

# The history of the discovery of emperor penguin colonies, 1902–2004

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**ABSTRACT.** This article summarises the history of the discovery of emperor penguin *Aptenodytes forsteri* colonies. Emperor penguins were probably first seen on James Cook's second voyage (1773–1775) but were not recorded as a separate species until 1844. The first breeding colony of these birds was found in 1902 and a further 32 were sighted over the next century. The total number of colonies is still unknown but today satellite technology is aiding the process of discovery.

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## Introduction

The first sighting of emperor penguins *Aptenodytes forsteri* has been ascribed to Johann Reinhold Forster, the naturalist on James Cook's second voyage (1773–1775). In 1773 and 1774, when Cook turned his ship to search for a southern continent, he reached latitudes at which emperor penguins could have been, and probably were, seen. However, Forster did not realise that he had found a new species but rather thought them to be king penguins, then known as *Aptenodytes patachonica*. Incidentally, Forster assigned all then known penguin species to the genus *Aptenodytes* (Forster 1781). Today only the two largest penguin species belong to this genus.

When Philip Lutley Sclater published his 'Note on emperor penguins' in 1888, the name 'emperor penguin', and the separate classification introduced by George Robert Gray in 1844, appear to have been relatively widely accepted (Gray 1844). However, few people had actually seen these birds. By 1888, emperor penguins had been reported by only three parties: as mentioned above, the first encounter probably occurred during James Cook's second voyage, the second during the British Antarctic Expedition in 1839–1843 under James Clark Ross, and the third took place in 1840 during the US Exploring Expedition (1838–1842) led by Charles Wilkes (Sclater 1888).

When Sclater was writing, only a handful of specimens had been secured but the distribution, range and breeding biology of emperor penguins remained a mystery for more than a century. Even today, after many decades of research on them, much remains to be discovered about these penguins. One question still to be answered is simple. How many viable breeding colonies actually exist?

The identification of a breeding colony is, perhaps surprisingly, difficult. Already more than 70 years ago,

Robert Alexander Falla noted that '[t]he presence of young birds still wholly or partially in down during the summer seems to be the only safe criterion in indicating nesting spots' of emperor penguins (Falla 1937). However, the timing of the sightings is also a crucial factor as chicks and adults need to be present throughout the chick rearing season (August–December). By January/February, many birds including fledglings have already left the colonies. Thus, sightings at this time of year may not be of colony areas. Gregarious by nature, emperor penguins often congregate away from their breeding colonies, particularly when they moult. This has occasionally led to sightings of emperor penguins being mistakenly reported as colonies (Wienecke 2009). Also, since emperor penguins require stable sea-ice as breeding platform, ice-based colonies are often hidden in inlets or behind ice bergs. Hence, ship-based discoveries are virtually impossible. Without the introduction of aircraft to Antarctica most colonies would probably have remained undiscovered until the present.

Even the few known land based colonies were anything but obvious, partly because extensive sea-ice separated them from waters accessible by ship, and at two of these colonies, the flat ground is hidden behind large rocks. Incidentally, Edward Wilson, who was the first to describe aspects of the breeding habits of emperor penguins, noted that the emperor penguin 'never steps on land or on land ice even to breed' (Wilson 1907). At the time, this conclusion seemed logical since the first emperor penguin colony to be discovered was based on sea-ice, and during their time in the Ross Sea region Wilson and his colleagues only ever saw these birds on the fast-ice or in the pack-ice. After all the first land-based colony was only found 46 years after the discovery of the colony at Cape Crozier (Wilson 1907, Stonehouse 1953).

An additional problem is to decide what constitutes a colony. The large colonies of these penguins (that is those with several thousand occupants) frequently break into suburbs that are highly mobile and move about independently. By early summer, the various groups can be several kilometres from each other. Late season sightings of distant groups may still be of birds of the

same rather than of different colonies (see for example Messick and others 1999).

