BEAK DEFORMATION IN AN ANTARCTIC CORMORANT *PHALACROCORAX [ATRICEPS] BRANSFIELDENSIS* CHICK

R. CASAUX

Instituto Antártico Argentino, Cerrito 1248, 1010 Buenos Aires, Argentina
(pipocasaux@infovia.com.ar)
Current address: Laboratorio de Ecología Acuática, Universidad Nacional de la Patagonia, Sarmiento 849, 9200 Esquel, Chubut, Argentina

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Beak deformation in sub-Antarctic and Antarctic birds is rare, or at least has been rarely reported (see Pütz & Plötz 1991, Splettstoesser & Todd 1998, Voisin *et al.* 2002). In Antarctica such an anomaly has been observed only in chicks of Emperor *Aptenodytes forsteri* (Pütz & Plötz 1991, Splettstoesser & Todd 1998) and Gentoo *Pygoscelis papua* (R. Casaux, pers. obs.) penguins. Given that, for adult specimens, this phenomenon has not been reported in the Antarctic literature, such an anomaly is likely to reduce survival. Pütz & Plötz (1991) described beak deformations in two moulting Emperor Penguin chicks and, although both individuals left the breeding locality without evident detrimental effects, they suggested that the birds would be unable to forage.

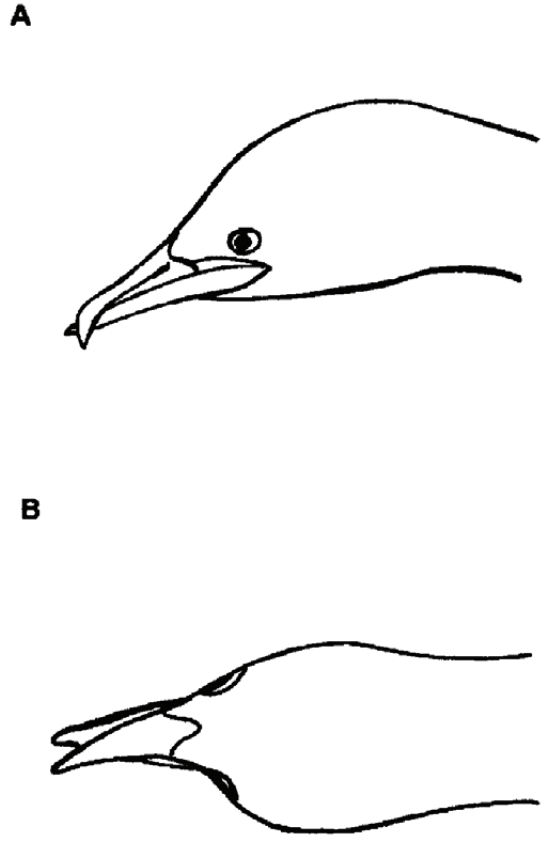

Fig. 1. (A) Lateral and (B) dorsal view of the maxillary deformation observed in an Antarctic Cormorant chick at Harmony Point, South Shetland Islands, Antarctica.

As part of a study on the breeding biology of the Antarctic Cormorant or Shag *Phalacrocorax [atriceps] bransfieldensis,* I observed beak deformation in a recently hatched chick and made observations on the chick's growth and survival. The study was carried out at Harmony Point (62°17′S, 59°13′W), Nelson Island, South Shetland Islands, Antarctica, during the 2000/01 breeding season.

At the laying date, assessed to an accuracy of one day, the egg of the chick under study was weighed with a Pesola spring balance (accuracy: 1 g) and then numbered. Subsequently, the nest was visited every two days. The chick was weighed on hatching (accuracy: 1 g) and then every five days (accuracy: 1–25 g). The same methodology was followed with the remaining chicks at the colony. The increase in mass of the chick under study and of those healthy chicks used for comparison of growth rate were fitted according to the Gompertz equation, which best fit the increase in mass in Antarctic Cormorant chicks at Harmony Point in previous seasons (Casaux 1998). The equation is expressed as

$$M = A \times e^{(-B \times e^{(-K \times t)})},$$

where M represents the body mass in grams, A is the asymptotic body mass, K is the growth rate constant, B is a constant and t is the age of the chick in days (Ricklefs 1968).

The beak deformation consisted of the lateral deviation of the anterior portion of the upper mandible (Fig. 1). Despite the anomaly, the feeding behaviour of the chick under study was similar to that observed in the other chicks in the colony.

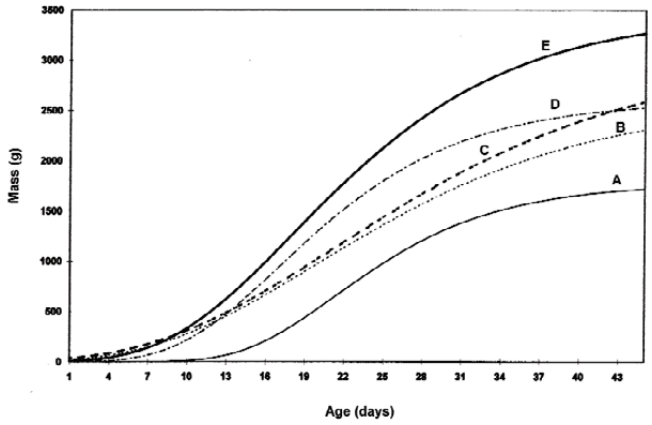

Fig. 2. Comparison of the increase in mass between (A) an Antarctic Cormorant chick with a deformed beak and (B–E) four normal chicks from single-chick broods at Harmony Point, South Shetland Islands, Antarctica.

