

The penguin eggs

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Taxonomy

The penguin family (*Spheniscidae*) consists of 18 species and 10 subspecies in six genera.

Table 1: Genera, species and subspecies in the Spheniscidae family (IOC World Bird List v. 7.3 (2017))

Genus	Species	Subspecies
Aptenodytes	2	0
Pygoscelis	3	2
Megadyptes	1	0
Eudyptula	1	6
Spheniscus	4	0
Eudyptes	7	2
Total	18	10

The following table shows the 18 species of the *Spheniscidae* family:

Table 2: Names of the 48 penguin species

Common name	Scientific name
King Penguin	<i>Aptenodytes patagonicus</i>
Emperor Penguin	<i>Aptenodytes forsteri</i>
Gentoo Penguin	<i>Pygoscelis papua</i>
Adélie Penguin	<i>Pygoscelis adeliae</i>
Chinstrap Penguin	<i>Pygoscelis antarcticus</i>
Royal Penguin	<i>Eudyptes schlegeli</i>

Macaroni Penguin	<i>Eudyptes chrysolophus</i>
Northern Rockhopper Penguin	<i>Eudyptes moseleyi</i>
Southern Rockhopper Penguin	<i>Eudyptes chrysocome</i>
Erect-crested Penguin	<i>Eudyptes sclateri</i>
Fiordland Penguin	<i>Eudyptes pachyrhynchus</i>
Snares Penguin	<i>Eudyptes robustus</i>
Yellow-eyed Penguin	<i>Megadyptes antipodes</i>
Little Penguin	<i>Eudyptula minor</i>
African Penguin	<i>Spheniscus demersus</i>
Magellanic Penguin	<i>Spheniscus magellanicus</i>
Humboldt Penguin	<i>Spheniscus humboldti</i>
Galapagos Penguin	<i>Spheniscus mendiculus</i>

Penguin eggs

Egg size:

Depending on the weight of the bird, the eggs differ in size. While the egg of the smallest penguin (*Eudyptula minor*) is similar to a hen's egg, the egg of the largest penguin (*Aptenodytes forsteri*) is more than eight times heavier (see figure 1, table 3 and 4).

Figure 1: The largest and the smallest penguin egg compared to a chicken egg



Egg-size diphormism:

16 of the 18 penguin species lay two eggs per clutch. The two largest species (*Aptenodytes*) have a one-egg clutch. The nine species of the genus *Pygoscelis*, *Spheniscus*, *Megadyptes* and *Eudyptula* have a two-egg clutch with nearly equal-sized eggs. The genus *Eudyptes*, however, exhibits an extreme degree of egg size diphormism, where the first-laid A-egg is 18% to 46% lighter in weight than the second-laid B-egg. Such an extreme egg-size diphormism is unique in the avian fauna and may be interpreted as a transitional stage in the evolution towards a one-egg clutch (see table 3).

Table 3: Egg mass and egg-size diphormism (ratio A-egg/B-egg)

	Clutch size	A-egg g	B-egg g	Ratio A-egg/B-egg
<i>Aptenodytes patagonicus</i>	1	334	-	-
<i>Aptenodytes forsteri</i>	1	445	-	-
<i>Pygoscelis papua</i>	2	135	136	0.99
<i>Pygoscelis adeliae</i>	2	122	115	1.06
<i>Pygoscelis antarctica</i>	2	110	107	1.03
<i>Eudyptes pachyrhynchus</i>	2	99	115	0.86
<i>Eudyptes robustus</i>	2	102	134	0.76
<i>Eudyptes sclateri</i>	2	84	155	0.54
<i>Eudyptes chrysocome</i>	2	91	115	0.79
<i>Eudyptes schlegeli</i>	2	100	164	0.61
<i>Eudyptes chrysolophus</i>	2	95	149	0.64
<i>Eudyptes moseleyi</i>	2	78	108	0.72
<i>Megadyptes antipodes</i>	2	137	139	0.99
<i>Eudyptula minor</i>	2	55	55	1.0
<i>Spheniscus demersus</i>	2	104	101	1.03
<i>Spheniscus humboldti</i>	2	121	121	1.0
<i>Spheniscus magellanicus</i>	2	109	109	1.0
<i>Spheniscus mendiculus</i>	2	81	83	0.98

Table 4: Egg dimensions: Where A-eggs and B-eggs are different, the dimension of the larger egg is listed.