To help understand why such 'basic' knowledge as the total number of breeding colonies has so far eluded us, this summary of the discovery of colonies of emperor penguins highlights the challenges and difficulties involved in detecting their breeding sites. The locations described in the following paragraphs include only those where downy chicks and adults have been seen any time during the chick rearing season.

### Discovery of breeding colonies

The first breeding colony of emperor penguins was sighted nearly 130 years after the first probable sighting of these birds (Table 1). In October 1902, Reginald Skelton, chief engineer on the *Discovery* Expedition (1901–1904) led by Robert Falcon Scott into the southern Ross Sea, and Charles Royds returned from Cape Crozier (77°29'S, 169°34'E) with three frozen emperor penguin chicks (Wilson 1907). The presence of downy chicks and adults during the chick rearing season is a certain sign of the existence of a breeding colony.

At the same time when Scott and his first party spent the winter in the Ross Sea, the ship of the German South Polar Expedition (1901–1903) under the command of Erich von Drygalski was beset in the winter ice in Podakowsky Bay, near Gaussberg, east Antarctica. Observing emperor penguins in the vicinity of their ship, sometimes in large groups, the men suspected a breeding colony nearby but they never saw one (Vanhöffen 1905). Podakowsky Bay is filled with large icebergs, and although the German party travelled extensively through the area, a penguin colony could easily have been missed.

A third wintering party was stationed at Snow Hill Island (64°22'S, 57°11'W) at the northeastern tip of the Antarctic Peninsula. Otto Nordenskjöld, who led the Swedish South Polar Expedition (1901–1903), and his men spent two winters there without seeing many emperor penguins (Nordenskjöld 1908). Interestingly, a breeding colony at the southern side of Snow Hill Island was discovered only in July 1997 (see below). Whether the colony did not exist to Nordenskjöld's time or whether the party simply failed to notice it is unknown.

The second breeding colony was sighted in November 1912 by the Douglas Mawson's western party of the Australasian Antarctic Expedition (1911–1914). Charles Archibald Hoadley, geologist, and Sydney Evan Jones, medical officer, discovered adult penguins and chicks near Haswell Island (66°33'S, 92°40'E) noting that the majority of birds present were chicks (Mawson 1915). Since then, this colony has been studied in detail (for example Pryor 1964, 1968).

During the 36 years following the discovery at Haswell Island no further colonies were found. Then, in 1948, British personnel came upon the first land based colony of emperor penguins at the Dion Islands (67°57'S, 68°43'W) (Stonehouse 1953). Incidentally, a second land based

colony was sighted six years later in 1954 in east Antarctica (see below). For 40 years, these were the only two colonies of emperor penguins known to be located on solid land.

In November 1950, the French Antarctic Expeditions to Adélie Land, east Antarctica, located the fourth colony at Point Geology (66°39'S, 140°01'E) (Cendron 1952). Note that Dalglish reported the colony at the Dion Islands to be the fourth one (Dalglish 1957). Clearly he was unaware of the doubtful status of a colony near Gaussberg. Willing (1958) suggested that the penguins seen by the German party could have come from Haswell Island (see below).

From 1954 until 1960, no fewer than 11 new emperor penguin colonies were sighted; only two, Halley Bay (Novatti 1959) and Gould Bay (Neuburg and other 1959), occurred in west Antarctica, and one of the largest, Coulman Island, was found in the Ross Sea (Harrington 1959). The other eight are all in east Antarctica (see Table 1). Two of these were particularly noteworthy. In October 1954, a sledging party from Mawson Station found the second land based colony of emperor penguins after following a line of penguins all heading in the same direction. The Taylor Glacier colony was well out of sight from the sea-ice and hidden in a small valley on a rocky outcrop (Dovers, Field trip report, 1954, unpublished). Another interesting discovery was of the first colony in the Haakon VII Sea. It was noticed during a reconnaissance flight by personnel from Lazarev Station (70°00'S, 12°58'E) near the northern tip of the Lazarev Ice Shelf. This discovery was reported in 1960 in Russian but the English translation did not appear until 1965 (Ledenev 1965).

