Nursing vocalization of a polar bear cub

Andrew E. Derocher1,4, Sofie M. Van Parijs2, and Øystein Wiig3

1Department of Biological Sciences, University of Alberta, Edmonton, AB T6G 2E9, Canada
2National Marine Fisheries Service, Northeast Fisheries Science Center, 166 Water Street, Woods Hole, MA 02543, USA
3National Centre for Biosystematics, Natural History Museum, University of Oslo, PO Box 1172, Blindern, N-0318, Oslo, Norway

Abstract: We recorded the nursing vocalization of a wild polar bear (Ursus maritimus) cub in Svalbard, Norway and describe it with the term humming. From a 3-minute recording of the vocalization, we found the sounds composed of between 30–55 pulses with a mean of 0.05 (SE = 0.002) seconds in duration, a frequency with the greatest energy at 0.28 kHz (SE = 0.06), and a mean maximum frequency of 0.85 kHz (SE = 0.15). The function of the pulsed vocalization is unknown but may relate to comfort and contentment or to stimulate milk release by the mother.

Key words: polar bear, Ursus maritimus, vocalization


Compared with birds, mammals are relatively non-vocal, but of the mammals, carnivores vocalize more often and have a wider range of vocalizations than most other groups (Ewer 1973, Peters and Wozencraft 1989). The vocalizations of Ursidae, however, are poorly described (Pruitt and Burghardt 1977, Peters and Wozencraft 1989), and even less is known about the vocalizations of polar bears (Ursus maritimus). The habitat of polar bears is largely inaccessible and comprises the arctic and sub-arctic sea ice and adjacent land areas. A consequence of their distribution is that relatively little is known about the behavior of the species with the exception of a few observational studies usually conducted at some distance (Stirling 1974, Stirling and Latour 1978, Latour 1981), making vocalization recordings difficult. In Svalbard, a breeding male was described as producing a coughing sound in the presence of an adult female (Wiig et al. 1992). In captivity, both male and female polar bears were noted as being vocal during the breeding season (Malyov 1991). Another study of captive polar bears described a chuffing vocalization used by adults and mothers with young (Wemmer et al. 1976). A report of a nursing sound in captive polar bear cubs was first reported by Schneider (1933), but little information is available on the vocalizations of juvenile polar bears (reviewed in Peters et al. 2007). In this paper, we document the vocalizations of a nursing polar bear cub.

Methods

On 25 April 1997, a 14-year-old female polar bear with 2 cubs-of-the-year (~4–5 months old) emerged from a den on Hopen Island, Svalbard, Norway (76°30’N, 25°E). The mother was captured by injection of Zoletil® (Virbac, Carros, France) by remote injection of a dart (Palmer Cap-Chur Equipment, Douglasville, Georgia, USA) fired from a helicopter (Stirling et al. 1989). During handling of the mother to collect samples and measurements, the undrugged cubs (one male, 9.25 kg, and one female, 8.25 kg) were kept close to the mother. Animal handling methods were approved by the National Animal Research Authority (NARA, Norwegian Animal Health Authority, Oslo, Norway).

During handling of the mother, one of the cubs began nursing, and 3 minutes of acoustic recordings were made at a distance of 1 m using a Sennheiser MKH 70 RF condenser microphone (frequency response: 50–20,000 Hz [Hertz]; sound pressure level: 124 dB [decibels] at 1 kHz; sensitivity: 50 mV/Pa [millivolt/Pascal]). Acoustic recordings were digitized and displayed as spectrograms (Fast Fourier Transforms [FFT], time step [dt]: 10 msec; digitizing frequency [df]: 102 Hz; FFT size: 512) using the Bat Sound analysis PC software program (Pettersson Elektronik 1996). One sound was considered to be the start to end of one inhalation with several pulses making up a sound. Three variables were measured for each sound: the total duration, frequency with the greatest energy (FMAX), and the maximum frequency.
Results

The cub produced 5 series of repetitive pulsed sounds (Fig. 1). The pulse trains were composed of 30–55 pulses, with mean pulse (n = 137) duration of 0.05 sec (SE = 0.002), mean FMAX of 0.28 kHz (SE = 0.06), and a mean maximum frequency of 0.85 kHz (SE = 0.15). Each pulse had a second area of energy within 0.6 kHz (SE = 0.08). Pulse trains were 0.4–5 sec long. From 1996–2002, 97 females with cubs-of-the-year were caught, and while nursing of offspring while handling the mother was not recorded, similar vocalizations were heard several times.

Discussion

Schneider (1933) describes 2 sounds for newborn polar bear cubs in captivity: “schreien” (crying) and “summen” (humming or buzzing). The former was prevalent during the first 10 weeks when the cub was immobile, and crying appeared to attract the mother toward it. Crying decreased as the cub aged and eventually disappeared completely. The latter sound was made during suckling, and Schneider (1933) noted it consisted of a rhythmical ‘m’ sound, which repeated itself every 1 to 1.5 seconds. He noted the suckling sounds occurred in bouts of 4 seconds, at the end of which the cub took a deep breath. Schneider also compared this suckling sound to that found in brown bears (U. arctos), and we believe his summen sound is the same as the sound we recorded. The vocalization we recorded also fits the description of a churr noted by Sieber (1984) in young raccoons (Procyon lotor), which were associated with hunger and were made by a suckling pup. Small black bear (U. americanus) cubs were reported to purr when comfortable or seeking comfort (Jonkel and Cowan 1971), and this appears similar to the vocalization we recorded. A recent analysis of the same vocalization for ursids, but not polar bears, was also described as humming (Peters et al. 2007) following Schneider (1933). The description of the vocalization matches our findings, so we support the use of the term humming for polar bears. The duration of both the single sounds and the sound events produced by the polar bear cub were similar to those of other ursid species described in Peters et al. (2007). The frequency range was similar to that of the Asiatic black bear (U. thibetanus) shown in Peters et al. (2007: Fig. 1c); however, the double component was not as clear in the polar bear pulsed sounds.

Our recording in the field was not fully natural given the sedated state of the mother, but cubs often appeared unstressed by our presence and sometimes fell asleep (without being drugged) during handling of their mother, and we believe the vocalization represented a natural communication in wild polar bear cubs.

The function of a specific vocalization can be difficult to ascertain, but the humming we heard has been attributed to signals of comfort or contentment or possibly to stimulate milk release (reviewed in Peters et al. 2007). In carnivores, satisfaction is often communicated through continuous, pulsed, low-intensity sounds (Peters and Wozencraft 1989). The humming is similar in structure to purring in felids or viverrids (Peters and Wozencraft 1989).

Polar bears and other ursids all have epipharyngeal pouches which may produce, modify, or amplify vocalizations (Ganzberger et al. 1995, Weissengruber et al. 2001), and some ursids are known to produce a variety of vocalizations. For example, giant panda (Ailuropoda melanoleuca) adults produce 11 distinct sounds, although juvenile vocalizations are poorly documented (Schaller et al. 1985). The vocal repertoire of polar bears is still poorly described, and additional investigation of the range of sounds polar bears can produce and the behavioral correlates is needed.
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Literature cited


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