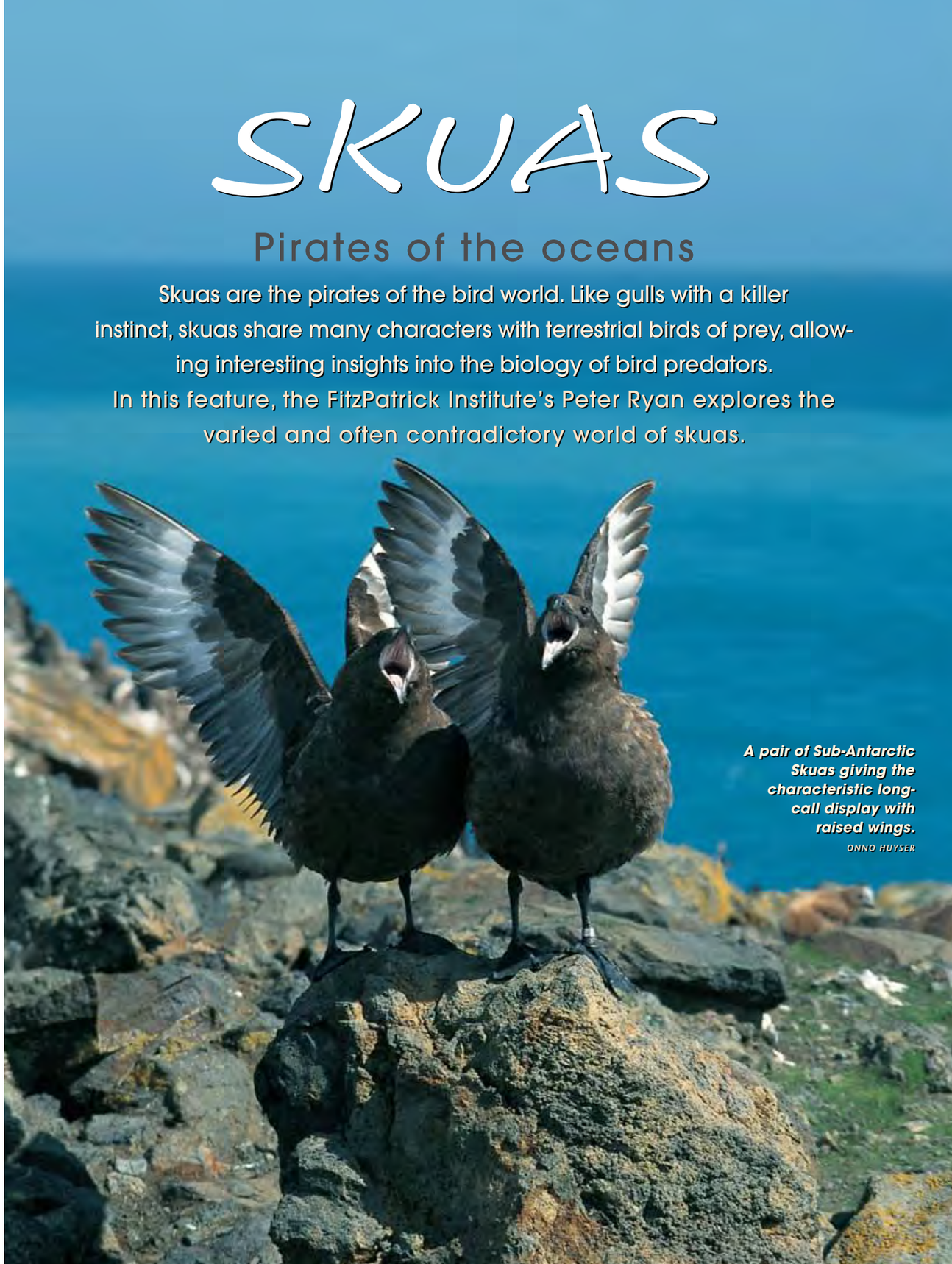
SKUAS

Pirates of the oceans

Skuas are the pirates of the bird world. Like gulls with a killer instinct, skuas share many characters with terrestrial birds of prey, allowing interesting insights into the biology of bird predators.
In this feature, the FitzPatrick Institute's Peter Ryan explores the varied and often contradictory world of skuas.