The International Geophysical Year (1957–1958) led to increased activities in Antarctica. The introduction of fixed wing aircraft, for example by the Australian and Russian Antarctic programmes, made it possible to survey much larger areas than on foot or by sledge. Hence, numerous colonies were first sighted from the air, and the majority were discovered approximately between 55°E and 105°E, the area where mapping operations were concentrated (for example Koblents 1965). Occasionally reports suggested the finding of new colonies but it could take some time before their existence could be confirmed. For example, emperor penguins were seen on the ice near Cape Washington (74°40'S, 165°30'E) in November 1958 (Harrington 1959). Yet the confirmation of this site as a colony occurred only in October 1965 when the area was visited by helicopter (Cranfield 1966). Similarly, adult emperor penguins had been spotted near Beaufort Island (76°56'S, 67°03'E) in November 1958 by Stephen Wilson from the deck of the U.S.S. *Glacier* but a colony was officially reported only in 1960 (Harrington 1960).

Thus 50 years after the first discovery, 15 colonies were known. It took approximately another 50 years to double this number. Four of the seven colonies in the Ross Sea region were noted in the 1960s, again due to an increase in aerial capacity of the United States Antarctic programme (see Table 1). A particularly successful season

Table 1. Chronological order of discoveries of emperor penguin breeding colonies, 1902–2004. \*indicates land based colonies.

Colony	Latitude	Longitude	Discovered	Observer(s)	Reference
1 Cape Crozier	77°29'S	169°34'E	18 Oct 1902	R.W. Skelton	Wilson (1907)
2 Haswell Island	66°33'S	92°40'E	Nov 1912	E.S. Jones and C.H. Hoadley	Mawson (1915)
3 *Dion Islands*	67°52'S	68°43'W	Oct 1948	D.G. Dalgleish	Stonehouse (1953), Dalgleish (1957)
4 Pointe Géologie	66°39'S	140°01'E	Nov 1950	J. Sapin-Jaloustre	Cendron (1952)
5 *Taylor Glacier*	67°28'S	60°53'E	Oct 1954	R. Dovers and G. Schwartz	Willing (1958), Budd (1962)
6 Fold Island	67°20'S	59°23'E	May 1956	D.A. Dowie and J. Seaton	Willing (1958)
7 Halley Bay	75°10'S	24°14'W	9 Jan 1956	R. Novatti	Novatti (1959)
8 Amanda Bay	69°14'S	76°53'E	30 Nov 1956	Y.S. Korotkevich	Korotkevich (1964)
9 Auster	66°33'S	64°00'E	Aug 1957	D. Johnston	Willing (1958)
10 Kloa	66°37'S	57°11'E	Sep 1957	P. Clemence	Willing (1958)
11 Gould Bay	77°30'S	48°30'W	Nov 1957	J.M. Malville	Neuburg and others (1959)
12 Cape Darnley	69°00'S	69°34'E	Aug 1958	P. Clemence	Willing (1958)
13 Coulman Island	73°25'S	169°50'E	6 Dec 1958	J. Dearborn and H. Dewitt	Harrington (1959)
14 Lazarev Ice Shelf	69°02'S	15°25'E	27–28 Dec 1959	unknown	Ledenev (1965)
15 Bowman Island	65°18'S	103°08'E	Oct 1960	Y.S. Korotkevich	Korotkevich (1964)
16 Beaufort Island	76°56'S	67°03'E	6 Dec 1962	B. Stonehouse	Stonehouse (1966), Harrington (1960)
17 Cape Roget	71°59'S	170°31'E	9 Nov 1964	H.J. Cranfield	Anon. (1964)
18 Cape Washington	74°40'S	165°30'E	29 Oct 1965	H.J. Cranfield	Cranfield (1966)
19 Franklin Island	76°07'S	168°15'E	19 Nov 1964	B. Stonehouse?	Stonehouse (1969)
20 Riiser Larsen Peninsula	68°50'S	34°40'E	1 Oct 1975	16 <sup>th</sup> Japanese Antarctic Research Expeditions	Hoshiai and Chujo (1976)
21 SANAE	70°19'S	2°21'W	Jan–Mar 1979	P.R. Condy	Condy (1979)
22 Atka Bay	70°33'S	8°00'W	Jan 1981 (?)	H.-E. Drescher	Drescher (1982)
23 Umebosi Rock	68°03'S	43°05'E	1984	unknown	Kato and others (2004)
24 Drescher Inlet	72°52'S	19°24'W	Jan 1985	R. Dubbels	Dubbels and others (1985)
25 Dawson-Lambert	76°30'S	29°00'W	Oct/Nov 1986	G. Hempel and B. Stonehouse	Hempel and Stonehouse (1987)
26 Stancomb-Wills	74°00'S	22°50'W	Oct/Nov 1986	G. Hempel and B. Stonehouse	Hempel and Stonehouse (1987)
27 Riiser-Larsen Ice Shelf	72°00'S	17°00'W	Oct/Nov 1986	G. Hempel and B. Stonehouse	Hempel and Stonehouse (1987)
28 Cape Colbeck	77°01'S	157°39'W	25 Oct 1993	T. Kooyman	Kooyman (1994)
29 Petersen Bank	65°56'S	110°12'E	3 Nov 1994	D. Melick and W. Bremmers	Melick and Bremmers (1995)
30 *Amundsen Bay*	66°55'S	50°00'E	17 Dec 1996	A. Kato and H. Ichikawa	Kato and Ichikawa (1999)
31 Snow Hill	64°22'S	57°11'W	20 Jul 1997	N. Coria and D. Montalti	Coria and Montalti (2000)
32 West Ice Shelf	67°04'S	81°34'W	Dec 1997	J. Splettstoesser	Splettstoesser and others (2000)
33 Mount Siple	73°25'S	125°38'W	29 Dec 2004	M.-A. Lea and T. Soper	Lea and Soper (2005)

