

References

- Gilbert, M. (editor). 1993. *The Dent Atlas of Russian History*. London: Dent.
- Huntford, R. 1985. *Shackleton*. London: Hodder and Stoughton.
- London Gazette. 1919. *Supplement to the London Gazette*: 18 February 1919.
- Luckett, R. 1971. *The white generals: an account of the white movement and the Russian Civil War*. New York: The Viking Press.
- Mather, J.H. 1919. Letter to Mrs. J.H. Mather, 18 April 1919. Mather Family Papers.
- Marsden, P. 2006. Report of research at Imperial War Museum. Letter to A. Vennell, 6 March 2006.
- Maynard, C.C.M. 1928. *The Murmansk venture*. London: Hodder and Stoughton.
- Naval and Military Record. 1914. Royal Naval Volunteer Reserve. An Antarctic promotion. *Naval and Military Record* 22 July 1914.
- Naval and Military Record. 1915. Royal Naval Volunteer Reserve. *Naval and Military Record* 31 May 1915.
- National Archives. 1920. Register of the Distinguished Service Order. WO 390/9: 104.
- Royal Geographical Society. 1948. Certificate of election of J.H. Mather to Fellowship, 15 March 1948. London: RGS/IBG Archives.
- Scott, R.F. 1913. *Scott's last expedition*. 2 vols. London: Smith, Elder.
- Second souvenir. 1915. *With the Royal Naval Division on board HMS 'Crystal Palace' and elsewhere*. Crystal Palace: Royal Naval Division.
- Stephenson, A. 1957. Obituary: Commander J. H. Mather, D.S.O., V.R.D., R.N.V.R. *The Geographical Journal* 123(2): 279.
- Strakhovsky, L. 1944. *Intervention at Archangel; the story of allied intervention and Russian counter-revolution in north Russia, 1918–1920*. Princeton: Princeton University Press.
- Young, P. (editor). 1986. *The Marshall Cavendish Illustrated Encyclopaedia of World War I*. New York: Marshall Cavendish.

An incident of polar bear infanticide and cannibalism on Phippsøya, Svalbard

Ian R. Stone

Scott Polar Research Institute, University of Cambridge, Lensfield Road, Cambridge CB2 1ER

Andrew E. Derocher

Department of Biological Sciences, University of Alberta, Edmonton T6H 2E9, Canada

Received December 2006

doi:10.1017/S0032247407246170

ABSTRACT. A case of polar bear infanticide and cannibalism is reported from Phippsøya, Svalbard. In this instance, a cub of some 7 months was killed by an adult male bear, which was in poor condition, in the close proximity of the mother, which was also in poor condition. It seems probable that the attack was made for nutritional gain.

Periodic reports of infanticide, intraspecific predation, and cannibalism have been noted in polar bears (*Ursus maritimus*) (Taylor and others 1985; Lunn and Stenhouse 1985; Derocher and Wiig 1999; Dyck and Daley 2002; Amstrup and others 2006), brown bears (*U. arctos*) (Troyer and Hensel 1962; Swenson and others 1997), and black bears (*U. americanus*) (Davis and Harestad 1996). In polar bears, the predator is often an adult male, although in many cases the predator's sex and age are uncertain. Polar bears are sexually dimorphic with adult males being roughly twice the mass of females (Derocher and others 2005). The preyed animals are often smaller dependent offspring although adult females and juveniles are also vulnerable (Taylor and others 1985; Derocher and Wiig 1999; Amstrup and others 2006). Intraspecific killing

and cannibalism should be viewed as separate events because killing does not always include consumption. Furthermore, infanticide is viewed as a specific form of killing. Proposed reasons for infanticide include: use of young for nutritional gain, to reduce competition for resources, sexual selection, parental manipulation of progeny, and social pathology (Hrady and Hausfater 1984). More recently, infanticide in brown bears was linked to disruption of social structure in harvested populations (Swenson and others 1997) although this appears to vary between populations (McLellan 2005).

This note reports an incident of polar bear cannibalism that took place at Eidsbukta, on the northern side of Phippsøya (Lat. 80° 42.5'N, Long. 20° 51'E), Svalbard, Norway at 1025UT on 30 July 2006. At the time, the lead author was acting as Expedition Leader on board the vessel *Professor Molchanov*, with some 50 passengers on board. There was much interest in Eidsbukta, a deep bay on the northern coast of Phippsøya, Svalbard, during the early part of summer 2006 because a whale carcass had washed up there and had attracted a number of bears. The species of the whale in question has not been definitely determined but it may have been a sperm whale, *Physeter macrocephalus*, or a minke, *Balaenoptera acutorostrata*. On the morning in question, at approximately 1000UT, 5 zodiacs from the ship, one of which was driven by the lead author, arrived offshore of a beach where the remains of the carcass, which simply appeared to be bones, were in view. More substantial carcass fragments, including pieces of fat, were evident in the water approximately 5 m from shore at a depth of approximately 2 m. At least 15 polar bears were in the area and were either attempting to feed, both on the beach or by diving, or resting. Most of the bears appeared to be young males but there were also two mothers with cubs-of-the-year (one with one cub and one with two cubs). This activity was taking place in a peaceful manner, although there could, of course,



Fig. 1. Adult male polar bear with recently killed polar bear cub-of-the-year, Svalbard, Norway, 30 July 2006. Photograph by William Clarke.



