

ANOMALOUSLY PIGMENTED BROWN BOOBIES IN THE GULF OF CALIFORNIA: LEUCISM AND POSSIBLY HYBRIDIZATION WITH THE BLUE-FOOTED BOOBY

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Plumage color anomalies in the Sulidae (boobies and gannets) seem to be uncommon and have received little attention in detailed studies of the family (Dorward 1962, Nelson 1978). The only reference to such anomalies in the Brown Booby (*Sula leucogaster*) is of an albino noted by Harrison (1983). Similarly, hybridization or mixed-species pairing among sulids has only rarely been reported; the only suspected cases involve the Brown and Masked (*S. dactylatra*) Boobies (Worcester, 1911, Nelson 1978), although the supporting evidence is weak. Here we report five leucistic Brown Boobies and two likely hybrids of Brown and Blue-footed (*S. nebouxii*) Boobies at Farallón de San Ignacio, northern Sinaloa, Gulf of California, México, during 2003 and 2004.

The Brown Booby colony at Farallón de San Ignacio has been estimated at 1200 pairs (González-Bernal et al. 2002), and the only other booby nesting on the island is the Blue-footed Booby, whose colony consists of 1500 pairs (González-Bernal et al. 2002). Most Brown Boobies here nest on the slopes of the island, whereas most Blue-footed Boobies nest on the flat top, although some pairs of each species nest with the other species.

Between January and March of 2003 and February and May of 2004 we recorded two male and three female leucistic Brown Boobies with white mantles, scapulars, and lesser coverts, all areas that are brown in normally pigmented birds. Sex was determined by size and voice. The males showed more extensive white on the head than does normally pigmented *S. l. brewsteri*; the heads of the females were pale brown (Figure 1). We did not observe breeding by the leucistic females, but the two leucistic males mated with normally plumaged females. One male, which we color-banded, mated and produced normally colored fledglings in two consecutive years.

These leucistic Brown Boobies at Farallón de San Ignacio superficially resembled Masked Boobies in coloration, and this similarity might cause misidentifications in the field. However, the smaller body size, lack of a black facial mask, relatively longer tail, the soft and less musical voice, and the forward head-waving display identified the birds as Brown Boobies. Additionally, the males mated readily with female Brown Boobies.

Some cases of leucism in seabirds have been attributed to dietary deficiencies (Clapp 1974). Although we do not know the nutritional state of the birds at the time of their last molt, they showed no obvious signs of malnutrition. Since one leucistic male paired with a normal female and produced normal fledglings, we think that a recessive gene is a more plausible explanation.

From 19 February to 16 April 2004 at Farallón de San Ignacio we observed a male and a female booby that appeared to be hybrids between the Brown and the Blue-footed. The head, neck, and chest of the apparent hybrid female (Figure 2) were paler than the dark brown of a typical female Brown Booby. The line of division between the dark chest and white belly was irregular and not clearly demarcated. The greenish-yellow legs and pinkish bill were similar to those of a normally colored Brown Booby. The feathers of the head and neck were textured more like those of a Blue-footed

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A



B



Figure 1. Male (A) and female (B) leucistic Brown Boobies at Farallón de San Ignacio, northern Sinaloa, Mexico, 18 October 2004.

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Figure 2. Apparent hybrid Brown Booby \times Blue-footed Booby at Farallón de San Ignacio, northern Sinaloa, Mexico, 20 February 2004.

Booby, and the slopes of forehead and bill in the apparent hybrid were more steeply angled than in a typical Brown Booby. The base of the bill, face, and orbital ring were blue-gray. The outer portion of the iris was yellow as in a female Blue-footed Booby. The honking vocalization was slightly deeper and stronger than that of a female Brown Booby. In body size it resembled a large female Blue-footed (Figure 2). The male, identified by voice, was seen once and looked like the female but smaller.

This female was courted by a normally colored male Blue-footed Booby but did not successfully mate during the two months that we monitored her. During courtship, when the male performed the sky-pointing display, the female responded by picking feathers and gravel in Brown Booby fashion, rather than reciprocating with the typical sky-pointing display of the Blue-footed Booby.

In addition to our observations, B. Tershy and D. Breese (pers. comm.) noted two anomalously colored males on Isla San Pedro Mártir that were intermediate in appearance between the Brown and Blue-footed Boobies. One paired with a female Brown Booby that laid an egg, but the other courted female Brown Boobies unsuccessfully for five years.

Reports of hybrids among boobies are uncommon (Nelson 1978, Schreiber and Norton 2002), and none has been confirmed by genetic analysis (Nelson 1978, Schreiber and Norton 2002). At Using Island, Philippines, Worcester (1911) found a male Brown Booby and a female Masked Booby attending an empty nest. He speculated that three anomalously colored Brown Boobies also present on that island were hybrid offspring of such a pair. Additionally, Nelson (1978) published photographs of possible hybrids on Boatswain Bird Island in 1961 by D. F. Dorward and on Moku Manu in 1967 by R. W. Schreiber. Both birds were anomalously colored, but they were not described in detail.

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Hybridization between the Brown and Blue-footed Boobies seems difficult, as both species rely mostly on visual clues for pair-bonding (Torres and Velando 2003) and both have clearly different courtship routines (Nelson 1978). Furthermore, because forced copulations by boobies are unknown (B. Tershy pers. comm.), hybrids are unlikely to be produced by such behavior.

Hybridization could occur through imprinting mistakes in dense colonies of mixed species (Hays 1975). Eggs that have rolled out of nests or very young wandering chicks may occasionally be adopted by other pairs (Dorward 1962, Drummond et al. 2003, Mellink 2002). If, in a two-species colony, the eggs or chicks of one species were to be adopted by the other, the chick could become imprinted on the wrong species (Hays 1975). However, it is uncertain whether such imprinting mistakes might lead to hybridization.

We recommend that boobies with “imperfect” coloration patterns or looking like Masked Boobies but outside their known range, and especially if they are in or near colonies of the Brown Booby, be carefully examined and documented appropriately, as they could be leucistic. Also, to our knowledge this is the first documentation of probable hybrid Brown × Blue-footed Boobies. More attention to, and better documentation of, anomalously pigmented individuals is needed to improve our understanding of leucism and of possible hybridization between these species of boobies.

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