The deformed chick hatched on 18 December 2000 from the first egg of a clutch of three, after 33 days of incubation. The mean incubation period observed at the colony for the first egg of three-egg clutches or for one-egg clutches was 32.4 days [standard deviation (s.d.): 1.21 days; range: 30–35 days; mode: 33 days; n = 37]. The next day, the only other chick at the nest hatched (from the third egg of the clutch and without beak deformation), but it died four days later. Thus, from an age of six days, the deformed chick was alone in the nest. (The second egg of the clutch was not viable.) The chick's mass at hatching was 45 g, representing 76.3% of the fresh egg mass of 59 g. The mean mass of eggs at laying and chicks at hatching were 58.5 g (s.d.: 4.63 g; range: 49–71 g; n = 148) and 44.3 g (s.d.: 6.63 g; range: 33–58 g; n = 74), respectively.

The increase in mass observed in the deformed chick and in those used for comparison (Fig. 2) was well fitted by the Gompertz equation (coefficient of correlation: 0.98 to 0.99). The increase in mass of the deformed chick was slower than that of healthy birds in single-chick broods. At an age of 38 days, the chick reached a peak mass of 1780 g (roughly 59% of the body mass of fledging chicks at the colony). The deformed chick died at an age of 44 days (beginning of the moulting period), weighing 1550 g, after two days of severe weather conditions during part of which it was, for the first time, not brooded. Non-surviving chicks at the colony died at a mean age of 14.7 days (s.d.: 12.3 days; range: 1–54 days; mode: 4 days; n = 36), whereas fledging commenced at 75–85 days of age.

Several causes—such as congenital defects, deficiency diseases, parasitic infections, injuries, pollution and abnormal feeding of the nestling—have been proposed to explain beak deformation (Gylstorff & Grimm 1987). Given that the chick hatched with a deformed beak and that egg mass, incubation period and mass at hatching were close to the mean values observed at the colony, only congenital defects or injuries during hatching might be considered to be the cause of the anomaly reported here.

The deformed chick grew more slowly than did the remaining chicks in single-chick broods at the colony. A delay in increase in mass was evident during the first 10 days of life (Fig. 2). It is known that, in this period of the life cycle, Antarctic Cormorant chicks are fed with small pieces of fish (Casaux *et al.* 1998). As chicks grow older, larger pieces and even whole fish are offered by parents. Thus, the delay in the increase in mass during the first days of life might be associated with mechanical limitations in handling small food items.

The deformed chick died at an age of 44 days, markedly older than most of the non-surviving chicks in the colony. Just before its death, the chick had recently started to moult; it weighed 52.7%–74.8% of the mass of normal chicks from single-chick broods of the same age. Whereas Antarctic Cormorant chicks remain permanently brooded up to an age of 20 days (Casaux 1998), the deformed chick was brooded up to the age of 42 days. During days 42 and 43, severe weather conditions affected the colony, and the chick remained unbrooded most of the time. Although almost all parents remained away from the colony during most of those two bad-weather days, only one other chick died at the colony during that period. The most likely explanation for the death of the deformed chick is that it was unable to ingest sufficient food for successful growth, feather development and thermoregulation.

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REFERENCES

CASAUX, R. 1998. Biología reproductiva y ecología alimentaria del Cormorán Antártico *Phalacrocorax bransfieldensis* (Aves, Phalacrocoracidae) en las Islas Shetland del Sur, Antártida. PhD Thesis. La Plata, Argentina: University of La Plata.

CASAUX, R., BARRERA–ORO, E., FAVERO, M. & SILVA, P. 1998. New correction factors for the quantification of fish represented in pellets of the Imperial Cormorant *Phalacrocorax atriceps. Marine Ornithology* 26: 35–39.

GYLSTORFF, I. & GRIMM, F. 1987. Vogelkrankheiten. Stuttgart: Verlag Eugen Ulmer.

PÜTZ, K. & PLÖTZ, J. 1991. Beak deformations in Emperor Penguin *Aptenodytes forsteri* chicks. *Polar Record* 27: 367.

RICKLEFS, R. 1968. Patterns of growth in birds. *Ibis* 110: 419–451.

SPLETTSTOESSER, J. & TODD, F. 1998. Further observations of beak deformations in Emperor Penguin *Aptenodytes forsteri* chicks. *Marine Ornithology* 26: 79.

VOISIN, J.-F., MOUGIN, J.-L., SEGONZAC, M. & ROPERT–COUDERT, Y. 2002. Colour aberrations and physical deformities in the King Penguin *Aptenodytes patagonicus* at the Crozet Islands. *Marine Ornithology* 30: 1–4.