for west Antarctica was 1986 when the coastal areas of Coats Land were surveyed. The locations of three previously sighted colonies (Atka Bay, Drescher Inlet, Halley Bay) were confirmed and three new ones (Riiser-Larsen Ice Shelf, Stancomb-Wills, Dawson-Lambton) were discovered (Drescher 1982; Dubbles and others 1985; Hempel and Stonehouse 1987; Novatti 1959). These three new discoveries brought the number of known emperor penguin colonies to 27 by the end of 1986.

In the 1990s, five further colonies were either confirmed or newly sighted. For example, in the eastern Ross Sea off the coast of King Edward VII Land numerous emperor penguins had been seen by members of the United States Antarctic Service Expeditions in January 1940 (Perkins 1947). During scientific voyages in the late 1970s, American scientists again reported high concentrations of emperor penguins in this area during the month of December (Ainley and others 1984). Given the numbers of penguins sighted a colony was suspected somewhere in the region but none was seen. In October 1993, when helicopters were employed to survey the area, a colony, deeply hidden in a small inlet, was sighted at Cape Colbeck near the King Edward VII Peninsula (Kooyman 1994).

Three further colonies were discovered in east Antarctica: at Peterson Bank, at the West Ice Shelf, and at Amundsen Bay. Peterson Bank is in the vicinity of Australia's Casey Station. Over the years, emperor penguin sightings in general station surroundings were reported and a colony was suspected. Again the first observation of the actual colony was made from a helicopter in 1994 (Melick and Bremmer 1995).

The report of emperor penguins near the West Ice Shelf is possibly an example of a colony forced to relocate because of the retreat of the ice shelf. First noted in 1956 at 65°55'S, it was revisited in the winter of 1960 (Korotkevich 1964). Loss of shelter when the ice shelf retreated may have gradually driven the penguins south, to about 67°S in 1997 (Spletstoesser and others 2000). The birds seen in 1997 may well be the progeny of emperor penguins that once bred further north.

