindneck and small dusky patch in front of eye. Underbody, finely barred dark grey-brown and white or pale buff, typically more uniform and darker on breast and grading to black-brown-and-white barring on rear-flanks, vent and undertail-coverts; at distance often appear grey below except for slight contrast between breast-band and upper belly; some uniformly dark grey-brown below. Upperparts, cold brownish-grey, with narrow white or pale-buff scaling or barring on saddle, rump, tertials and innerwing-coverts when fresh, forming thin transverse lines on innerwing-coverts. Primary coverts and remiges, brown-black; outer two (occasionally three or four) primaries have contrasting pale shafts, as on adult, but primaries normally have no, or only fine, pale tips. Uppertail-coverts boldly barred black and pale buff or white, often showing as pale patch at distance; birds with obvious pale hindneck and only indistinct barring on uppertail-coverts often seen. Underwing: axillaries and underwing-coverts boldly barred black and off-white (conspicuous at distance and contrasting with dark underbody); remiges, glossy dark grey, with clear-cut white patch on basal third of primaries; rarely, greater primary coverts have pale bases which, with pale patch at base of primaries, appear as double pale patch (as on juvenile Pomarine Jaeger). Tail, brown-black (grading to silvery-white at base on underside); central rectrices slightly rounded at tips, normally with pale fringes, and elongated, projecting beyond rest of tail; at longest, characteristic blunt-tipped stubs. **LIGHT PHASE:** Pattern of plumage similar to that of intermediate morph, differing by: paler and greyer tones; broader and more prominent pale scaling and barring on upperparts and strongly barred black-and-white uppertail-coverts; much paler off-white hindneck collar and belly, contrasting with grey breast-band; and bolder dark barring on flanks and undertail-coverts. Palest birds appear to have white head and underbody, with varying grey breast-band. **DARK PHASE:** Pattern similar to darkest intermediate morphs but more uniform and darker, grey-black or black-brown, with faint or no pale hindneck or patch on belly; pale scaling on upperparts and barring on underbody vary (fine and indistinct on some) but uppertail- and undertail-coverts usually boldly barred; pale barring on axillaries and underwing-coverts narrower and less prominent. A few have pale markings so reduced that they appear uniformly dark apart from pale bases to underside of primaries and tail; such birds possibly sometimes confused with adult dark morph. Bare parts similar in all morphs. Bill, bi-coloured: distal half or so, black; base, pale grey or bluish grey. Iris, dark brown. Legs and base of feet, pale blue-grey; rest of foot, black. **Immatures** At first, all forms much as juvenile plumages. After post-juvenile moult, all forms similar in appearance; dark morph undescribed. **First immature (non-breeding and breeding)** Differ from juvenile by: Saddle and inner upperwing-coverts more uniform, black-brown, with narrow white scaling to saddle when fresh, and sometimes mixed with slate-grey feathering. Paler, off-white areas on hindneck, sides of neck, belly and, sometimes, chin and throat; most appear white below, with grey breast-band



and clear dark barring on flanks, vent and undertail-coverts; some appear to have white belly, with dark-grey head, neck and breast. Underwing and uppertail-coverts heavily barred as juvenile. Central rectrices: short, strongly tapered spikes projecting farther beyond rest of tail, or do not project. More black on bill, especially along cutting edges of mandibles, and base more grey or yellow; legs and feet, as juvenile or with some black spotting on tarsi. All immatures best aged during first austral summer–autumn by juvenile appearance coupled with active moult of remiges and rectrices. **Second immature non-breeding** Similar to adult non-breeding except: upperparts darker, more brownish grey; underwing mostly barred like juvenile, though barring finer and less prominent; and remiges uniform dark grey or with only faint pale patch at bases of primaries. Legs and feet as first immature but with more black on tarsi. **Second immature breeding** Similar to adult breeding except: black cap mixed with grey or brown and less sharply demarcated; pale areas of rest of head and neck lack yellow wash and usually have some dark streaks and spots. Varying amount of non-breeding plumage retained. Axillaries and underwing-coverts as second immature non-breeding, though pale barring finer and less extensive and tends to be concentrated along leading-edge of innerwing and in pale panel on central innerwing-coverts and subhumeral, surrounded by dark-grey coverts. Central rectrices shorter. Some advanced birds probably as third immature breeding. Legs and feet similar to second non-breeding or with more black on tarsi. **Third immature (non-breeding and breeding)** Similar to adult and inseparable, unless retain a few barred smaller underwing-coverts or other small traces of non-breeding plumage.

**Similar species Arctic Jaeger** (q.v.).

Outside breeding season, Long-tailed seen singly, in pairs, or small groups, especially when attracted to trawlers for food scraps or to chase assembled seabirds; rarely in groups of 30 or so. In HANZAB region, prefer pelagic, shelf-break and off-shore waters; only jaeger normally encountered in open ocean during non-breeding season. Only rarely close inshore, such as when oceanographic conditions suitable or when forced in by gales; exceptionally, enter outer reaches of larger bays and harbours. General appearance in flight far less menacing and more elegant, buoyant and tern-like than Arctic Jaeger, body often moving vertically with each wing-beat. Except in very strong winds, patrol c. 3 m above sea and often stall, hover and dip to surface in tern-like manner before continuing; when patrolling, often reluctant to alight on water. In strong winds, hug wave troughs (at times floating over crests of waves) or alternate shearwater-like careening on fixed wings with bouts of flapping and gliding on flexed wings; occasionally indulge in rapid and dramatic careening. When chasing other seabirds, piratical flight agile and acrobatic, much as Arctic Jaeger; will chase seabirds from size of Silver Gull to Great-winged Petrel *Pterodroma macroptera* but generally more dependent on tern-like surface-feeding than piracy for food. Often seen resting on sea, singly or in loose flocks, with buoyant carriage, small head on upstretched neck and long wing-points and tail held well up at 45°. Gait on land as Arctic Jaeger but more graceful with small head held high. Normally silent at sea.