Fig. 2. Adult male polar bear consuming recently killed polar bear cub (left) with the cub's mother nearby, Svalbard, Norway, 30 July 2006. Photograph by Kaj Kampp.

have been different interactions before the observation. For example, at one time a mother and cub were situated close to the backbone of the whale, with two other bears in close proximity, while a further two bears were diving on the pieces of carcass on the sea bed.

After approximately 25 minutes of observation, three additional bears were observed coming at a rapid walk, over a low col leading towards the eastern extremity of the beach, some 250 m from the whale bones, and not directly towards them. The bears were two adults of markedly different sizes and a cub-of-the-year (approximately 7 months old). As this closeness of these three animals seemed unusual, the bears were approached by zodiac to a distance of about 100 m. When the bears were some 40 m from the edge of the water, the cub started running down the slope with the two adults in pursuit. The larger of the two, an adult male based on body size and secondary sex characteristics (Fig. 1), manoeuvred himself between the cub and its mother, and appeared to kill the cub with one blow of his paw to the head. He immediately jumped on the cub and seemed to bite it in the neck. At the time of death the mother was some 3 m away. Then holding it in his mouth, the male dragged the cub towards some large rocks under a low cliff where he proceeded to eat it. The mother was in close attendance during the consumption of the cub (Fig. 2). The mother intermittently approached the male, upon which the male carried the cub further away. The whole incident lasted less than four minutes from the first appearance of the bears to the dragging away of the cub. Both adult bears were considered to be in poor condition based on the visibility of the hip bones through the hide. There were no vocalisations associated with the incident. Many photographs were taken of the event although no pictures were secured of the actual killing.

The authors do not consider that the presence of the zodiacs had any relevance to this incident. The boats were equipped with quiet four stroke engines and were a considerable distance away. Furthermore, the three bears

were moving towards the beach (that is obliquely towards the boats).

The polar bear population living near Svalbard is considered to be largely driven by natural factors having recovered from both the effects of the excessive harvest that ended in 1973 and high pollution loads which had an unknown impact (Derocher 2005). Therefore, disruption in social structure due to harvesting would not play a role in the present observations as reported for brown bears (Swenson and others 1997). Further, the breeding season of polar bears extends from April to June (Lønø 1970; Rosing-Asvid and others 2002) thus the present observation after the mating season cannot be linked to attempts to gain a mating opportunity. Thus, we suggest that the killing and consuming of the cub, represented a nutritional gain to the adult male and this probably relates to his poor body condition. The ultimate cause of the poor condition of the adult male cannot be determined but changes in body condition have been linked to both natural long-term fluctuations (Stirling 2002) and climate change (Stirling and others 1999). The adult male did not appear to have any injuries that might explain his poor condition. In a review of the possible effects of global warming on polar bears, intraspecific aggression and cannibalism were predicted to increase with climate change (Derocher and others 2004). In addition, recent observations of intraspecific killing and cannibalism in polar bears in the Beaufort Sea of North America were linked to nutritional stress that was related to a longer ice-free period (Comiso 2002; Amstrup and others 2006). As bears become nutritionally stressed, adult males are likely to attempt intraspecific predation more frequently for nutritional gain and females are likely to risk infanticide while seeking opportunities to feed. For example, the risk of infanticide was seen to affect the foraging decisions of female brown bears along salmon (*Onchorhynchus* spp.) streams in Alaska (Ben-David and others 2004). Similarly, in this observation of infanticide, the presence of the whale

carcass probably brought the female into the proximity of the predatory male.

This note adds further evidence that infanticide in polar bears is the result of adult males and that nutritional gain can be a factor in such events. Observations of intraspecific killing and cannibalism in bears remain uncommon but the recent increase in the reports of such events apparently in association with bears being in poorer physical condition, suggests that increased monitoring of polar bears is warranted; particularly given the rapid changes that are ongoing in the Arctic sea ice.

Acknowledgements

The authors thank two referees for their valuable comments on an early draft of this note. The lead author expresses his appreciation to Oceanwide Expeditions of Vlissingen, the Netherlands for enabling him to visit Svalbard in 2006. Thanks are also due to the Captain and crew of the vessel *Professor Molchanov*. The photographs were kindly provided by William Clarke and Kaj Kamp.

