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Chapter 16 The Status of Bears in Japan
16.1 The Status of Brown Bears in Japan

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Biology

Taxonomy and morphology

The brown bears in northeastern Eurasia are divided into four subspecies based on cranial and dental morphology (Baryshnikov et al. 2004). Brown bears in Hokkaido (including southern Chishima = Kuril Islands) received the subspecific name *U. a. ferox* Temminck, 1842 (*U. a. yesoensis* Lydekker, 1897 is a junior synonym) and those of Sakhalin and Primorski the name *U. a. beringianus* Stroganov, 1962. The skulls of *U. a. ferox* in Hokkaido are generally smaller than the other three subspecies in northeastern Eurasia (Baryshnikov et al. 2004).

A brown bear in Hokkaido has a hump on its shoulders just as brown bears in the other regions. Fur color varies: black, dark brown, or bright yellowish brown (golden). Some bears have black fur with a golden or dark brown portion from the face to their back. Occasionally, a white patch was present on their breast (Imaizumi 1960).

For wild bears in Hokkaido, there were only a few published reports about body measurements. In adult bears, from the Oshima Peninsula in southern Hokkaido who were live-trapped, mean body weight was 81.7 kg (n = 17, SD = 17.2) for females and 127.6 kg (n = 8, SD = 33.9) for males (Hokkaido Institute of Environmental Sciences (IES) 2004a). Mean body weight of three adult females (6-7 years old) live-trapped in Urahoro, located in the central-eastern part of Hokkaido, was 104.7 kg (SD = 6.4) (Sato et al. 2004a). Among adult bears live-trapped from the Shiretoko Peninsula in eastern Hokkaido, mean body weight was 102.9 kg (n = 31) for females and 192.4 kg (n= 7) for males (no SD was given; Kohira et al. 2006). It is noted that direct comparison of body weight variation among these regions should not be done, since there seems to be a distortion of body weight, depending on type and size of traps used. In addition, a credible maximum recorded weight is for an adult male hunted in Shyari-cho, eastern Hokkaido during November, 2002, which weighed 400 kg (Nakamura 2003). This record is not much less than that of the maximum recorded weight (440 kg) of the captive bears at Noboribetsu Bear Farm (Maeda and Ohdachi 1994). Other external measures such as body length, body height, neck circumference, and width of forepaw of wild brown bears in Hokkaido were reported on in few papers (Hokkaido IES 2004a, Sato et al. 2004a). Thus, geographic, age, seasonal, and sexual variations in external measures for wild brown bears in Hokkaido should be investigated in the near future.

For the captive brown bears of Hokkaido, maximum body weight was 440 kg for males and 221 kg for females. Mean body weight of 4-6 years old bears (sample size is largest in this age class) was 115.0 kg for females and 219.0 kg for males (Maeda and Ohdachi 1994). For the other adult age class, males are also approximately twice as heavy as females. Chest girth and body weight were positively correlated ($p < 0.001$) and chest girth was a good indicator of body weight. In addition, the width of forepaw can discriminate adult males ($\geq$ 4 years old) from young males (1-3 years old) and females ($\geq$ 1 year old) with a 9.3% error rate (Maeda and Ohdachi 1994).

Skull size (condylobasal length) of the brown bear increases from south-west to north-east in Hokkaido (Yoneda and Abe 1976; Ohdachi et al. 1992). An adult male moved approximately 70 km distance in five days in central Hokkaido (Waseda 1999). Thus, these are interesting differences because they exist despite the small size of Hokkaido (ca. 78,400 km^2 for Hokkaido

mainland) relative to the potential high dispersal ability of bears.

Matsuhashi et al. (1999) revealed that there are three haplotypes of the mitochondrial control region in brown bears (see the genetic section below). Each of the three haplotypes specifically occurs in southern (south to Ishikari lowlands), central (east to Ishikari lowlands and north to Kushiro region), and eastern (Shiretoko and Akan areas) regions, respectively. Baryshnikov et al. (2004) compared cranial and dental morphology among bears of the three haplotypes. Skull size was smallest in the southern group of haplotype and largest in the eastern group. In particular, bears from eastern Hokkaido (including Kunashiri = Kunashir and Etorofu = Itrup Islands) had significantly larger skulls, smaller cheek teeth, and broader faces than the southern and central genetic groups. Thus, it is possible to suggest that the morphological difference in skull and teeth in Hokkaido brown bears might be associated with genetic differences.

Baryshnikov et al. (2004) implicitly pointed out that dietary difference is a cause of the geographic variation of cranial morphology in Hokkaido. In general, carnivorous Ursids tended to have smaller cheek teeth than omnivorous and herbivorous Ursids (but larger than insectivorous species) (Sacco and van Valkenburgh 2004). In the eastern Hokkaido, where bears have broader face and small cheek teeth, robust salmonoid fish were abundant. In addition, sika deer (*Cervus nippon yezoensis*) meat is recently an important food resource for bears in eastern Hokkaido (Sato et al. 2004b 2005a). Therefore, the broad face and small cheek teeth of the bears in the eastern group might be related to their food habits. However, bear diets are unstable even over a few tens of years (Ohdachi and Aoi 1987; Sato et al. 2004b, 2005a). Thus, we can not conclude that the dietary difference caused the morphological variation. The evolutionary interpretation of morphological variation in the skulls of Hokkaido brown bears should be carefully investigated.

(Satoshi D. Ohdachi, Hifumi Tsuruga)