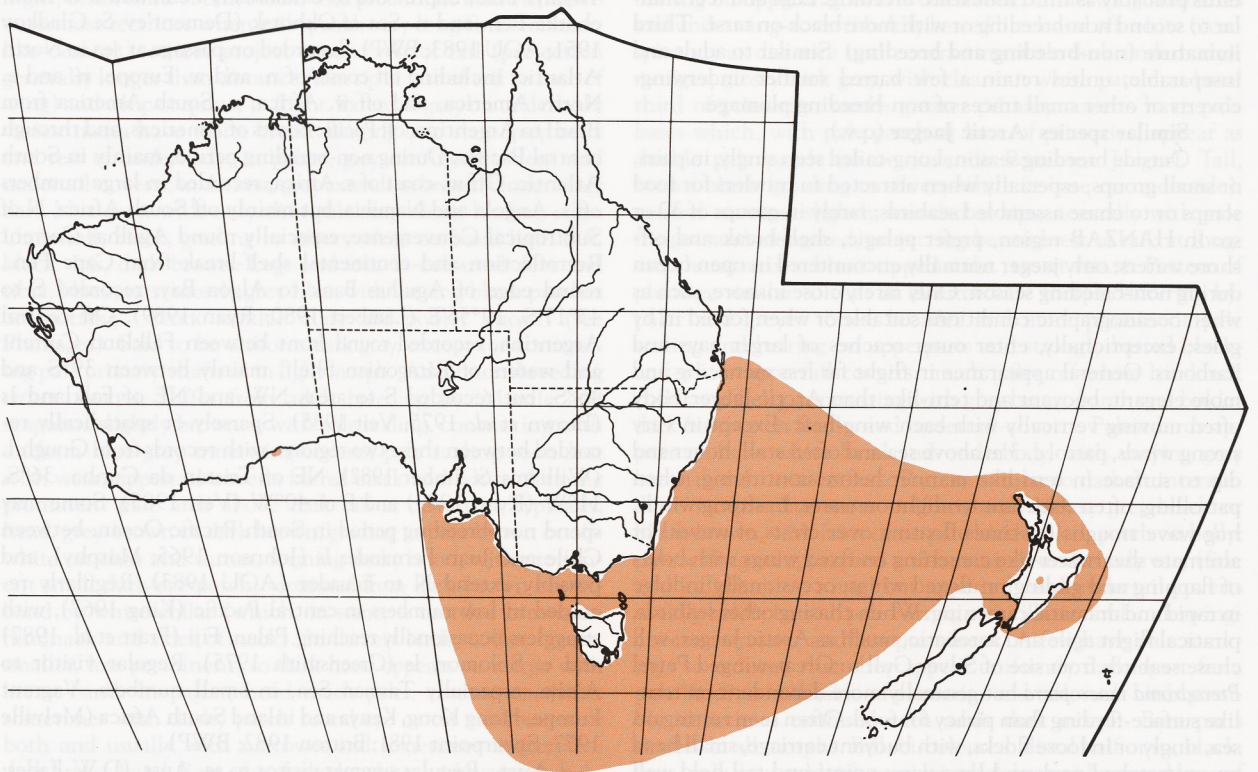
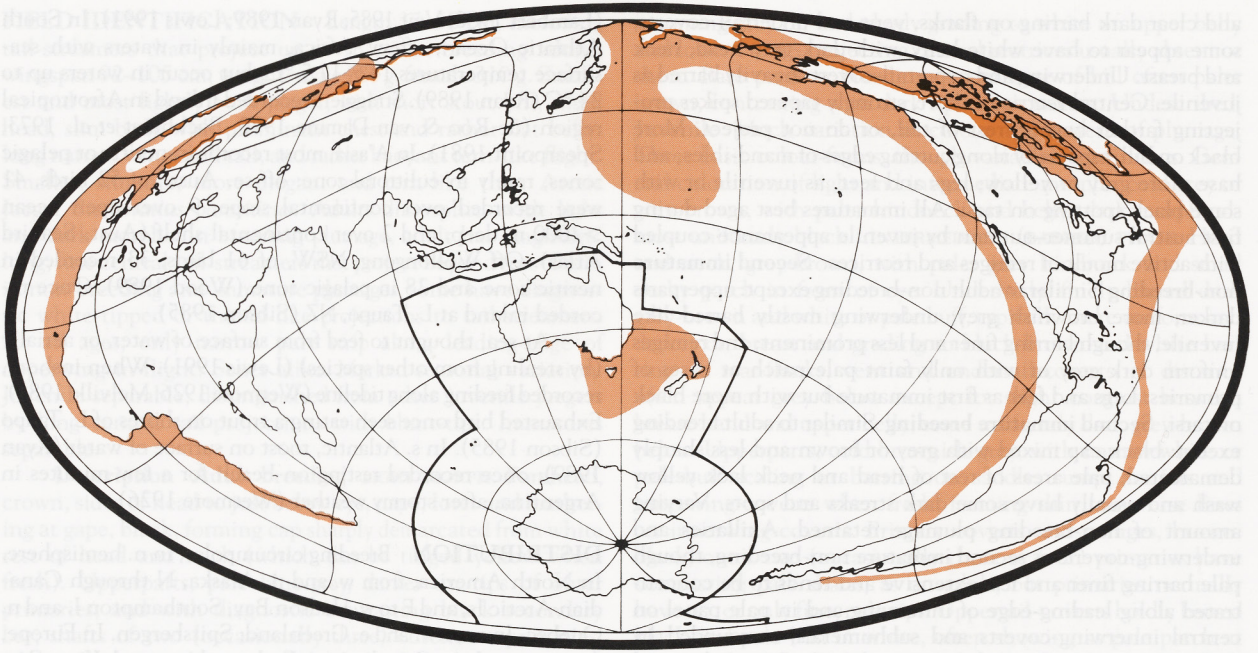
**HABITAT** During non-breeding periods, marine, mostly in offshore and pelagic waters; more rarely inshore, usually after rough weather. In s. hemisphere, mainly over subtropical and subantarctic seas. In main wintering areas, mostly over continental shelf-breaks, along convergent thermal fronts at boundaries of cool ocean currents and warmer coastal water

(Lambert 1980; Veit 1985; Ryan 1989; Lewis 1991). In South Atlantic Ocean, off sw. Africa, mainly in waters with sea-surface temperatures 14.5–17.5 °C, but occur in waters up to 24 °C (Ryan 1989). Stragglers recorded inland in Afrotropical region (de Roo & van Damme 1970; Backhurst *et al.* 1973; Spearpoint 1981). In A'asia, most records in neritic or pelagic zones, rarely in eulittoral zone: off se. Aust., of 52 birds, 41 were recorded over continental slope, 9 over open ocean >2000 m deep, and 2 over continental shelf (Aust. Seabird Atlas). Off Wollongong, NSW, of 61 birds, 33 recorded in neritic zone and 28 in pelagic zone (Wood 1989). Once recorded inland at L. Taupo, NZ (Sibson 1985).

At sea, thought to feed from surface of water, or aerially (by stealing from other species) (Lewis 1991). When inshore, recorded feeding along tideline (Wetmore 1926; Melville 1985). Exhausted bird once seen eating a trout on shores of L. Taupo (Sibson 1985). In s. Atlantic, roost on surface of water (Ryan 1989); once recorded resting on beach for a few minutes in Argentina, after stormy weather (Wetmore 1926).

**DISTRIBUTION** Breeding circumpolar, in n. hemisphere. In North America, from w. and n. Alaska, N through Canadian Arctic Is, and E to w. Hudson Bay, Southampton I. and n. Quebec. In w., nw. and e. Greenland; Spitsbergen. In Europe, from n. and w. Scandinavia, E through coastal Kara Sea, Taymyr Pen., Laptev Sea to Chukotskiy Pen., and S to Kamchatka Pen. and n. Sea of Okhotsk (Dement'ev & Gladkov 1951; AOU 1983; BWP). Recorded on passage at sea in North Atlantic, including off coasts of n. and w. Europe, n. and e. North America, and off w. Africa, e. South America from Brazil to Argentina, off Pacific coasts of Americas, and through central Pacific. During non-breeding period, mainly in South Atlantic. Off w. coast of s. Africa, recorded in large numbers off s. Angola and Namibia, but mainly off South Africa, N of Subtropical Convergence, especially round Agulhas Current Retroflexion and continental shelf-break from Cape Pen., round edge of Agulhas Bank to Algoa Bay; recorded S to 43°17'S, 19°56'E (Lambert 1980; Ryan 1989). Off central Argentina, recorded round front between Falkland Current and waters of Patagonian Shelf, mainly between 39°S and 45°S, but recorded S to areas NW and NE of Falkland Is (Brown *et al.* 1975; Veit 1985). Sparsely or sporadically recorded between these two regions, with records from Gough I. (Williams & Imber 1982), NE of Tristan da Cunha, 36°S, 11°W (Ryan 1989) and E of 40°W (Veit 1985). Some may spend non-breeding period in South Pacific Ocean, between Chile and Juan Fernandez Is (Johnson 1965; Murphy), and possibly extend N to Ecuador (AOU 1983). Regularly recorded in low numbers in central Pacific (King 1967), with stragglers occasionally reaching Palau, Fiji (Pratt *et al.* 1987) and e. Solomon Is (Greensmith 1975). Regular visitor to A'asia, especially Tasman Sea, in small numbers. Vagrant Europe, Hong Kong, Kenya and inland South Africa (Melville 1977; Spearpoint 1981; Britton 1982; BWP).

