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Received 16 August 1994, accepted 9 May 1996.
Associate Editor: J. S. Marks

The Auk 113(4):955–957, 1996

Interbreeding of a Tricolored Heron and a Snowy Egret in South Dakota

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Reports of interbreeding among herons are uncommon and include a Little Blue Heron (*Egretta caerulea*) and a Cattle Egret (*Bubulcus ibis*) in California (Bailey et al. 1989), a Little Blue Heron and a Snowy Egret (*E. thula*) in Florida (Sprunt 1954), and a Little Blue Heron and a Tricolored Heron (*E. tricolor*) in Arizona (Phillips et al. 1964). In addition, a possible hybrid between a Snowy Egret and a Tricolored Heron was photographed in Florida in 1960 (Dickerman and Parkes 1968). In this paper, we report interbreeding between a Tricolored Heron and a Snowy Egret. To our knowledge, this hybrid combination has not been reported previously.

Tricolored Herons and Snowy Egrets occur sympatrically along the Atlantic coast from New York to South America, and along the Pacific coast from Mexico to Peru (Hancock and Elliott 1978). Tricolored Herons rarely nest inland as far north as South Dakota (Schmidt 1979, Skadsen 1986), whereas Snowy Egrets have been locally common breeders in eastern South Dakota since at least the early 1980s (South Dakota Ornithologists' Union 1991).

On 23 June 1995, we observed a Tricolored Heron in a mixed-species heronry in Brown County, South Dakota (45°40'N, 98°05'W). This observation was only the fifth record of a Tricolored Heron in South Dakota (South Dakota Ornithologists' Union 1991). The heronry was in a flooded, 5-ha stand of dead Russian olive (*Elaeagnus angustifolia*) trees. Extensive flooding in 1993 and 1994 had increased the available aquatic habitat and probably contributed to the establishment of the heronry. Nesting species included Cattle Egrets, Great Egrets (*Ardea alba*), Snowy Egrets, Little Blue Herons, and Black-crowned Night-Herons (*Nycticorax nycticorax*). About 1,200 pairs of herons (mostly Cattle Egrets) nested in the heronry in 1994 (Peterson 1995), and about 5,950 pairs (95% Cattle Egrets) nested there in 1995 (Naugle unpubl. data).

On 30 June 1995, we marked a nest site after observing the Tricolored Heron perched on the rim of a nest bowl. This nest contained four light-bluish eggs and was constructed of Russian olive branches about 30 cm above the water. On 2 July, a Snowy Egret was incubating the remaining two eggs in the marked nest, which also contained two nestlings. While we were observing the incubating Snowy Egret, a Tricolored Heron landed near the nest. Subsequently, we observed a "nest relief ceremony," in which the Tricolored Heron and the Snowy Egret raised their head plumes and began bill-nibbling and vocalizing (see Rodgers 1977). Following the nest relief ceremony, the Tricolored Heron settled on the nest and incubated the eggs.

All four eggs had hatched by 6 July. During that visit we photographed and recorded a nest relief ceremony on standard 1.25-cm VHS tape. The Snowy Egret fed the chicks regurgitated food. The Tricolored Heron also fed the chicks in the absence of the Snowy Egret. On 1 August, photographs were taken of the four juveniles (which were in the late branching stage of development) at the nest site (VIREO accession batch V06/24/001–005; Academy of Natural Sciences, Philadelphia). Their plumage and soft-part colors were unlike those typical of juvenile Snowy Egrets or Tricolored Herons (McVaugh 1972, 1975). Their heads were marked with a gray-brown crown that extended down the nape of the neck and graded to a slate gray on the back and wings (see Fig. 1). The sides of the neck and breast varied among individuals from slate gray to pale rufous. All juveniles were white on the head and undersides of the neck and body. Their irides were yellow, and their bills were black above and dark orange below, grading to black distally. The legs were yellow-green proximally and posteriorly, grading to dark on the distal anterior surface. There was no brownish-red color on the primary or secondary coverts or on the sides of the neck or breast, as would be typical of juvenile Tricolored Herons.