A pair of Sub-Antarctic Skuas giving the characteristic long-call display with raised wings.

ONNO HUYSER

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WARWICK TARBOTON

Above *A pair of Sub-Antarctic Skuas sitting peacefully next to a dozing Chinstrap Penguin* **Pygoscelis antarctica**, *but other birds have to watch out when skuas are around, or they may find themselves losing a meal, their eggs and chicks, or even their lives.*
Above right *An intermediate phase Arctic Skua in flight, showing the much more slender build and elongate central tail feather, characteristic of* **Stercorarius**.

There are few more stirring sights than the rakish silhouette of a skua approaching a flock of terns, accelerating with deep, effortless wingbeats. Your pulse quickens as the skua pursues its victim relentlessly until the tern is forced to regurgitate, and the skua swoops to grab the bolus of food in the air. Skuas are masters of aerial pursuit, and their dogfights have captured the imagination of birders around the world. But in Africa we only see these remarkable birds during the non-breeding season. To understand skuas you have to travel to their breeding grounds, almost literally at the ends of the earth.

The skuas are a small family, closely related to the gulls. The consensus is to recognize seven species in two genera, but this is controversial. Three small species in the genus *Stercorarius* (namely, the Pomarine, Arctic and Long-tailed skuas) breed on the Arctic tundra or, in the case of some Arctic Skuas, in association with northern seabird breeding colonies. After breeding they migrate south to winter in the southern hemisphere. An exception is the Pomarine Skua, which has a more northerly wintering range, with many remaining in the tropics.

By comparison, the four large skuas in the genus *Catharacta* (South Polar, Sub-Antarctic, Great, and Chilean) tend to have a southerly distribution. Three species breed around the coast of Antarctica, southern South America and at sub-Antarctic islands. Only the Great Skua breeds in the northern hemisphere, where it is restricted to the north-east Atlantic. All four species tend to disperse towards warmer areas during the winter non-breeding season, but only the most southerly breeding species, the South Polar Skua, migrates across the equator. It competes with the Arctic Tern *Sterna paradisaea* for the longest migratory range, with a bird ringed as a chick on the Antarctic Peninsula being recovered six months later north of the Arctic Circle. The South Polar Skua also is remarkable for being the only vertebrate other than man known to visit the South Pole. It breeds in association with Snow *Pagodroma nivea* and Antarctic Petrel *Thalassoica antarctica* colonies, south to almost 80 ˚S. ▷

PETER STEYN

Above *Sub-Antarctic Skua pairs often hunt co-operatively, and help each other tear up large prey items, such as the remains of this bird.*

COLIN PATERSON-JONES

ONNO HUYSER

Above *A pair of Sub-Antarctic Skuas at their nest site on a rare clear day at Bouvet Island.*

ONE GENUS OR TWO?

Historically there was much confusion regarding skua taxonomy, partly because of the range of plumages, and partly because of regional variation within the large skuas. Most authorities accept two genera, but there is debate about the Pomarine Skua, which is somewhat intermediate between the small *Stercorarius* (termed jaegers in America) and the larger *Catharacta* skuas. More contentious has been the status of the various forms of large skuas, which are rather similar and have been combined in various ways. Researcher Bob Furness has suggested that the Great Skua is a recent colonist of the North Atlantic, resulting in speculation as to which of the three southern species was its most likely ancestor. However, this argument has been confounded by recent genetic evidence which shows that the three southern species of *Catharacta* are more closely related to each other than they are to the Great Skua.

More surprising is the finding that the Pomarine Skua is very similar genetically to the Great Skua, much more so than it is to either of the other small skuas. This is based on looking at genes carried in mitochondria, which are inherited solely from the female parent. Either Pomarine Skuas coincidentally resemble the other *Stercorarius* skuas, or the species has arisen from a hybrid between a female Great Skua and a male Arctic or Long-tailed Skua. The latter explanation accounts for the mosaic of characters exhibited by Pomarine Skuas. Although they closely resemble the small skuas, including having the diagnostic barred juvenile plumage found only among *Stercorarius*, detailed analysis of their morphology suggests they are closer to the large skuas, and they share the wing-raising display with the large skuas.