**Aust.** Regular summer visitor to se. Aust. (D.W. Eades; D.J. James; T. Reid; R.P. Scofield). **Qld** Said to be rare visitor to waters off SE, N to 27°25'S (Storr 1984). Records include: single, off Camel Rock, Stradbroke I., 1 Apr. 1973 (Corben 1973); single, Michaelmas Cay, 1983 (J.L. McKean); two, off C. Moreton, 29 Nov. 1986 (Qld Bird Rep. 1986). Unverified reports: single, off Pt Lookout, 21 Oct. 1984. **NSW** First confirmed record, single bird off Sydney Heads, 24 Mar. 1973 (Lindsey 1974). Subsequently recorded regularly off Ballina, Sydney and Wollongong (Wood 1989; Lewis 1991; Brandis *et*



*al.* 1992; NSW Bird Reps); also observed off Coffs Harbour and Merimbula (Barton 1978; Morris *et al.* 1981). Records of beachcast birds include those found between Brunswick Heads and Byron Bay (NSW Bird Rep. 1974), Ballina (NSW Bird Rep. 1981) and Long Reef (AM). Other unconfirmed records. **Vic., Tas.** Mainly in e. Bass Str., with most records between Gabo and Flinders Is (Barton 1982; Tas. Bird Rep. 14; Vic. Bird Reps 1984, 1985). In Vic., rarely recorded W of Port Phillip Bay: single, s. Port Phillip Bay, 4 Apr. 1965 (Carter

1966); single, S of Port Fairy, 12 May 1980 (Aust. Atlas); singles, off Portland, 15 Feb., 15 Mar. 1987 (Vic. Bird Rep. 1987); several recent sightings off Warnambool and Portland, summer–autumn (M.J. Carter). In Tas., other records include: singles, c. 20 km E of Maria I. (first Tas. record), 3 Nov. 1984 (Tas. Bird Rep. 14); single at shelf off Eaglehawk Neck, 11 Oct. 1992 (Tas. Bird Rep. 22); S of Storm Bay: single, 5 Dec. 1984 (Tas. Bird Rep. 14), three, 5 Nov. 1992, singles, 20 Nov., 20 Dec. 1992 (Tas. Bird Rep. 22); off Blackman's Bay, 30 Apr.

1991 (Tas. Bird Rep. 21). Recent unverified reports off w. coast, Devonport and sw. Tas. spring–summer. Also several records over shelf-break and slope-waters off se. Tas. and S of 45°S between 143°E and 148°E (Tas. Bird Rep. 18; Aust. Seabird Atlas). **SA** First recorded at Robe, 12 Apr. 1971 (Cox 1973). Several records at sea off SE, round 37°S, between 138°E and 139°E (Aust. Seabird Atlas); unverified report of up to 60, widely scattered in slope-waters, 24 Jan.–8 Feb. 1989. **WA** Single, beachcast, Eyre Bird Observatory, 8 Nov. 1994 (WAM). Unverified reports: single, Timor Sea, nw. WA, Apr. 1992; two, W of Fremantle at 32°S, 110°E (just beyond Aust. waters). **NT** Single, Malak, Darwin, Mar. 1983 (H.A.F. Thompson & D.K. Goodfellow).

**NZ** First confirmed record: single, beachcast, Muriwai, 10 Jan. 1964 (Sibson 1967). Earlier records not verified (Melville 1985). Several recorded between Sept. 1981 and Jan. 1982: single, beachcast, East Beach, near Houhara Harbour, 23 Sept. 1981 (Powlesland 1984; Melville 1985; [incorrectly cited as 3 Oct. in Powlesland 1983]); single, Kawatau Spit, L. Taupo, Oct. 1981 (Sibson 1985); two, near Picton, Dec. 1981 (Melville 1985); single, Muriwai, 3 Jan. 1982 (Powlesland 1984; Melville 1985). Minor wreck occurred early 1983 (singles and beachcast unless stated): near Dargaville, 22 Jan. 1983; South Makara Beach, Wellington, 28 Jan. 1983; ten, Ninety Mile Beach, 29–30 Jan. 1983; Muriwai, 4 Feb. 1983; Pekapeka, 12 Feb. 1983; Te Horo Beach, 12 Feb. 1983; Hokio Beach, Levin, 17 Feb. 1983 (Melville 1985). Also up to 13 dead and c. 12 live birds thought to be this species (but identity not confirmed) on beaches from Twilight Beach S to Tikinui, and also at Whangaparoa, Bay of Plenty, during this time (Melville 1985). Subsequent records include single birds, near Three Kings Is, 17 Mar. 1984 (Fennell 1984) and Manawatu, 8 Apr. 1985 (Fennell 1987); two at sea 45°S, 175°W, 11–12 Mar. 1985 (Fennell 1986); single beachcast birds from Auckland West (location unknown) and Otaki Beach, Wellington West, Nov.–Dec. 1988 (Powlesland & Pickard 1992; NZCL).

**Christmas I.** A jaeger found on road, mid-1979, thought to be either Long-tailed or Arctic Jaeger (Stokes *et al.* 1987).

**Lord Howe I.** Said to be rare visitor; recorded sometime between 1975 and 1990 (Hutton 1991).

**Southern Ocean** Regularly occur in small numbers S of Tas. to 47°S and, occasionally farther S (D.W. Eades & T. Reid); most s. record: two, 50°33'S, 142°01'E, 16 Dec. 1994 (T. Reid).

**S. Orkney Is** Possible record from Signy I., Jan. 1966, more likely to have been immature Arctic Jaeger (Rootes 1980).

Major influx in n. NZ in early 1983 coincided with unprecedented numbers off Sydney Heads (NSW Bird Rep. 1983), and records in Qld and NT. First Tas. record in 1984, coincided with many records in e. Bass Str. and e. Tas. (Tas. Bird Rep. 14; Vic. Bird Rep. 1984).

**MOVEMENTS** Migratory but movements poorly known. Breed in Arctic, moving S for boreal winter to non-breeding areas, apparently mainly in s. hemisphere. Breeding areas of birds in HANZAB region not known; most likely e. Russia and Alaska. Usually migrate well offshore, alone or in groups; most oceanic of Stercorariinae (Wetmore 1926; AOU 1983; Furness 1987; Wood 1989; Lewis 1991; BWP). For details of passage through Atlantic Ocean, see BWP.

