

IS IT POSSIBLE FOR A PROCELLARIIFORM TO RAISE TWO CHICKS? A CASE OF CHICK ADOPTION IN SOUTHERN GIANT PETRELS *MACRONECTES GIGANTEUS* IN THE SOUTH SHETLAND ISLANDS, ANTARCTICA

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SUMMARY

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We report on the adoption of a Southern Giant Petrel *Macronectes giganteus* chick by a breeding pair on 25 de Mayo Island (King George Island), South Shetland Islands, Antarctica. Our observations showed both chicks received similar amounts of food, but there were differences in their growth rates that could be explained by their gender. After the third week of adoption, aggressive behaviors were common between chicks, usually expressed through regurgitation. This resulted in a low rate of growth in both chicks. Neither chick fledged, and both were found dead near the colony seven weeks after adoption. The constant fights between them could be one of the causes of their death, particularly if death resulted from excessive regurgitation. Although exclusion of unrelated chicks at nest sites has not been reported in *M. giganteus*, chick adoption seems to have no clear benefits and may contribute to brood failure.

Key words: chick adoption, *Macronectes giganteus*, Southern Giant Petrel

INTRODUCTION

Chick adoption has been reported in over 150 bird species (Riedman 1982), including the Herring Gull *Larus argentatus*, the Western Gull *Larus occidentalis* (Graves & Whiten 1980, Carter & Spear 1986) and the Little Penguin *Eudyptula minor* (Wienecke 1995). In Antarctica, Jouventin *et al.* (1995) recorded chick adoption by non-breeding Emperor Penguin *Aptenodytes forsteri*, and Lefevre *et al.* (1998) also reported chick adoption in Brunnich's Guillemot *Uria lomvia* (Alcidae).

The Southern Giant Petrel *Macronectes giganteus* is a circumpolar pelagic bird distributed from Antarctica to approximately 20°S in austral winter. It breeds in coastal areas of the Antarctic continent and on islands located in the south of the Antarctic convergence, on sub-Antarctic islands and on some South American islands (Marchant & Higgins 1990, Patterson *et al.* 2008). Southern Giant Petrels nest in colonies established mainly in open spaces of variable size. On South Shetland Island, their sole egg hatches during the first week of January. The chick-rearing period is slightly longer than three months, and parental care rarely extends longer than the fourth week of life of the chick (Cooper *et al.* 2001).

In this study, we report the adoption of a Southern Giant Petrel chick by a breeding pair on 25 de Mayo Island (King George Island), South Shetland Islands, Antarctica.

METHODS

As part of a study on the reproductive biology of the Southern Giant Petrel, on 21 January 2006, we recorded an adult on a nest, brooding two chicks, in a colony located in Potter Peninsula (62°14'S, 58°40'W), 25 de Mayo Island, South Shetland Islands. Only one chick had been brooded on the previous day. Both chicks were photographed, banded with metal rings and observed weekly thereafter. On each occasion their body mass (g) was recorded using a spring balance (accuracy ±50 g) and the length of exposed culmen was measured with a Vernier caliper (accuracy ±0.05 mm). For chick age estimation, body mass and length of exposed culmen values were compared with growth data for other chicks from the Potter Peninsula colonies (Coria 2006).

RESULTS

An *M. giganteus* chick observed to be alone in a nest on 20 January 2006 was adopted the next day by a female brooding her own chick in a nest located 1.5 m away (Fig. 1). At this time, the chick in the original nest weighed 750 g and the length of its exposed culmen measured 45.6 mm. The adopted chick weighed 1 150 g and the length of its exposed culmen measured 47.4 mm.

Average date of chick hatching in this colony was 10 January 2006; based on this date and body measurements taken from both chicks,

we estimated chicks to be between 15 and 18 days old. Until the third week after adoption, chick body mass increased at different rates (week 1: 750 g/week and 530 g/week, week 2: 945 g/week and 600 g/week and week 3: 1030 g/week and 470 g/week for native and adopted chicks, respectively), while culmen length grew at a similar rate (Figs. 2 and 3). However, differences in the body mass became evident during the sixth week after adoption (Fig. 2). From the third week after adoption, aggressive behaviors were common between chicks, usually expressed through regurgitation. Their body mass started to fluctuate, and the growth rate decreased for both chicks, while culmen growth continued to increase (Figs. 2 and 3). Both fledged chicks were found dead near the colony seven weeks after the adoption of the second chick.

DISCUSSION

Adoption of chicks by breeding adults among seabirds is rare (Hunt & Hunt 1975, Graven & Whiten 1980, Carter & Spear 1986, Wienecke 1995) and mainly anecdotal. In Antarctica, the adoption of chicks, especially among fulmarine petrels (Procellariiformes) has received little attention, probably because of the location of their colonies away from human settlements and because of the extreme weather conditions. However, it may be that adoption of chicks is a rare event within this group. Once the single chick raised by *M. giganteus* goes through the initial three-week period of parental care, and its food demands increase, both parents go to sea to forage (Hunter 1984). Seabird chicks are usually abandoned if their parents are unable to get food or cannot return to their nest because of bad weather conditions (Wienecke 1995). In these cases, the chick loses body mass quickly. The fate of abandoned chicks depends largely on their mass at the time of adoption and the ability of parents to provision food for two chicks. In this case, the causes of chick abandonment could not be determined; it was adopted during the parental care stage (brood stage) while in good health. How the chick got into the adoptive nest is not known either; since Giant Petrels are altricial, the chick probably relocated on its own or was "led" by non-breeding birds.