	Egg length mm	Egg width mm	Ratio L/W*
<i>Aptenodytes patagonicus</i>	106	76	1.39
<i>Aptenodytes forsteri</i>	119	82	1.45
<i>Pygoscelis papua</i>	70	59	1.19
<i>Pygoscelis adeliae</i>	70	56	1.25
<i>Pygoscelis antarctica</i>	68	54	1.21
<i>Eudyptes pachyrhynchus</i>	71	54	1.31
<i>Eudyptes robustus</i>	74	57	1.30
<i>Eudyptes sclateri</i>	80	58	1.38
<i>Eudyptes chrysocome</i>	71	54	1.32
<i>Eudyptes schlegeli</i>	82	60	1.37
<i>Eudyptes chrysolophus</i>	77	59	1.31
<i>Eudyptes moseleyi</i>	69	53	1.30
<i>Megadyptes antipodes</i>	77	57	1.35
<i>Eudyptula minor</i>	56	42	1.33
<i>Spheniscus demersus</i>	69	52	1.33
<i>Spheniscus humboldti</i>	72	55	1.31
<i>Spheniscus magellanicus</i>	70	53	1.32
<i>Spheniscus mendiculus</i>	62	49	1.27

* factor k according to Schönwetter (see text)

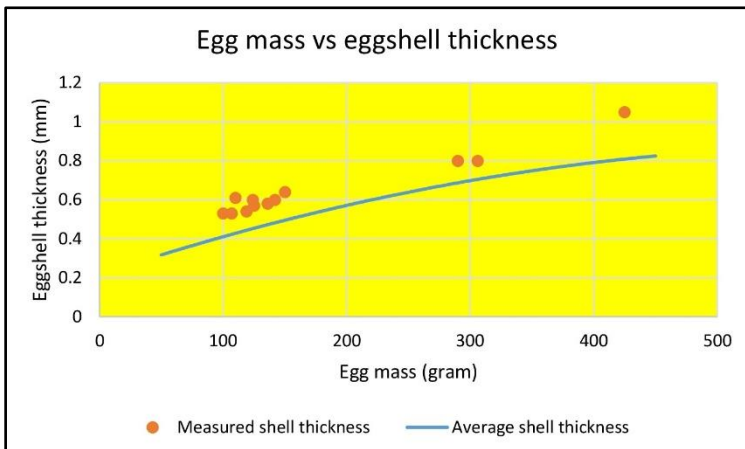
Eggshell thickness:

Most penguin species incubate their eggs on hard substrates with little nesting material – circumstances that could easily lead to egg breakage. But studies have shown that penguin eggs rarely break or crack. This is because penguins have thicker eggshells. For example, the thickness of the eggshell of *Aptenodytes forsteri* is 1.08 mm. This shell is nearly 30% thicker than the average eggshell of a bird with the same egg mass.

In figure 2, the shell thickness for 12 penguin species was plotted versus their egg mass (data from Schönwetter's *Handbuch der Oologie*). In addition, a curve was

added showing the average shell thickness as a function of the egg mass for all bird families. The shell values for the penguins are at least 15% higher than the typical values for bird eggs of similar weight.

*Figure 2: Eggshell thickness as a function of the egg mass
 Blue curve: average values for all bird families
 Orange data points: measured values for penguin eggs (12 species)*



Egg coloration:

In museum collections, penguin eggs are white or slightly brownish (stained from nesting material). The freshly laid eggs can show different colours, e. g. bluish (*Megadyptes antipodes*). This coloration often disappears a few days after oviposition.

Egg shape:

The shape varies among genera and species. The *Pygoscelis* eggs are nearly round, while the *Aptenodytes* eggs are cone-shaped. In the *Handbuch für Oologie*, Schönwetter introduced a factor k (defined as the ratio of

the long and the wide eggshell axis) which describes the degree of roundness. With higher values of k the shape turns from round to elliptic.

**Appendix: Eggs of the 18 penguin species
(scale 1 : 2.5)**



Aptenodytes patagonicus

Aptenodytes forsteri



Pygoscelis papua

Pygoscelis adeliae

Pygoscelis antarctica



Eudyptes
pachyrrhynchus

Eudyptes
robustus

Eudyptes
sclateri



Eudyptes
chrysocome

Eudyptes
schlegeli

Eudyptes
chrysolophus



Eudyptes
moseleyi



Megadyptes
antipodes

Eudyptula
minor

Sphenicus
demersus



Sphenicus
humboldti

Sphenicus
magellanicus

Sphenicus
mendiculus