**Departure** Mainly Aug. and Sept. (Dement'ev & Gladkov

1951; see BWP), though arrive earlier in S in years when breeding unsuccessful (Furness 1987). In Pacific Ocean, regular in small numbers as offshore passage migrant Japan (Orn. Soc. Japan 1974). No large movements recorded in Pacific (Melville 1985), but see Johnson (1965), Tuck & Heinzel (1980), Harrison (1983) and Lewis (1991). Said to move through tropical Pacific, Sept.–Oct.; straggler to Palau (Sept.), Fiji and Solomon Is (Feb.) (King 1967; Greensmith 1975; Pratt *et al.* 1987). In Asia, recorded Thailand (Lekagul & Round 1991), and large migratory movement recorded Lesser Sunda Is, Sept. 1990 (Roseveare & Allen 1991). Said to be rare visitor to waters off se. Qld from Jan. (Storr 1984). Regular to waters of e. Aust., where generally arrive Oct. but some Sept.; highest densities, Jan. (Lewis 1991); rare visitor farther S. Recorded irregularly in NZ, where earliest record late Sept. to early Oct. (see Melville 1985).

**Non-breeding** Pelagic (BWP). Two main wintering areas: off Argentina (Veit 1985) and W and S of s. Africa to Subtropical Convergence (Lambert 1980; Ryan 1989). Movements possibly dispersive in response to availability of food; influx in e. Aust. and wreck in NI, NZ in 1983 occurred when unusual and severe El Niño Southern Oscillation apparently reduced food resources in tropical Pacific (NSW Bird Rep. 1983; Melville 1985; Powlesland 1985). Some high counts near shore associated with strong onshore winds and poor weather appears associated with many records in HANZAB region (e.g. Darwin; McKean 1983).

**Return** Leave e. Aust., Apr.–May (Lewis 1991). Extraliminally, one, Malaysia, May 1986 (see van Balen 1991) and one, Hong Kong, early May 1976, in unusual weather conditions (Melville 1977). Said to pass through tropical Pacific Ocean, Apr.–May (King 1967; Pratt *et al.* 1987). Pass Japan mostly May (Orn. Soc. Japan 1974). Arrive breeding areas, mid-May to mid-June, though timing depends on snow conditions (see Dement'ev & Gladkov 1951; Harrison 1983).

**Breeding** Non-breeders rarely occur S of breeding areas during breeding period (AOU 1983). No records in HANZAB region during winter.

**FOOD** Carnivorous; on breeding grounds, almost entirely rodents, but when these scarce, take plant material, berries, worms, molluscs, crustaceans, spiders, insects, fish, young birds and eggs and carrion (BWP). **Behaviour** Little information for HANZAB region; for extralimital details, see BWP. Observed feeding along tide-line, rising into air then dropping with head down, to pick up unidentified material (Melville 1985). Seen trying to steal food from Great-winged Petrel (D.W. Eades) and Silver Gulls *Larus novaehollandiae*, but did so less than other jaegers (Wood 1989). Recorded taking fish at sea (Witherby *et al.* 1941).

**Adult** No detailed studies in region. Seen feeding on head of trout *Salmo* (Sibson 1985).

**VOICE** No information from HANZAB region. Seldom call away from breeding areas (Peterson 1961). For summary of calls made at breeding grounds, see BWP. Calls said to be higher pitched than those of Pomarine Jaeger (BWP).

**PLUMAGES** Prepared by R.P. Scofield. Fledge and migrate S in varying juvenile plumage; three colour-phases described: dark, light and intermediate. The colour of juvenile plumage not related to colour of adult plumage. Adult plumage said to have dark and light morphs, though dark morph very rare (see Geographical Variation). First attain immature non-breeding

(first basic) plumage in complete post-juvenile (first pre-basic) moult after s. migration. Undergo partial first pre-breeding (pre-alternate) moult to first immature breeding plumage late in first austral summer. Thereafter, moult twice annually in series of immature post-breeding (pre-basic) and pre-breeding (pre-alternate) moults, with gradual transition to adult plumage. Immatures distinguished by barred underwing-coverts. First attain definitive adult breeding plumage in pre-alternate moult, at end of fourth or fifth austral summer; and usually attain definitive adult non-breeding plumage in pre-basic moult at beginning of fifth austral summer. Adults moult twice annually. Subspecies occurring in FANZAB region not known; probably *pallascens*, which is described below.

**Adult breeding** (Definitive alternate). **LIGHT MORPH:** **Head and neck** Forehead, crown, lores, and cheeks below eye, black (89); hindneck, grey (84) with narrow buff (124) half-collar on nape; collar may be orange-buff (153) when fresh. Rest of head and neck, off-white, faintly washed buff (124) or cream (54). **Upperparts** Mantle, scapulars, back, rump and uppertail-coverts, brownish grey (c79). **Tail** Grey-black (82) grading to black (89) at tip; fades to dark brown (219A) with wear. Central rectrices (t1), narrow, elongated, and extend average 180 mm beyond rest of tail (see Structure). Bases of shafts of central rectrices and, often, basal webs, off-white. **Underparts** Mostly off-white. Axillaries, upper flanks, rear of belly, and patch on thigh, brownish grey (80) becoming darker (79) on vent and undertail-coverts; feathers of vent narrowly tipped off-white when fresh. **Underwing** Coverts, brownish grey (c79). Remiges, black-brown (119) with dark-brown (119A) bases to inner webs of p6–p9. Shafts of p9 and p10, off-white, grading to brown (119B) at tip; shafts of rest of primaries, off-white near base grading to brown (119B) then black-brown (119) at tip. **Underwing** Marginal coverts, black-brown (119). Axillaries, subhumeral and subhumeral coverts, uniformly brownish grey (80). Lesser secondary coverts, brownish grey (c79) with narrow paler edges to outer webs of outer row; median secondary coverts, grey (85) with paler edges to outer webs; greater secondary coverts, all primary coverts and remiges, black-brown (119) with slight sheen on outer primaries and, often, off-white shaft to p10.

**Adult non-breeding** (Definitive basic). **LIGHT MORPH:** **Head and neck** Feathers of forehead, crown, lores and cheeks, dark brown (119A) or brownish grey (c79) with white or off-white edges, giving streaked appearance when fresh. Ear-coverts, sides of neck, chin and throat, vary, from mostly off-white with brown (119B) shaft-streaks and subterminal bars on scattered feathers, through to mostly dark-brown (119A) with off-white edges to feathers. Feathers of nape, off-white, with varying orange-buff (153) wash (lost with wear) and broad brown (119B) shaft-streaks. **Upperparts** Mostly dark grey (83) with off-white or pink-buff (121D) fringes to feathers of mantle, back and rump; fringes narrow on back and rump. Uppertail-coverts, boldly barred black-brown (119A) and off-white or buff (124); some have off-white shafts. **Tail** As adult breeding but, while still strongly tapered, t1 much shorter, extending only 40–100 mm. Tip and subterminal spots often marked with off-white or buff (124). **Underparts** Mostly off-white. Chest varies from mostly brownish grey (c79) with white fringes when fresh, to off-white with brown (119B) shaft-streaks and subterminal marks. Axillaries and upper flanks, brownish grey (79). Lower flanks, vent and undertail-coverts varyingly barred with two or three indistinct brown (119B) bars, strongest on thighs, though never as bold as in immatures. **Underwing** Coverts, uniformly dark grey (83). Remiges, black

(89) when fresh. **Underwing** Coverts, uniform dark grey (83). Remiges, grey-black (82).