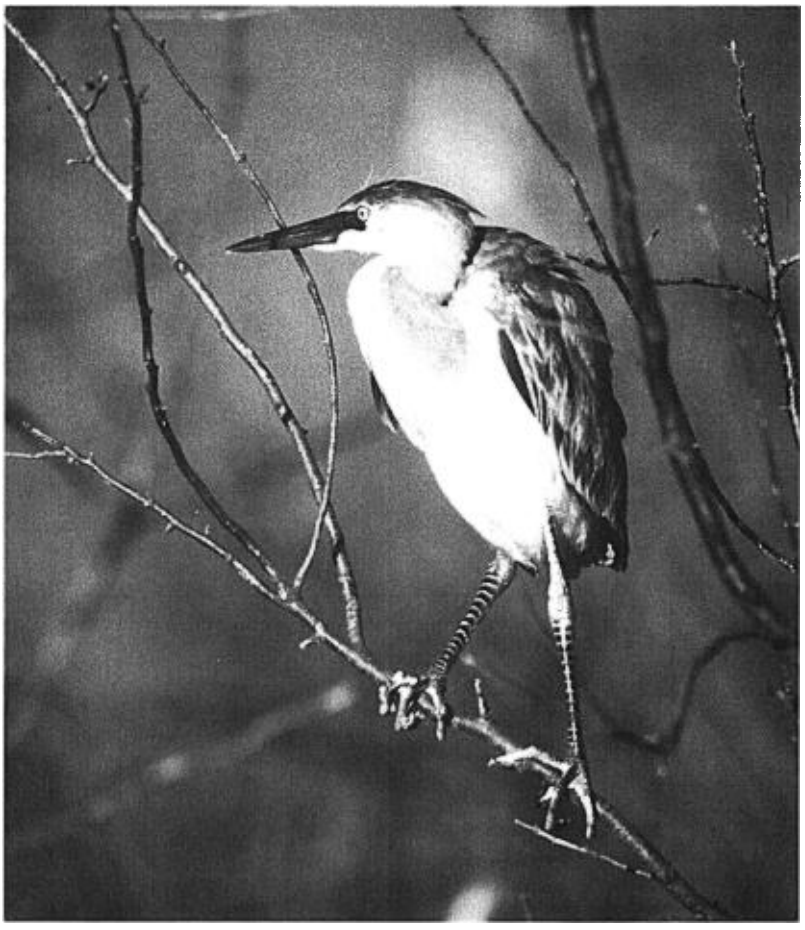

FIG. 1. Juvenile Tricolored Heron × Snowy Egret, Brown County, South Dakota, 1 August 1995.

Successful interbreeding, although rare in natural settings, occurs when interspecific isolating mechanisms break down (Mayr 1963). Isolating mechanisms may be morphological, ecological, or behavioral (Dusi 1968). Promiscuous behavior also may give rise to interbreeding in large heronries (Hancock and Elliott 1978). Palmer (1962) reported several observations of promiscuity in Snowy Egrets. Birds located outside their normal range and isolated from conspecifics may accept related species as mates to form mixed-species pairs (Mayr 1963). Factors that may have promoted the hybrid pairing we observed include the large concentration of egrets and herons in close association, and the presence of a single Tricolored Heron among a low number of Snowy Egrets.

Acknowledgments.—Staff of Sand Lake National Wildlife Refuge provided financial assistance and logistical support. Funding for this project was provided by Federal Aid to Wildlife Restoration (W-107-R, Job No. 8), South Dakota Cooperative Fish and Wildlife Research Unit in cooperation with South Dakota Department of Game, Fish and Parks, South Dakota State University, U.S. Fish and Wildlife Service (Research Work Order No. 54), and the Wildlife Management Institute. We thank D. Hinrichs for granting access to the heronry, and J. Rodgers, Jr., E. Dowd Stukel, F. B. Gill, G. R. Graves, and R. S. Palmer for reviews of the manuscript.

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Received 18 December 1995, accepted 5 June 1996.
Associate Editor: A. J. Baker

The Auk 113(4):957–960, 1996

Skewed Sex Ratios in Cooper's Hawk Offspring

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The selective forces influencing avian sex ratios have received much recent attention (e.g. Bednarz and Hayden 1991, MacWhirter 1994, Weatherhead and Montgomerie 1995, Leroux and Bretagnolle 1996). Gowaty (1993) and Weatherhead and Montgomerie (1995) noted the paucity of information on sex ratios in avian offspring and called for more empirical data. Here, we provide new data for Cooper's Hawk (*Accipiter cooperii*) based on 16 years of study in Wisconsin.

Rosenfield et al. (1985) found that sex ratios did not differ significantly from unity (53.5% males, 46.5% females; χ^2 test, $P > 0.25$) in 71 broods of Cooper's Hawks in Wisconsin from 1980 to 1983. Further research through 1995 has increased this sample substantially and changed our earlier conclusion. Based on morphometric differences that are apparent at 11 to 12 days of age (Meng 1951, Rosenfield and Bielefeldt 1993a), we determined the sex of nestling Cooper's Hawks (ages 12 to 22 days; $\bar{x} = 16$ days) at 372 nests throughout Wisconsin from 1980 to 1995. We determined sex ratios at hatching (which we presume are the same as at fertilization) in nests where complete clutch sizes were known, all eggs hatched, and all young survived to an age at which sex could be determined (see Newton and Marquiss 1979, Rosenfield et al. 1985). We also calculated sex ratio among fledglings (≥25 days of age) when, following banding and sexing of nestlings (and some subsequent mortality), we revisited nests opportunistically for other purposes (Rosenfield and Bielefeldt 1993a, b). For temporal analyses of offspring sex ratios, time of clutch completion was determined by back-dating from nestling age, assuming a 34-day incubation period (Rosenfield and Bielefeldt 1993a).

Because we found no significant differences in sex ratios among years at fertilization ($\chi^2 = 13.87$, df = 15, $P = 0.54$) or the nestling stage ($\chi^2 = 16.07$, df = 15, $P = 0.38$), we pooled data across years. We examined sex ratio at fertilization in 554 eggs at 130 nests (Table 1). Males were significantly more numerous (55%) at conception ($\chi^2 = 6.0$, df = 1, $P = 0.01$). We also examined sex ratio in 1,337 nestlings at 372 nests (Table 1). Again, males were significantly more numerous (54%) at this stage ($\chi^2 = 9.55$, df = 1, $P = 0.002$). We further examined sex ratios in 105 fledglings ($\bar{x} = 32$ days old, range = 25–56 days) at 33 nests. Once again, the sex ratio was significantly male-biased (60%; $\chi^2 = 4.2$, df = 1, $P = 0.04$). Annual samples of fledglings were too small for analyses of year-to-year sex ratios.

Sex ratio at fertilization did not vary significantly

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