

A Note on Bird Song: Samuel Hearne's Observations on the Snow Bunting (*Plectrophenax nivalis*)

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In 1795, the Arctic explorer Samuel Hearne recorded detailed observations on the distribution, ecology, molt, and behaviour of the Snow Bunting (*Plectrophenax nivalis*). The most significant of his observations was that Snow Buntings imitated the vocalizations of Atlantic Canaries (*Serinus canarius*) when housed with that species. His account has apparently not been widely recognized by ornithologists, but it is one of the first such observations on bird's acquisition of vocalizations.

Key Words: Arctic; bird song; Atlantic Canary; Snow Bunting; Samuel Hearne; *Serinus canarius*; *Plectrophenax nivalis*

Introduction

The study of avian vocalizations, especially their acquisition and development, is a central part of what is often recognized as “classical” ethology (Kroodsma and Miller 1996). Niko Tinbergen was one of the founders of ethology (Tinbergen 1951), and details of his field studies of Snow Buntings (*Plectrophenax nivalis*) in Greenland remain a classic (Tinbergen 1939; Dawkins *et al.* 1991). This note brings attention to an apparently unrecognized early description of the vocalizations of Snow Buntings in the written accounts of a European Arctic explorer, Samuel Hearne.

The species-typical nature of avian vocalizations has long been recognized and is the basis for field identification by expert field naturalists (Baptista 1975). Pernaú is now recognized for attributing birds' acquisition of species-typical song to learning in the 16th century, but his observations are not widely known or generally appreciated (Birkhead 2003). Some of the earliest experimental observations on the acquisition of avian vocalizations were reported in the scientific literature by Barrington (1773). He hand reared young Linnet (*Carduelis cannabina*) and concluded that they acquired their vocalizations as a result of early exposure to those of adult birds. His experimental approach showed the way for many who followed (Kroodsma and Baylis 1982); however, it was not until recording and playback equipment became available that much progress could be made in the study of avian vocalizations (Baker 2001). The considerable advances in the study of avian vocalizations from the 1950s were a result of the use of equipment, especially the sonograph, that had been developed during World War II for detecting and recording sounds (Thorpe 1954).

Our understanding of the development of avian vocalizations is well past the classical studies of Marler (1952) and Thorpe (1954). Complexities of song acquisition include both auditory and visual cues, varying degrees of plasticity, dialects, vocal mimicry, and restricted learning (Brooke and Birkhead 1991). De-

tailed models have been proposed to account for song learning in birds, including instruction, selection, and instruction followed by selection in production (Marler 1997). However, what might appear to be simple descriptions of natural history observations, such as those by Hearne, are always valuable in any area of science. In this case, they document an important historical accomplishment that deserves credit in itself. They are also important as they may be useful to test the generality of our current hypothesis or suggest yet another interesting prediction to be tested in another species.

Historical Record

Samuel Hearne was one of the first European explorers in the region that is now part of the Canadian Arctic (Cavell and Noakes 2010). His writings (Hearne 1911) provide a wealth of details on numerous mundane aspects of daily routines as well as more unique events. He gave detailed accounts of the distribution and abundance of a number of bird species, mostly in relation to hunting them as food. However, he also remarked on the behaviour of Snow Buntings that he held as part of an extensive menagerie (Newman 1998). He described how they could be captured, or shot, at different times of the year, and he recorded that, when held in the company of exotic Atlantic Canaries (*Serinus canarius*), Snow Buntings learned to imitate the song of the canaries.

With reference to the vocalizations of Snow Buntings, Hearne wrote: “They live long in confinement, have a naturally pleasing note, and when in company with Canary birds soon imitate their song. I have kept many of them in cages in the same room with Canary birds, and always found they sung in Winter as well as in Summer; but even in confinement they change their plumage according to the season, the same as in a wild state” (Hearne 1911, page 386).

Unfortunately, his description lacks some valuable details. For example, the sex and age of the Snow Buntings, particularly as they might relate to song acquisi-

tion and development, are not given in his description. We now know from a wealth of detailed experimental studies a good deal about song development in Oscines, the group that includes the Snow Bunting (Marler 1997). We know that these birds develop their songs by learning early in ontogeny. It seems unlikely that Hearne would have reared Snow Buntings in captivity from the early age (about 20 days after hatching) that is required to demonstrate initial song learning. Thus, it would seem that he observed Snow Buntings changing their songs later in life, after they had acquired their species-typical songs in nature. There is evidence that some oscine species can change their songs later in life, as a result of exposure to vocalizations from other species (Marler 1990; Beecher and Brenowitz 2005; Laiolo *et al.* 2011).

Hearne's descriptions do not indicate whether his observations refer only to males or to both sexes of Snow Buntings. Females of some oscine birds do vocalize (Brenowitz and Arnold 1986). Hearne did not report whether the Snow Buntings replaced their song with the canary songs. He also does not provide any further details as to how he managed to hold the birds alive for such a long time under what were terribly demanding conditions for humans, let alone their domestic companion species (Newman 1998). Incredibly, he does not mention how or why he happened to have Atlantic Canaries available to him during his explorations of the North American Arctic!

Discussion

Hearne's Arctic accounts are widely and well known, but his observations of Snow Bunting vocalizations have not been noted before, despite reviews in the ornithological literature (Houston 1989). There is extensive literature on the domestication of the Atlantic Canary that dates from at least the 16th century. The songs of the canaries and their colours attracted a great deal of attention, and the birds were widely distributed by amateur bird keepers throughout Europe and Britain (Birkhead 2003). The 18th century European explorers who came to North America would certainly have been familiar with canaries, but it is remarkable that they brought them on their voyages (Houston *et al.* 2003).

Recent descriptions of the behaviour and ecology of Snow Buntings have included descriptions of their vocalizations (Thorpe and Lade 1961; Lyon and Montgomerie 1985, 2011; Espmark 1995, 1999; Alsop 2001; Hofstad *et al.* 2002; Meltofte 2007). Espmark (1995) concluded that the song of the Snow Bunting is stereotypic, as it is for most Emberizidae species. Alsop (2001) describes the song as "a series of bold repetitive high trilling notes," produced only on the breeding grounds. Snow Buntings are reported to have individual song patterns and Espmark (1995) concluded that there is no strong evidence of local song dialects. There has been no detailed study of the development

of vocalizations in this species; thus, we do not know whether they learn their song by instruction or selection, nor do we know the period during which they can acquire their song. However, Hearne clearly deserves recognition for his insightful early observations on the development of behaviour, in addition to his broader contributions to our understanding of Arctic biology.

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