**Juvenile** Dark, light and intermediate phases described (e.g. Mather 1981; BWP) but nature of variation not well understood. A photo in Olsen (1989: 164) shows a juvenile Long-tailed Jaeger comparable to dark-phase juvenile Arctic Jaeger. Birds in almost complete juvenile plumage seen in A'asia till Dec. **LIGHT PHASE:** Account based on one Aust. specimen and BWP. **Head and neck** Mostly off-white or buff (124) with occasional brown (119B) shaft-streaks most prevalent on crown and forehead. Feathers of lower hindneck have broad brown (119B) subterminal bars. Exceptionally, may have light-rufous (c40) tones on head, similar to those of Arctic Jaeger (see Kaufman 1988) and a varying amount of brown (119B) feathering on lores in front of eye. **Upperparts** Mostly dark brown (119A). Feathers of mantle have incomplete off-white subterminal bars. Feathers of back and rump have off-white fringes and two marginal spots. Uppertail-coverts have 3–6 broad white bars. **Tail** Rectrices, mostly black-brown (119) with off-white or pinkish-buff (121D) tips and varyingly marked with scattered subterminal and marginal spots. Bases of outer two rectrices have large off-white spots or bars; area of white on bases of rectrices increases towards t1, on which basal third normally white. Tips of central rectrices rounded (pointed in immature and adult non-breeding). Undersides of shafts, white. **Underparts** Mostly white, with brown (119B) shaft-streaks to feathers of sides of breast; indistinct brown (119B) barring on flanks, vent and patch on thighs, and strong dark-brown (119A) barring on undertail-coverts. **Underwing** Mostly dark brown (119A) with: white mottling on marginal coverts; off-white tips to greater, median and lesser primary coverts; and white tips and pinkish buff (121D) submarginal spots to tertials and humerals. Rest of remiges, black-brown (119) with off-white shafts to four outer primaries. **Underwing** Greater and median coverts, strongly barred brown (28) and white, barring grading to dark brown (119A) on lesser coverts. Remiges, grey-brown (91), somewhat reflective on outer primaries; shafts, off-white. **DARK PHASE:** Apparently rare in A'asia. **Head and neck** Feathers of forehead, crown, lores, chin, throat and breast, dark brown (119A) with narrow pinkish-buff fringes (121D). Feathers of nape and narrow pinkish-buff half-collar have broad shaft-streaks. **Upperparts, Underparts, Tail** Mostly dark brown (119A) with pinkish-buff (121D) fringes to most contour feathers and rectrices; fringes broadest on rump, uppertail-coverts, lower belly and undertail-coverts. **Wing** As light phase, though pale tips to upperwing-coverts usually pinkish buff (121D). **INTERMEDIATES:** Any intergrade between extremes of Dark and Light Phases.

**First immature non-breeding** (First basic). Like adult non-breeding, except underwing-coverts strongly barred dark brown (119A) and white, like juvenile; juvenile t1 with rounded ends (tail stubs) retained till at least Jan.; may moult central rectrices from Jan. and replacement can take 2–3 months. Those that moult from dark-phase juvenile plumage may have much darker underparts than typical adult non-breeding birds, as proportion of dark immatures observed greater than that of dark-morph adults.

**First immature breeding** (First alternate). Attained at end of first austral summer. Like first immature non-breeding but central rectrices slightly elongated, projecting 36–82 mm beyond rest of tail, and with off-white tips and off-white or pinkish-buff (121D) spots on edges. Basal third of all rectrices often off-white and outer primaries may have pale centres to bases of outer webs.

**Second immature non-breeding** (Second basic). Probably attained from mid- to late austral winter of second calendar year. Like adult non-breeding but with barred underwings and worn, pointed central rectrices; probably indistinguishable from third immature non-breeding (q.v.).

**Second immature breeding** (Second alternate). First attained at end of second austral summer. A mixture of fresh breeding and retained non-breeding plumages. Some may not be separable from third immature breeding (BWP). Like adult breeding except: **Head and neck** Crown, mixture of black (89) and greyish brown (c79). Sides of neck and throat, off-white, with some brown (119B) shaft-streaks. **Upperparts** Mantle and scapulars, greyish brown (c79); some feathers, black (89) with off-white edges and submarginal spots. **Uppertail-coverts** barred brown (119B) and white. **Tail** Central rectrices shorter than in adult breeding (see Measurements). **Underparts** Breast, mostly off-white, with many retained worn brown (119B) or off-white-and-brown feathers. Flanks, vent and undertail-coverts, mixture of fresh brownish-grey (c79) feathers, typical of adult breeding, and worn boldly barred dark-brown (119A) and off-white immature feathers. Belly and vent, off-white, with scattered grey-brown (78) flecks (tips of feathers). **Wing** Lesser and inner greater coverts of underwing, fringed or barred white.

**Third immature non-breeding** (Third basic). Attained in late austral winter and early spring of third calendar year. Poorly known. As second immature non-breeding. May show three generations of body-feathers, as the preceding three moults are all partial; retained first non-breeding feathers in upperwing-coverts would be very worn, but distinguishing feathers from different moults difficult. When beginning moult to immature breeding, likely to show traces of adult-type brownish-grey (c79) feathering.

**Third immature breeding** (Third alternate). Attained at end of third austral summer. Like adult breeding. Occasionally retain some barring on mantle, flanks and underwing-coverts (BWP). One specimen (AIM B 71822) differed from adult breeding only by strong dark-brown (119A)-and-white barring on undertail-coverts. May be separable only by length of fully grown central rectrices, which are shorter than in adult breeding (see Measurements).

**Fourth immature non-breeding** (Fourth basic). Attained at beginning of fourth austral summer. Most probably inseparable from adult non-breeding; a few may retain some juvenile underwing-coverts and axillaries. Birds that appear to be adult non-breeding but have central rectrices (t1) with large amounts of white on bases and large off-white spots on edges and tips may be of this age.

**Fourth immature breeding** (Fourth alternate). Attained at end of fourth austral summer. Probably most like adult breeding. It has been suggested that some individuals may retain immature plumage in their fourth austral summer (BWP). These birds, which would be inseparable from third immature breeding, possibly have shorter central rectrices than birds in adult breeding plumage.

**BARE PARTS** Based on museum labels (three skins from s. hemisphere; AM) and photos (Pringle 1987; *Br. Birds passim*; BWP).

**Adult** Bill, black (89), sometimes with dark olive (c30) or greenish olive (c49) at base. Iris, brown (119B) to black-brown (119). Tibia, toes, webs and soles of feet, black (89); tarsus varies; when breeding, mostly light blue-grey (c81 or 88) with varying amounts of black (89). Extralimitally, 50% of

males and 60% of females have small amounts of black on joints and on sides of tarsi; 25% of males and 12% of females have mostly black tarsus; the rest are intermediate (BWP). In adults, not known whether amount of black on tarsi changes with season or with age. **Juvenile** Bill, grey-blue (c88) with black (89) tip. Iris, black-brown (119). Tarsi, blue-grey (c81 or c88) with some black at joints and sides; soles and distal half of toes and webs, black; proximal half of webs and toes, either pinkish white (c7) or pale blue-grey (c88). **Immatures** Bill and iris like those of adult though may retain pale base of bill in second calendar year. Black on distal half of foot quickly increases to cover rest of foot and then gradually spreads up and down tarsi from joints; amount of black increases with age: in second calendar year covers 0–5% (exceptionally 20%) of tarsi; in third calendar year, 0–20%; in older immatures, 5–80% (BWP).

