

# POSSIBLE HYBRIDIZATION BETWEEN THE PERUVIAN BOOBY *SULA VARIEGATA* AND THE BLUE-FOOTED BOOBY *S. NEBOUXII* IN LOBOS DE AFUERA ISLANDS, PERU

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The Blue-footed Booby *Sula nebouxii* breeds in the California Gulf (Mexico), the Panama Gulf (Panama) and on the Galapagos (Ecuador), Lobos de Tierra and Lobos de Afuera islands (Peru) (Nelson 1978). The Peruvian Booby *S. variegata* is a bird endemic to the Peruvian Current and its breeding distribution follows the Peruvian coast, from Lobos de Tierra Island to Morro Sama (Peru) and to the central coast of Chile (Nelson 1978). These species coincide geographically in the islands of Lobos de Tierra and Lobos de Afuera; however, at both islands, the populations of the Blue-footed Booby are much larger (Ayala 2006, Stucchi & Figueroa 2006).

In November 2004 and August 2005, we visited the Lobos de Afuera Islands (06°57'S, 80°41'W), which are 93 km west of Lambayeque, Peru. The group is formed of several islets and rocks, approximately 2.36 km<sup>2</sup> in area. Four species of the Sulidae have been reported in these islands: Blue-footed Booby, Peruvian Booby, Nazca Booby *S. granti* and Masked Booby *S. dactylatra* (Figueroa 2004). The latter is a rare species; the Blue-footed and Peruvian boobies are both very abundant (Stucchi & Figueroa 2006).

In 2004, two aberrant boobies with coloration characteristics shared by the Blue-footed and Peruvian boobies were observed. As in Ayala (2006), the head of the aberrant booby was light brown, the eyes were bright orange and the legs were grey as in the Peruvian Booby. In contrast, the wing secondary feathers were brown, similar to those in the Blue-footed Booby, without the variegated pattern of the Peruvian Booby (Fig. 1). In 2005, an aberrant booby was observed with the same characteristics as seen in the two other cases, except that the feet were light turquoise. In all cases, the aberrant boobies were adult males found in the Blue-footed Booby colony. Also, they were always seen courting Blue-footed Boobies with vocalizations very similar to those of the male of that species. Additionally, G. Macurí (pers. comm. 2004) observed, in September 2004 at a nest without eggs, a couple formed by a Peruvian Booby and a Blue-footed Booby.

Nelson (1978) argues that hybridization may occur between the Masked Booby and the Brown Booby *S. leucogaster*. Pitman & Jehl (1998) found, in the Clipperton and San Benedicto islands, individuals whose beaks had a coloration intermediate between the Nazca Booby and the Masked Booby, which those authors suggested may be some form of hybrid. In March 1999 on Lobos de Tierra Island, JF observed courtship behaviour between a Blue-footed Booby and a Nazca Booby, and in June that same year, the presence of an aberrant booby, with the same characteristics described by Ayala (2006). Pierotti (1987) found, in an analysis of

more than one hundred different seabird species, that whenever they nest sympatrically, species with similar coloured beaks and feet are more likely to hybridize.

Sulidae have been present on the Peruvian coast since the early middle Miocene (Stucchi & DeVries 2003). During the late Miocene and the Pliocene a radiation of up to seven species has been identified (Stucchi 2003, Stucchi & Urbina 2004) among which *S. aff. variegata* and four new species were reported. This radiation is ecologically equivalent to the one found in North America, where the genus *Morus* predominates (Warheit 2001), suggesting an independent evolutionary history. Friesen & Anderson (1997) suggest that the extant species appeared in no more than three million years and that *S. variegata* and *S. nebouxii* have speciated since the last interglacial period. The scarce interspecific variability (in many cases, lower than intraspecific variability) of extant and fossil Sulidae (Warheit 1992, Stucchi 2003) and the constant hybridization of the species, reported in this work and by Ayala (2006), could indicate that the parapatric speciation suggested by Friesen and Anderson (1997) have permitted an open gene flow in the last millions of years.

In conclusion, it appears that the evolution of Sulidae is more complex than is suggested by molecular studies in extant species.



**Fig. 1.** An aberrant booby (left) and Blue-footed Booby *Sula nebouxii* (right), Lobos de Afuera Islands, Peru, November 2004. Photo by M. Stucchi.

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