Despite this confusion, seven species currently are accepted. All but the Chilean Skua occur at sea off Africa.

NIGEL ADAMS

Above *Sub-Antartic Skuas have extremely catholic diets, including carrion such as this young penguin. At the breeding islands they are displaced from carcasses by the larger giant petrels,* Macronectes *spp.*

Specialist generalists

Skuas differ from gulls in a number of ways. Perhaps the most remarkable differences are the larger size of females and the presence of pale and dark plumage varieties independent of age or sex. Both these features are unusual among birds, but are found in other birds of prey, which suggests that skuas evolved these characters in response to their predatory lifestyle (see box, page 63). Other adaptations to a life of skulduggery and piracy include a powerful bill for tearing flesh, and long, recurved claws. Also, relative to gulls, skuas have larger, more efficient flight muscles and longer primaries to allow them to accelerate rapidly – useful when chasing other birds.

Skuas are renowned for kleptoparasitism – stealing food from other birds. They are arguably the bird world's greatest pirates. Frigatebirds, the other contenders for the piracy crown, are certainly efficient at robbing boobies, but stealing is relatively unimportant in their diet, and their morphology has evolved to grab flying fish out of the air.

However, not all skuas live by piracy. Small skuas breeding on the Arctic tundra feed mostly on lemmings and other rodents, as well as birds, insects, berries and carrion. Only Arctic Skuas breeding in association with seabird colonies rely on piracy to feed their chicks. During the non-breeding season, Arctic and Pomarine skuas parasitize seabirds in coastal waters, although Pomarines are not averse to snacking on the odd phalarope or other small bird. By comparison, Long-tailed Skuas occur far offshore and have seldom been seen stealing food from other birds.

The large skuas use a wide array of feeding techniques. Some Great Skuas kleptoparasitize Northern Gannets *Sula bassana* and other seabirds, but few of the other large skuas indulge in piracy during the breeding season. Fish are important in the diets of some, notably South Polar and Great skuas. Other birds steal eggs and chicks from penguins and other seabirds, or compete with giant petrels *Macronectes* for carrion.

However, the most impressive foraging behaviour is the predation of burrowing petrels and other seabirds. On the breeding grounds Sub-Antarctic Skuas are every bit as dashing as falcons, pursuing petrels in high-speed chases where the goal is more than just robbing the petrel of its last meal. But most petrels are killed at night on the ground, pounced on as they stumble to and from their burrows. Skuas also dig up burrows to reach petrels, often showing considerable perseverance as they wrestle for up to an hour to clear roots and other debris from nest entrances.

Ironically, away from its breeding grounds the highly pugnacious Sub-Antarctic Skua seldom hassles other birds, feeding largely for itself, and often scavenging at fishing vessels. By comparison, the South Polar Skua, which is generally less aggressive than the Sub-Antarctic Skua where the two species breed together, undergoes a Jekyll and Hyde transformation. During the non-breeding season it becomes a fearless pirate, even tackling the largest of all flying seabirds, the Wandering Albatross *Diomedea exulans*. I vividly recall the bewilderment of a Wanderer tumbling out of the sky with a South Polar Skua gripping firmly onto its tail, in an unlikely David and Goliath rematch.

Although most birds hunt singly, pairs team up to kill birds almost the same size as themselves, such as White-chinned Petrels *Procellaria aequinoctialis*. Other pairs work together to steal eggs and chicks from large, surface-nesting birds such as penguins and albatrosses. One bird distracts the guarding parent while the other raids the nest. Small prey, such as storm petrels, are swallowed whole, but larger birds are torn apart. Skuas don't use their feet to hold prey, complicating the handling of large prey. Pairs often combine to tear up food items, and newly hatched skua chicks may starve if one parent dies, leaving the other incapable of reducing the meal into bite-sized pieces for the chicks.

One characteristic of skua diet is the considerable variation between individuals. They are supreme opportunists, willing to try any new gastronomic possibilities, even bars of soap left out by unwary visitors! Once an individual finds a successful foraging technique, it may exploit it to the virtual exclusion of other methods, often destroying the resource base. Single birds have been recorded to cause the breeding failure of entire seabird colonies by developing a particularly effective new foraging technique. Such methods can also spread through the population because, like gulls, skuas have the ability to learn new behaviours.