**MOULTS** Poorly understood, especially in immatures, because pelagic during non-breeding season. Based mainly on BWP, data in Melville (1985) and unpublished field notes (D.W. Eades). **Adult post-breeding** (Pre-basic). Complete; primaries outwards. Head and body, Oct.–Dec.; from early July in failed and non-breeders. May moult some feathers of head before leaving breeding grounds, but most moult of body occurs in wintering areas. Sequence usually crown, neck, mantle, chest, flanks, tail-coverts, rest of head, belly and vent and smaller scapulars. Moult larger scapulars, back, rump, tail and wing, Nov. to late Feb. or Mar. Secondaries probably moult in two series, ascendent and descendent, meeting centrally. Tail, centrifugal or irregular; commonest pattern: t2–t1–t3–t6–t4–t5. **Adult pre-breeding** (Pre-alternate). Partial; mainly Mar.–Apr. Moult head, much of body and central rectrices (t1); do not moult some larger scapulars, and some feathers in centre of back and rump (which can be extremely worn by time of adult post-breeding moult). Central rectrices take 30–40 days to grow fully. An adult in pre-breeding moult in Apr. (photo in Pringle 1987) appeared to have finished moult of back, rump, uppertail and upperwing-coverts, but still moulting head, and central rectrices were only just visible beyond rest of tail. **Post-juvenile** (First pre-basic). Complete; in non-breeding areas. Moult body immediately after arrival, about Oct.–Feb.; primaries and tail, Jan.–June. A bird off s. Aust. in early Feb. appeared to have mostly juvenile plumage, moulting greater primary coverts of underwing, and had just started to moult inner primaries and central rectrices. Another seen on the same day had not yet dropped its central rectrices but had apparently completed moult of all other rectrices (D.W. Eades). **First immature pre-breeding** (First pre-alternate). Do not breed in this plumage. Partial; in late first austral summer. Moult some feathers of head, neck and mantle. **First immature post-breeding** (Second pre-basic). Often partial, retaining some feathers replaced in first pre-alternate. Like adult post-breeding but assumed to start earlier, in austral winter or spring. **Second immature pre-breeding** (Second pre-alternate). Do not breed in this plumage. Partial; like adult pre-breeding but retain some feathers of body and some even may retain worn t1. **Second immature post-breeding** (Third pre-basic). Complete; as adult post-breeding but may start earlier, in mid-June. **Third immature pre-breeding** (Third pre-alternate). Some may breed in this plumage. Partial; as adult pre-breeding but some retain basic plumage on mantle and flanks, and longer undertail-coverts.

**MEASUREMENTS** Subspecies *pallesens*. (1–2) North

America (breeding birds) and s. hemisphere (non-breeding birds), adult, skins; for definition of T6, T1–T6, M–U, Gonys and SNS, see Pomarine Jaeger (AM, MV, NTM, SAM): (1) Adults; (2) Subadults.

| UNSEXED |   |
|---------|---|
| WING    | (1) 311.1 (9.98; 296–329; 11)<br>(2) 280.4 (20.01; 257–311; 7)  |
| TAIL    | (1) 201.5 (40.51; 135–284; 11)<br>(2) 124.1 (15.82; 102–148; 7) |
| T6      | (1) 84.5 (25.29; 27–122; 11)<br>(2) 97.0 (9.12; 79–105; 7)      |
| T1–T6   | (1) 84.5 (25.29; 27–122; 11)<br>(2) 27.1 (18.29; 2–54; 7)       |
| BILL    | (1) 27.5 (2.17; 24.6–31.7; 11)<br>(2) 26.5 (2.03; 24.1–30.8; 8) |
| GONYS   | (1) 9.0 (1.01; 8.0–11.0; 11)<br>(2) 8.7 (0.72; 7.6–9.5; 7)      |
| SNS     | (1) 13.5 (1.79; 10.8–16.3; 11)<br>(2) 12.6 (1.63; 10.6–15.6; 7) |
| TARSUS  | (1) 43.8 (2.08; 40.2–46.7; 11)<br>(2) 41.7 (1.91; 38.9–44.7; 8) |
| TOE     | (1) 37.6 (1.90; 34.7–40.5; 10)<br>(2) 36.9 (1.60; 35.0–40.3; 8) |

Bill and t1 significantly shorter in subadults. For measurements of nominate subspecies and subspecies *palescens* from Greenland see BWP.

(3) S. South America, ages combined (Murphy).

|        | MALES                    | FEMALES             |
|--------|--------------------------|---------------------|
| WING   | (3) 309.1 (295–327; 16)  | 313.3 (305–317; 6)  |
| TAIL   | (3) 299.0 (263–350; 16)  | 295.0 (238–350; 6)  |
| BILL   | (3) 28.6 (27.0–31.5; 16) | 28.8 (27.5–30.0; 6) |
| TARSUS | (3) 41.1 (38.0–44.0; 16) | 41.8 (40.0–42.5; 6) |
| TOE    | (3) 32.7 (31.0–36.5; 16) | 32.5 (31.0–34.5; 6) |

Ratio of length of supra-nasal saddle to length of maxillary unguis: in juveniles, 0.20 (0.019; 0.17–0.23; 6); in immatures, 0.25; and in adults, 0.22 (0.028; 0.17–0.26; 14).

**WEIGHTS** A'asia, museum labels (AM, NTM, WAM): males, 234, 360; beachcast and starving immatures, 178, 207. Two adults (4+) from s. Brazil weighed 236 and 218 (Vooren & Chiaradia 1989). In n. Alaska, breeding adults: males 280 (31.1; 236–343; 26); females 313 (31.4; 258–358; 18) (Maher 1974). When breeding, females significantly heavier than males; see Furness (1989) for discussion.

**STRUCTURE** Wing, long, narrow and sharply pointed when compared with that of Arctic and Pomarine Jaegers; width of wing between carpal joint and longest tertial, about one-third length of wing. Eleven primaries; extralimitally: p10 longest; in adult, p9 12–17 mm shorter, p8 24–35; p7 48–62; p1 170–185; in juvenile, p9 2–10 mm shorter, p8 15–30, p7 35–52, p1 155–185; may fledge with p10 shorter than p9 (AM O46181); p11 minute and hidden by primary coverts (BWP; lengths of other primaries not given); no Aust. data because specimens in moult. Tips of primaries of immatures and adults, rounded. Tips of outer primaries of juveniles said to be rounded (cf. slightly pointed in Arctic Jaeger) (Walter 1962). However, no marked differences between freshly fledged Arctic and Long-tailed Jaegers examined (though BWP [*contra* Walter

1962] states that pointed tips to feathers occur only in barred- and dark-phase juvenile Arctic Jaeger, none of which were available for examination). Seventeen secondaries, including four tertials. Twelve rectrices; tail slightly rounded, with t2 longer (5–16 mm) than t6 and sometimes slightly elongated. T1 elongated in adult breeding, becoming thread-like with wear; left and right t1 often unequal in length; greatly reduced in adult non-breeding. Length of t1 increases with age (see Arctic Jaeger: Recognition, Table 2); in juveniles, project 18–32 mm and only slightly elongate, with rounded tips (cf. Arctic Jaeger which always has obtuse point). Bill, slighter and shorter than that of Arctic Jaeger. Ratio of length of bill to length of maxillary unguis decreases with age (see Arctic Jaeger: Recognition, Table 1). In adult breeding, tips of feathers of neck and sides of head not pointed (cf. Arctic and Pomarine Jaegers). Tarsus and toes, short and broad; scutellate. Front three toes, fully webbed, with cancellate texture. Nails, sharp, decurved; outer toe c. 86% of middle; inner c. 74%; hind c. 27%.