The discovery of an emperor penguin colony at Amundsen Bay in 1996 was of particular interest because it is the third known land based colony of this species (Kato and Ichikawa 1999). Amundsen Bay located west of Enderby Land is rarely visited. Australian researchers noted numerous emperor penguins there in the early 1950s but never found a colony (see Wienecke 2009 for more detail). Emperor penguins require a reasonably flat surface as a breeding platform; Amundsen Bay is exceptional as it is not only relatively even ground but contains a small lake (Richardson Lake) that freezes in winter, providing a highly suitable environment for the birds. In January 2007, an Australian field party visited Richardson Lake and reported 24 moulting emperor penguin chicks (Graham Cook, personal communications, January 2007).

Another especially important colony was found south of Snow Hill Island near the tip of the Antarctic

Peninsula in July 1997 (Coria and Montalti 2000). At latitude 64°22'S, it is the northernmost colony of emperor penguins. Prior to the discovery of Snow Hill, the colony at Emperor Island, Dion Island, was thought to be farthest north. This fact was reason enough to have the colony declared an Antarctic Specially Protected Area by the Antarctic Treaty System in 1966. The values to be protected were the facts that it was the only emperor penguin colony at the western side of the Antarctic Peninsula; it was then one of only two known land based colonies and also the most northerly breeding ground of the species (Antarctic Treaty Secretariat 1966). Snow Hill Island is about 3.5° latitude farther north than Emperor Island. It was suggested that this colony comprises birds of a colony supposedly seen by C.A. Larsen in 1893 (Todd and others 2004). However, while travelling along rugged ice cliffs from ~66°50'S to ~67°00'S in December 1893, Larsen reported in his diary that 'many king penguins were seen in these fjords' (Aagaard 1944). While he was clearly mistaken about the identity of the penguins, he neither mentioned a colony nor the presence of chicks.

The most recent sighting of a new emperor penguin colony occurred in 2004 from a tourist vessel. This colony is located near Mount Siple (73°24'S, 125°38'W) (Lea and Soper 2005) and is so far the only confirmed colony in that part of west Antarctica. This discovery brought the number of emperor penguin colonies sighted from the air or from the ground to 33 by 2004 (Table 1).

Whether all these colonies are still in existence is doubtful. For example, the colony at the Dion Islands is one of the smallest ever known and it is located in the fastest warming area of Antarctica. Incidental observations indicate that this colony has all but vanished. There is also uncertainty about the colony seen at the Lazarev Ice Shelf. In 1959, members of a Russian expedition had spotted a colony comprising adults and dark-gray, fluffy chicks at the northern tip of the Lazarev Ice Shelf (Ledenev 1965). They noted that the chicks had not yet started to moult; this leaves little doubt that this location was indeed a breeding colony. However, the frontal position of the Lazarev Ice Shelf has retreated since this sighting. Moreover, in May 2002, a large iceberg (D 17) calved off the shelf at a time when the penguins would have started to lay. In how far this event affected the colony is unknown. Other locations, such as Petersen Bank, Bowman Island and West Ice Shelf, have not been visited for a number of years and reconfirmation is needed that emperor penguins are still breeding there.

Thus, more than a century after the first discovery of a breeding colony of emperor penguins there is still uncertainty about the exact number of them. However, satellite technology may provide the tools needed to make a final determination. Recently, researchers from the British Antarctic Survey used satellite images that covered most of the Antarctic coast line and used faecal stains to locate emperor penguin colonies (Fretwell and Trathan 2009). Another 10 new colonies may have been discovered. This is an exciting new development and has

brought us one step closer to assessing how many colonies there really are. Ground visits or high resolution images are now needed to confirm these findings since for some locations the signal on the satellite pictures was weak and others were seen only at the very end of the breeding season (January). Once we establish how many colonies of emperor penguins there are, we may be able to assess the size of their global population, the determination of which has so far eluded us.

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