Skua home life

Like almost all seabirds, skuas breed in the same area and tend to retain the same mate in successive years. The only exception is the Pomarine Skua, which is nomadic, moving around to breed where lemmings are abundant. Males arrive on the breeding grounds first, and re-establish their territory. When the female arrives, she is initially rebuffed, but after a few days the pair bond is reaffirmed, and she joins the male in territory defence.

Breeding skuas are intensely territorial. Often there are many more potential breeders than available territories. For example, Inaccessible Island in the Tristan group supports fewer than 25 breeding pairs out of a population of several hundred skuas. The unsuccessful birds gather in large 'clubs' – often more than 100 strong – on the periphery of the breeding area. From here, unpaired birds fly sorties over the breeding territories looking for vacancies. In a somewhat callous experiment on Gough Island, researcher Bob Furness removed one member of a pair from a territory each night for 10 successive nights. In each case, the bird was replaced within a few hours the next day by a new recruit from the club, irrespective of the sex of the bird removed.

Although monogamy is the rule, some birds, notably certain populations of Sub-Antarctic Skuas, form breeding groups. These almost invariably involve one female and two or more males, and may be stable for several years. The exact reason why some birds opt for a group breeding strategy is unclear, but it doesn't appear to be related to a problem with feeding the chicks: pairs have the same or slightly better breeding success than groups. Nor is it a case of groups of related birds working together: generally the males involved are not closely related. Intriguingly, there is no strict hierarchy in terms of access to the female, with all males copulating and fathering offspring.

Once the pair bond is established, the female becomes almost totally reliant on the male for food. She remains on the territory and begs for food, inducing the male to regurgitate. When faced with a begging female, males have the choice between regurgitating or soliciting copulation. Perhaps not surprisingly, the appropriate response is to feed the female when her begging is especially vociferous!

All skuas nest on the ground, selecting a level area which is often slightly raised to afford all-round visibility. Both sexes contribute to building the nest scrape, which tends to be rather rudimentary. The clutch size is almost invariably two eggs. Skuas can only successfully incubate two eggs at a time; adding a third egg results in all three failing to hatch. This is because skuas have rather small brood patches, and they incubate their eggs on their feet to supplement the meagre insulation provided by the nest scrape. The eggs are laid generally two days apart and, since incubation starts with the laying of the first egg, the chicks hatch within a day or so of each other.

Both sexes incubate, although the female spends more time on the eggs than the male, who does most of the foraging. One curious aspect of skua incubation is that they appear to have lost the innate behaviour found in gulls to retrieve eggs that roll out of the nest. Displaced eggs are ignored, which may account for the preference to nest on flat ground! The chicks hatch with a thick layer of down, but are closely guarded for the first few days. The first-hatched chick, being larger, gains preferential access to food and actively excludes the younger sibling from the nest. Like many birds of prey, it may even kill its sibling. This strategy ensures that at least one chick survives when food is scarce, although generally both chicks survive to fledging.

Skuas defend their offspring pugnaciously, dive-bombing intruders to

Below *An endearing Sub-Antarctic Skua chick with its well-developed legs which allow it to run and hide when threatened.*

ONNO HUYSER

the territory, be they foxes, humans or sheep. The ferocity of these attacks varies between birds and with the stage of the breeding season, peaking shortly after the eggs hatch. Interestingly, Sub-Antarctic Skuas breeding on predator-free Sub-Antarctic islands show the same behaviour, although they only become aggressive towards the end of the incubation period. This mobbing behaviour is effective, as anyone who has searched for skua chicks can attest. The birds dive-bomb you from behind, often striking you on the head with their feet. Should you choose to ignore this warning, Sub-Antarctic Skuas will even land on your head and try to pull out beaksful of hair!

The small skuas are especially good at synchronizing their attacks, so that as one bird whizzes over your head, the other is lining up for its next pass. However, if this measure fails, Arctic Skuas are unique among skuas, gulls and terns in also having a 'broken wing' distraction display to lure away particularly persistent predators such as Arctic foxes.