**RECOGNITION** See Arctic Jaeger.

**SEXING** Breeding females have longer wings and weigh more than males (BWP); females generally slightly darker than males (Manning 1964).

**GEOGRAPHICAL VARIATION** Not fully known. Two subspecies recognized (e.g. BWP). Subspecies *palescens* described above (Løppenthin 1932, 1943; Salomonsen 1950; Dement'ev & Gladkov 1951; Manning 1964). Nominote *longicaudus* differs by darker underparts (Løppenthin 1932; Salmonson 1950). Intermediates said to occur in lower Indigirka area and Novosibirskiy Ostrova (Dement'ev & Gladkov 1951). Validity of subspecies *palescens* questioned (e.g. Bird & Bird 1941; Walter 1962). Walter (1962) found that specimens from n. North America had underparts similar to those from Scandinavia and one-third of birds from Greenland could not be separated from those from Scandinavia. Furthermore, a large series from Svalbard are intermediate in character between Greenland and Scandinavia (Walter 1962: Figs 1,2).

**Morphs** Dark-morph adults very rare and may just be aberrant melanistic birds or extremely dark juveniles that cannot be separated from adults (Salomonsen 1950; photos: Olsen 1989: 164; Olsen 1992: 96, no. 66). Reported only from Greenland (Furness 1987; BWP [*contra* Salomonsen 1950]), se. South America (Veit 1985; Vooren & Chiaradia 1989) and, possibly, St Lawrence I., Alaska (MVZ 66430; Brooks 1939) (Alaskan specimen possibly not adult as it was moulting in late July). Only two of 400 seen by Veit (1985) were considered dark morph.

No skins of dark morph available for study. Plumage apparently entirely uniform brownish grey (c79) except for off-white shafts of p9 and p10; rest of primary-shafts assumed to grade from black-brown (119) at tip through brown (119B) to off-white near base, extent of white increasing outward (Veit 1985; BWP). A specimen from Brazil described as 'entirely dark except for faint white barring on the flanks and undertail-coverts, and the belly feathers have greyish white tips ... feet and tarsi are entirely black' (Vooren & Chiaradia 1989). However, identification of specimen as adult based on incorrect assumption that only older adults have all-dark legs (cf. BWP); also, colour of legs fades rapidly to black after death. The description more typical of immature or dark-phase juvenile (though the central rectrices and colour of the

bill unfortunately not described). One bird from South America described as 'entirely dark save for a creamy facial streak that outlined the base of the blackish cap' (Veit 1985).

Dark morphs not definitely recorded HANZAB region; possible A'asian records from Feb. (D.W. Eades, C. Corben; unpubl. photos: M.J. Carter, D.W. Eades). However, it is possible that these may have been adults undergoing early pre-breeding moult, showing unusually dark-grey (c79) belly and vent, and retaining dark breast-band, flanks and patch on thigh from non-breeding plumage, and thus appearing uniformly dark below, or nearly so.

## REFERENCES

- AOU. 1983. *Check-list of North American Birds*. Am. Orn. Union, Lawrence, Kansas.
- Backhurst, G.C., et al. 1973. *J. E. Africa Nat. Hist. Soc. & Nat. Mus.* 140: 1–38.
- Barton, D. 1978. *A'asian Seabird Grp Newsl.* 10: 14–19.
- 1982. *Emu* 82: 56–9.
- Bird, C.G., & E.G. Bird. 1941. *Ibis* 14: 118–61.
- Brandis, C.C.P., et al. 1992. *Aust. Bird Watcher* 14: 165–79.
- Britton, P.L. 1982. *Cormorant* 10: 116.
- Brooks, A. 1939. *Ibis* (14) 3: 324–8.
- Brown, R.G.B., et al. 1975. *Ibis* 117: 339–56.
- Carter, M.J. 1966. *Emu* 66: 69–70.
- Corben, C. 1973. *Sunbird* 4: 54–5.
- Cox, J.B. 1973. *S. Aust. Orn.* 26: 85–6.
- de Roo, A., & B. van Damme. 1970. *Rev. Zool. Bot. Afr.* 82: 157–62.
- Dement'ev, G.P., & N.A. Gladkov (Eds) 1951. *Birds of the Soviet Union*. 3. Israel Prog. Scient. Transl., Jerusalem (1969).
- Fennell, J.F.M. 1984. *OSNZ News* 32: 3.
- 1986. *OSNZ News* 39: 3.
- 1987. *OSNZ News* 43: 3–4.
- Furness, R.W. 1987. *The Skuas*. Poyser, Calton, England.
- Greensmith, A. 1975. *Sunbird* 6: 77–89.
- Harrison, P. 1983. *Seabirds: An Identification Guide*. Croom Helm, Sydney.
- Hutton, I. 1991. *Birds of Lord Howe Island Past and Present*. Author, Coff's Harbour, NSW.
- Johnson, A.W. 1965. *The Birds of Chile and Adjacent Regions of Argentina, Bolivia and Peru*. 1. Platt Establecimientos Gráficos, Buenos Aires.
- Kaufman, K. 1988. *Birding* 20: 159–62.
- King, W.B. 1967. *Seabirds of the Tropical Pacific Ocean*. Smithsonian Inst., Washington D.C.
- Lambert, K. 1980. *Bietr. Vogelkd.* 26: 199–212.
- Lekagul, B., & P.D. Round. 1991. *Birds of Thailand*. Saha Karn Bhaet, Bangkok.
- Lewis, M. 1991. *Aust. Bird Watcher* 14: 119–22.
- Lindsey, T. 1974. *Aust. Birds* 9: 31–2.
- Løppenthin, B. 1932. *Meddel. om Grønland* 91: 1–127.
- 1943. *Meddel. om Grønland* 131 (12): 1–12.
- Maher, W.J. 1974. *Pac. Coast Avifauna* 37: 1–148.
- Manning, T.H. 1964. *Biol. Pap. Univ. Alaska* 7: 1–16.
- Mather, J.R. 1981. *Br. Birds* 74: 257–9.
- McKean, J.L. 1983. *Ranger Rev.* May 1983: 2.
- Melville, D.S. 1977. *Bull. Br. Orn. Club* 97: 34–7.
- 1985. *Notornis* 32: 51–73.
- Morris, A.K., et al. 1981. *Handlist of Birds in New South Wales*. NSW Field Orn. Club, Sydney.
- Olsen, K.M. 1989. *Br. Birds* 82: 143–76.
- 1992. *Jagers*. GMB Uitgeverij, Haarlem.
- Orn. Soc. Japan. 1974. *Check-list of Japanese Birds*. Gakken, Tokyo.
- Peterson, R.T. 1961. *A Field Guide To Western Birds*. Houghton Mifflin, Boston.
- Powlesland, R.G. 1983. *Notornis* 30: 125–35.
- 1984. *Notornis* 31: 155–71.
- 1985. *Notornis* 32: 23–41.
- , & C.R. Pickard. 1992. *Notornis* 39: 27–46.
- Pratt, H.D., et al. 1987. *A Field Guide to the Birds of Hawaii and the Tropical Pacific*. Princeton Univ. Press, Princeton.
- Pringle, J.D. 1987. *The Shorebirds of Australia*. Angus & Robertson, Sydney.
- Rootes, D.M. 1980. *Br. Antarct. Surv. Bull.* 80: 87–119.
- Roseveare, P., & T. Allen. 1991. *Kukila* 5: 151.
- Ryan, P.G. 1989. *Ostrich* 60: 89–90.
- Salomonsen, F. 1950. *Grønlands Fugle. The Birds of Greenland*. Munksgaard, Copenhagen.
- Sibson, R.B. 1967. *Notornis* 14: 79–81.
- 1985. *Notornis* 32: 108.
- Spearpoint, J.A. 1981. *Cormorant* 9: 45.
- Stokes, T., et al. 1987. *Aust. Bird Watcher* 12: 1–7.
- Storr, G.M. 1984. *Rec. West. Aust. Mus. Suppl.* 19.
- Tuck, G., & H. Heinzel. 1980. *Seabirds*. Collins, Sydney.
- van Balen, S. 1991. *Kukila* 5: 117–24.
- Veit, R.R. 1985. *Am. Birds* 39: 873–8.
- Vooren, C.M., & A. Chiaradia. 1989. *Ardea* 77: 233–5.
- Walter, H. 1962. *J. Orn., Lpz.* 103: 166–79.
- Wetmore, A. 1926. *Smithson. Inst. US nat. Mus. Bull.* 133: 434.
- Williams, A.J., & M.J. Imber. 1982. *S. Afr. T. Antarkt. Nav.* 12: 40–5.
- Witherby, H.F., et al. 1941. *The Handbook of British Birds*. 5. Witherby, Lond.
- Wood, K.A. 1989. *Corella* 13: 97–104.