References

- Amstrup, S.C., I. Stirling, T.S. Smith, C. Perham, and G.W. Thiemann. 2006. Recent observations of intraspecific predation and cannibalism among polar bears in the southern Beaufort Sea. *Polar Biology* 29: 997–1002.
- Ben-David, M., K. Titus, and L.R. Beier. 2004. Consumption of salmon by Alaskan brown bears: a trade-off between nutritional requirements and risk of predation? *Oecologia* 138: 465–474.
- Comiso, J.C. 2002. A rapidly declining perennial sea ice cover in the Arctic. *Geophysical Research Letters* 29: 1956. DOI: 10.1029/2002GL015650.
- Davis, H., and A.S. Harestad. 1996. Cannibalism by black bears in the Nimpkish Valley, British Columbia. *Northwest Science* 70: 88–92.
- Derocher, A.E. 2005. Population ecology of polar bears at Svalbard, Norway. *Population Ecology* 47: 267–275.
- Derocher, A.E., M. Andersen, and Ø. Wiig. 2005. Sexual dimorphism of polar bears. *Journal of Mammalogy* 86: 895–901.
- Derocher, A.E., N.J. Lunn, and I. Stirling. 2004. Polar bears in a warming climate. *Integrative and Comparative Biology* 44: 163–176.
- Derocher, A.E., and Ø. Wiig. 1999. Infanticide and cannibalism of juvenile polar bears (*Ursus maritimus*) in Svalbard. *Arctic* 52: 307–310.
- Dyck, M.G., and K.J. Daley. 2002. Cannibalism of a yearling polar bear (*Ursus maritimus*) at Churchill, Canada. *Arctic* 55: 190–192.
- Hrdy, S.B., and G. Hausfater. 1984. Comparative and evolutionary perspectives on infanticide: introduction and overview. In: Hausfater, G., and S.B. Hrdy (editors). *Infanticide: comparative and evolutionary perspectives*. New York: Aldine Publishing Company: xiii–xxxiii.
- Lønø, O. 1970. The polar bear (*Ursus maritimus* Phipps) in the Svalbard area. *Norsk Polarinstitutt Skrifter* 149: 1–115.
- Lunn, N.J., and G.B. Stenhouse. 1985. An observation of possible cannibalism by polar bears (*Ursus maritimus*). *Canadian Journal of Zoology* 63: 1516–1517.
- McLellan, B.N. 2005. Sexually selected infanticide in grizzly bears: the effects of hunting on cub survival. *Ursus* 16: 141–156.
- Rosing-Asvid, A., E.W. Born, and M.C.S. Kingsley. 2002. Age at sexual maturity of males and timing of the mating season of polar bears (*Ursus maritimus*) in Greenland. *Polar Biology* 25: 878–883.
- Stirling, I. 2002. Polar bears and seals in the eastern Beaufort Sea and Amundsen Gulf: a synthesis of population trends and ecological relationships over three decades. *Arctic* 55: 59–76.
- Stirling, I., N.J. Lunn, and J. Iacozza. 1999. Long-term trends in the population ecology of polar bears in western Hudson Bay in relation to climate change. *Arctic* 52: 294–306.
- Swenson, J.E., F. Sandegren, B.A. Söderberg, R. Franzén, and P. Wabakken. 1997. Infanticide caused by hunting of male bears. *Nature* 386: 450–451.
- Taylor, M., T. Larsen, and R.E. Schweinsburg. 1985. Observations of intraspecific aggression and cannibalism in polar bears (*Ursus maritimus*). *Arctic* 38: 303–309.
- Troyer, W.A., and R.J. Hensel. 1962. Cannibalism in brown bear. *Animal Behavior* 10: 231.

A preliminary archaeological survey of a Tupolev TB-3 (ANT-6) aircraft on Ostrov Rudol'fa, Zemlya Frantsa-Iosifa, Russia

P.J. Capelotti

Division of Social and Behavioral Sciences, Penn State University, Abington College, Abington, PA 09001, USA

Received December 2006

doi:10.1017/S0032247407256177

ABSTRACT. The partially snow-covered wreck of specially-modified Arctic variant of the Tupolev TB-3

four-engine bomber was located at Buhkta Teplits [Teplits Bay], Ostrov Rudol'fa [Rudolf Island] in Zemlya Frantsa-Iosifa [Franz Josef Land]. From data gathered, the wreck was subsequently identified as TB-3 (ANT-6) No. 210. This aircraft was piloted by Boris Chukhnovsky during a failed search for another TB-3 (ANT-6), No. 209, which had been lost in August 1937 during an attempt to fly from Moscow over the north pole to the United States. The Teplits TB-3 (ANT-6) wreck represents both the primary aeronautical archaeology of the triumphs and disasters of the Soviet Union's air expeditions to the pole in 1937–1938 and, at 81°47.5'N, is the northernmost aircraft wreck yet identified.