It has been suggested that parents might differentiate their offspring by their physical appearance (Miller & Emlen 1975). Although feeding sessions were not observed, the native chick and the adopted chick were raised successfully at first, but after the third week of adoption, we observed aggressive behaviors between the chicks,



Fig. 1. Female of *Macronectes giganteus* and both chicks.

expressed through regurgitation, a situation that could explain — at least in part — the body mass loss of both chicks.

Although repulsion of foreign chicks from the nest has not been reported in *M. giganteus*, chick adoption seems to have no clear benefits and may contribute to brood failure.

REFERENCES

- CARTER, L.R. & SPEAR, L.B. 1986. Costs of adoption in Western Gulls. *Condor* 88: 253–256.
- COOPER, J., BROOKE, M.D., BURGER, A.E., CRAWFORD, R.J.M., HUNTER, S. & WILLIAMS, A.J. 2001. Aspects of the breeding biology of the Northern Giant Petrel (*Macronectes halli*) and the Southern Giant Petrel (*M. giganteus*) at sub-Antarctic Marion Island. *International Journal of Ornithology* 4: 53–48.
- CORIA, N.R. 2006. Biología reproductiva y ecología alimentaria del Petrel gigante del sur *Macronectes giganteus* (AVES, Procellariidae) en las Islas Shetland del Sur y Orcadas del Sur, Antártida. Tesis Doctoral. Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, La Plata, Buenos Aires, Argentina.
- GRAVES, J.A. & WHITEN, A. 1980. Adoption of strange chicks by Herring Gulls, *Larus argentatus*. L. *Zeitschrift für Tierpsychologie* 54: 267–278.

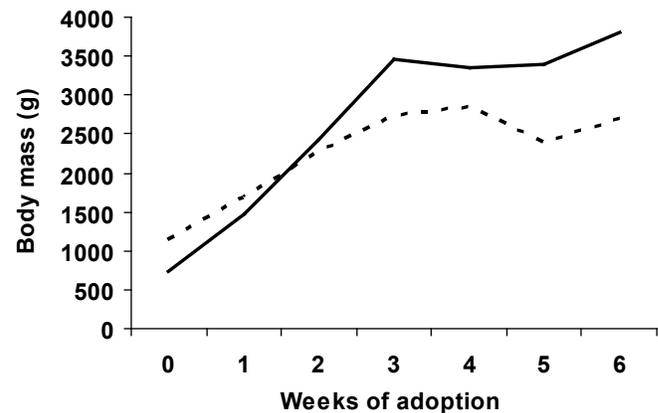


Fig. 2. Body weight increments of both adopted and native chicks. Continuous line (native chick), point line (adopted chick).

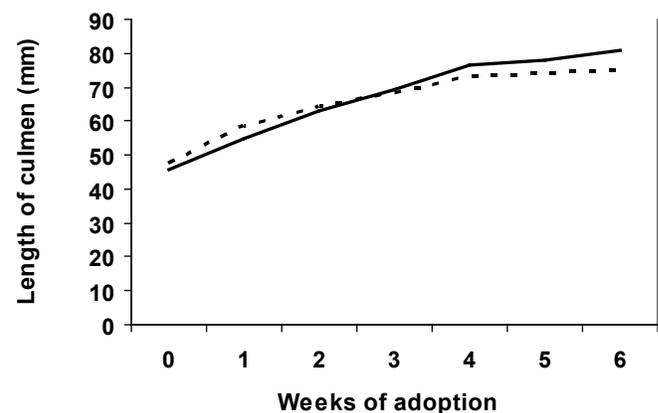


Fig. 3. Culmen growth in adopted and native chicks. Continuous line (native chick), point line (adopted chick).

- HUNT, G.L. & HUNT, M.W. 1975. Reproductive ecology of the Western Gull: the importance of nest spacing. *Auk* 92: 270–279.
- HUNTER, S. 1984. Breeding biology and population dynamics of Giant Petrels *Macronectes* at South Georgia (Aves: Procellariiformes). *Journal of Zoology* 203: 441–460.
- JOUVENTIN, P., BARBRAUD, C. & RUBIN, M. 1995. Adoption in the emperor penguin, *Aptenodytes forsteri*. *Animal Behaviour* 50: 1023–1029.
- LEFEVRE, K., MONTGOMERIE, R. & GASTON, A.J. 1998. Parent-offspring recognition in thick-billed murrelets (Aves, Alcidae). *Animal Behaviour* 55: 925–938.
- MARCHANT, S. & HIGGINS, J.P. (Eds). 1990. Handbook of Australian, New Zealand and Antarctic birds. Vol. 1: Ratites to Ducks, Part A: Ratites to Petrels. Melbourne, Australia: Oxford University Press.
- MILLER, D.E. & EMLLEN, J.T. 1975. Individual chick recognition and family integrity in the Ring-billed Gull. *Behaviour* 52: 124–144.
- PATTERSON, D.L., WOEHLE E.J., CROXALL J.P., COOPER J., PONCET, S., PETER, H.U., HUNTER, S & FRASER, W.R. 2008. Breeding distribution and population status of the Northern Giant Petrel, *Macronectes halli* and the Southern Giant Petrel *M. giganteus*. *Marine Ornithology* 36: 115–124.
- RIEDMAN, M.L. 1982. The evolution of alloparental care and adoption in mammals and birds. *Quarterly Review of Biology* 57: 405–435.
- WIENECKE, B.C. 1995. Adoption of chicks by little penguins *Eudyptula minor* on Penguin Island, Western Australia. *Emu* 95: 119–122.
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