Volume 3, Plate 24

Great Skua *Catharacta skua* (page 388)

1 Adult on breeding grounds, austral summer; 2 Downy young; 3 Juvenile

South Polar Skua *Catharacta maccormicki* (page 412)

4 Adult pale morph, in worn plumage at breeding grounds, austral summer; 5 Adult dark morph, in fresh plumage at breeding grounds, austral summer; 6 Downy young; 7 Juvenile

Pomarine Jaeger *Stercorarius pomarinus* (page 438)

8 Adult female breeding, light morph; 9 Juvenile, intermediate phase

Arctic Jaeger *Stercorarius parasiticus* (page 448)

10 Adult breeding, light morph; 11 Juvenile, intermediate phase

Long-tailed Jaeger *Stercorarius longicaudus* (page 459)

12 Adult breeding, light morph; 13 Juvenile, intermediate phase





BRETT JARRETT

Volume 3, Plate 26

Pomarine Jaeger *Stercorarius pomarinus* (page 438)

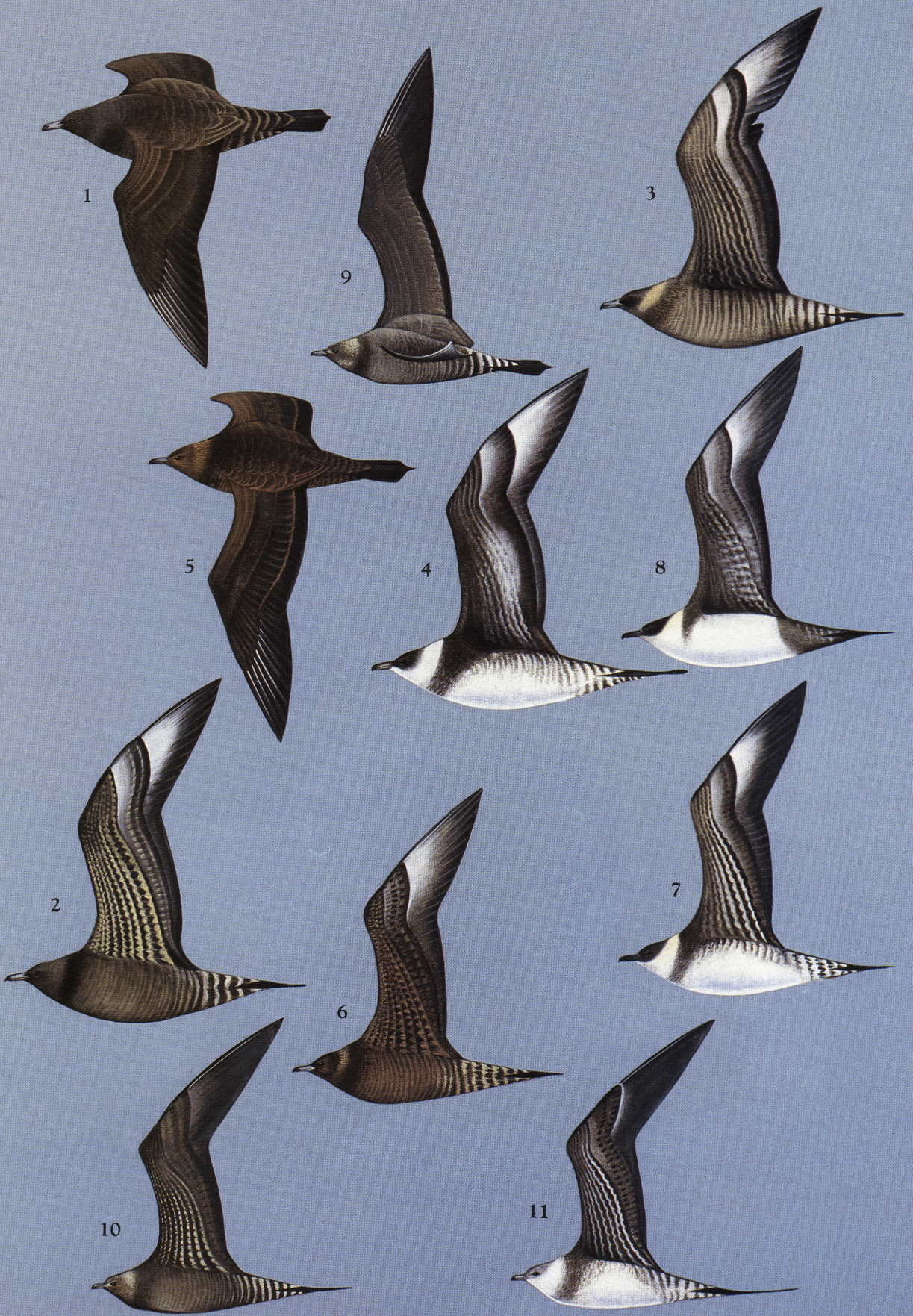
1, 2 Adult male breeding, light morph; 3, 4 Adult non-breeding, light morph; 5, 6 Adult breeding, dark morph

Arctic Jaeger *Stercorarius parasiticus* (page 448)

7, 8 Adult breeding, light morph; 9, 10 Adult non-breeding, light morph; 11, 12 Adult breeding, dark morph

Long-tailed Jaeger *Stercorarius longicaudus* (page 459)

13, 14 Adult breeding, light morph; 15, 16 Adult non-breeding, light morph



BRETT JARRETT

Volume 3, Plate 27

Pomarine Jaeger *Stercorarius pomarinus* (page 438)

1, 2 Juvenile, intermediate phase; 3, 4 Juvenile, light phase, in early stage of moult to first immature non-breeding, first austral summer-autumn; 4 Third immature non-breeding, light morph

Arctic Jaeger *Stercorarius parasiticus* (page 448)

5, 6 Juvenile, intermediate phase; 7 Second immature breeding, light morph; 8 Third immature breeding, light morph

Long-tailed Jaeger *Stercorarius longicaudus* (page 459)

9, 10 Juvenile, intermediate phase; 11 Second immature non-breeding, light morph