Albinism in the Indiana Bat, *Myotis sodalis*

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Although complete albinism in bats is rare (reviewed by Uieda, 2000) and there are few published incidences of partial albinism (i.e., leuistic individuals; e.g., Walley, 1971), the occurrence of white and leuistic Indiana myotis (*Myotis sodalis*) is a reoccurring phenomenon. Metzger (1956) found an adult male *M. sodalis* in Bat Cave, Kentucky, with hair that was white, except the extreme tips of guard hairs, which were tinged with brown. Barbour and Davis (1969) reported that *M. sodalis* sometimes had a conspicuous white patch on the dorsum or venter, varying in size from a small patch to an area covering a third of the furred surface. They also said that the frequency of such markings varied from one in three hundred to one in several thousand individuals. Mumford and Whitaker (1982) reported three *M. sodalis* with white spots in Wyandotte Cave, Indiana, and during biennial censuses of bats hibernating in Indiana (Brack et al., 2003), we found a number of other examples that we summarize in this report.

We first saw a white *M. sodalis*, an apparent albino, in Ray’s Cave, in central Indiana, during censuses in 1985, 1987, and 1989 (Brack and Johnson, 1990). A white bat, presumably this same individual, was found in Ray’s Cave in 1991, when seven additional bats with varying amounts of white pelage were discovered. These included an individual with a distinct white band across the scapular area (Fig. 1a), normal pelage with a smudge of white ca. 1–2 cm in diameter in the scapular area, a white bat with a similar smudge of gray, and other variations in between (Fig. 1b). In 1993, only a single bat with white markings (a white belly) was found. Similarly, in 1995, a single leuistic bat was seen, and it did not appear to be any of the individuals that we had previously observed. Although no color abnormalities were noticed in 1997, a bat with a white spot on its face was noted in 1999. In 2001, a bat with blond fur (intermediate in color between white and gray with a yellowish hue) and a partly white bat were found. In 2003, no color abnormalities were seen in this cave, but in 2005, an individual with a light-colored dorsal patch was observed.

During our censuses from 1985 to 2005, essentially all *M. sodalis* hibernating in Indiana were observed, yet we found only two white bats in other caves. In 2005, a white bat was found in Coon Cave, ca. 16 km NE of Ray’s Cave, and a blond bat with a white face was found in Jug Hole Cave, ca. 100 km S of Ray’s Cave. Coincidently, also in 2005, J. Kath (pers. comm.) found a totally white *M. sodalis* in Illinois, and J. Kiser and J. MacGregor (pers. comm.) found a completely white *M. sodalis* in Kentucky; both caves were ca. 300 km from Ray’s Cave. From 1985 to 2005, the population of *M. sodalis* in Indiana increased from ca. 99,000 to 205,000 individuals (X = 166,000), and the number of bats hibernating in Ray’s Cave increased from ca. 16,000 to 54,000 (X = 41,500; Brack et al., 2003; V. Brack, Jr., unpubl. data). During this time, 19 albino or leuistic individuals were found statewide, with most (17) occurring in Ray’s Cave. Thus, these color abnormalities occurred with a frequency of about 1/27,000 in Ray’s Cave but only 1/93,000 state-wide. These rates are considerably lower than indicated by Barbour and Davis (1969).
Figure 1. Examples of *Myotis sodalis* with pelage that was partially white, including a) a white dorsal band and b) white pelage with gray smudges.
Pelage color in mammals can be a complex phenomenon, controlled by genes at multiple loci, each with multiple alleles. For example, the loci and alleles for coloration in horses are known (see Model Horse Reference: www.mhhref.com, accessed 2 March 2005). The number of variations in color of *M. sodalis* that were observed indicates that pelage color for this species is not based on a single gene with simple Mendelian ratios and suggests that the trait is multifactorial. The occurrence of white-colored pelage may be an indication of successful breeding by individuals with the phenotypic expression of the trait or by carriers of a recessive trait(s). Similarly, we do not know whether the occurrence of white bats in 2005 in populations that hibernate in southern Indiana, Illinois, and Kentucky is a result of interbreeding among populations or is independent in each population. Nevertheless, for this coloration to be observed intermittently over 23 years in Indiana and 49 years in Kentucky, the gene or genes responsible are apparently maintained in the population at low levels.

Detailed studies of survivorship of *M. sodalis* have not been completed, making a comparison of white and leucistic individuals with normal-colored individuals difficult. Humphrey and Cope (1977) reported survival rates for *M. sodalis* as 75.9% for females and 69.9% for males during years 1–6 after banding, 66.0% for females and 36.3% for males in years 6–10, and 4.1% (females) after 10 years. Humphrey and Cope (1977) could not determine survivorship for young of the year, but survival was much lower the first year after marking (ca. 41%), which was attributed to low survivorship of young-of-the-year.

Survivorship of white and leucistic *M. sodalis* that we observed was low, based on the assumptions that all *M. sodalis* hibernating in Indiana were found, all white and leucistic individuals were identified during each census, and there was no movement of bats between hibernacula in Indiana and hibernacula in other portions of the range. The first white bat that we found in 1985 was 0.5 or 1.5 years of age when first found (because our sampling occurred every 2 years), and this bat was found during three subsequent visits (at 2-year intervals), indicating an age of 6.5–7.5 years of age when last seen. All other bats with white markings (disregarding the three in 2005) were not found after their initial discovery, so we found only 1 of 13 bats during a second cave visit. Our sample is small, of course, but it suggests 7.7% survivorship for young-of-the-year with color abnormalities, if one assumes that all individuals were 0.5-year old when first found. This calculated rate may be low because some bats may have been 1.5 years of age when first discovered and they may have survived an additional year before the next survey occurred. Although it is tempting to conclude that white coloration makes bats more susceptible to predation by visually oriented nocturnal predators, low survivorship during adolescence occurs in many mammalian species (Caughley, 1977). Studies of survivorship by known young-of-the-year with normal coloration are needed for comparison before a definitive conclusion can be made regarding negative effects of albinism or partial albinism in *M. sodalis*.

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Literature Cited