Once the chicks fledge, they disperse and, in the case of long-distance migrants, many don't return to the breeding grounds until they are two years old. Some individuals start breeding as early as one to two years of age, but most take considerably longer, especially in areas where competition for territories is intense. Adult survival is fairly high: some 90 per cent return to the breeding grounds each year. The longest lived individual known from ringing studies is a 34-year-old Great Skua from Shetland.

In the past, skuas breeding in areas frequented by man were exploited for food and persecuted because they occasionally attack livestock, but fortunately such practices have largely ceased. One threat skuas face currently is another consequence of their predatory lifestyle: like terrestrial birds of prey, skuas tend to accumulate high levels of pollutants, such as PCBs and DDT derivatives, that are concentrated through food chains. Another problem is that changes in fishing practices, notably the reduction in waste dumping, is reducing this food source for skuas and other seabirds. In Europe there is concern that this is causing Great Skuas to increase their predation on other seabirds. On the whole, though, the remote areas where skuas breed and their pelagic existence when away from the breeding grounds, should ensure the survival of this fascinating family of ocean pirates. □

Below *A Sub-Antarctic Skua giving the long-call display with raised wings.*

NIGEL ADAMS

CONVERGENCE WITH RAPTORS

Large females and plumage polymorphism

JIM ENTICOTT

Above *A rather dark pale-phase South Polar Skua on the Antarctic ice. This is the only* **Catharacta** *species to show well marked plumage polymorphism. The pale phase is readily distinguished from other* **Catharacta** *skuas, but the dark phases pose serious identification problems.*

In most birds the male is the larger sex, presumably because sexual selection favours larger males in the competition for mates. Skuas are unusual in that females average 10–15 per cent heavier and some three per cent larger than males. They share this 'reverse size dimorphism' with *inter alia* frigatebirds, owls and raptors, which suggests that it is a characteristic of a predatory lifestyle. It has been argued that smaller males are favoured because of the extensive use of aerial chases and displays in skua territoriality. Smaller birds are more agile, and can outcompete larger males in the air. There is some validity to this argument; male skuas have proportionately longer tails than females, enhancing their aerial abilities. However, it doesn't explain reverse dimorphism among owls, which are not renowned for aerial displays!

Behavioural differences during breeding provide a more plausible explanation for the larger size of females. Among skuas and other predators, the female undertakes most of the care and guarding of the eggs and chicks, while the male does most of the hunting. Large size in females has been favoured to afford maximum protection at the nest, especially in species where nest-robbing by adjacent territory holders is not unknown.

The other unusual character found in skuas and many raptors is plumage polymorphism – the presence of a number of plumage types irrespective of age or sex. One possible explanation for this feature is that prey species learn to recognize predators. Colour morphs make life harder for prey species, and favour the persistence of rare varieties in the predator population by enhancing their feeding success. Among small owls, polymorphism may reduce detection during the day, when they are subject to mobbing and predation.

Pale and dark forms are found in the small *Stercorarius* skuas, although dark morphs are rare among Pomarine and especially Long-tailed Skuas. Pale and dark forms also occur in South Polar Skuas, and there are at least vestiges of polymorphism among some of the other large skuas.

Is there evidence to support the idea that polymorphism enhances feeding success? The generally dark plumage of skuas (relative to gulls and many other seabirds) is suggested to be a form of aggressive camouflage, allowing skuas to sneak up on potential victims. Among colonies of Arctic Skuas that feed almost exclusively by robbing other seabirds, dark birds are preferred as mates and are the most common form. However, they do not have a higher attack success rate than pale birds, presumably because many prey species fail to recognize the threat posed by the much rarer pale-morph skuas. Interestingly, dark-morph Arctic Skuas become increasingly rare farther north, corresponding with a switch from bird to mammal prey.

Colour variation in skuas is thought to result from switching in a single gene. However, males tend to have a higher proportion of dark individuals than females, suggesting that additional factors may play a role. □

Below *A dark-morph Arctic Skua on its nest. Plumage polymorphism has been studied extensively in this species, which shows geographic and sexual differences in the frequency of colour phases.*

PETER STEYN