

APPARENT HYBRIDIZATION BETWEEN BLUE-FOOTED *SULA NEBOUXII* AND PERUVIAN *S. VARIEGATA* BOOBIES ON LOBOS DE TIERRA ISLAND, PERU

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The Blue-footed Booby *Sula nebouxii* breeds on islands off Mexico, Ecuador and Peru (Nelson 1978, Harrison 1983). In Peru, birds are found breeding off the northern coast on Lobos de Tierra and Lobos de Afuera islands. At these islands, Guillen (1991) estimated more than 50 000 Blue-footed Boobies to be present, and Duffy *et al.* (1984) counted 15 000 pairs on Lobos de Tierra. Both islands are situated at the boundary between the cool upwelling waters of the Peruvian Current and the low-productivity warm waters of the Equatorial Pacific Ocean (Duffy *et al.* 1984). The Blue-footed Booby generally breeds on flat ground and slopes on these islands (Murphy 1936). This locality may be particularly good for breeding, as suggested by low chick mortality (Velando 2002).

The Peruvian Booby *Sula variegata* nests on islands and headlands along the coasts of Peru and Chile (Nelson 1978, Harrison 1983). Peruvian Boobies on Lobos de Tierra are currently scarce, but their population in the middle of the last century probably exceeded 400 000 individuals (Nelson 1978). Lobos de Tierra is probably not the best breeding locality for this species, as suggested by low reproductive success and high rates of egg and chick desertion (pers. obs.). Although Blue-footed and Peruvian booby breeding areas overlap on Lobos de Tierra, no previous accounts of hybridization between them exist (Nelson 1978).

I visited Lobos de Tierra (6°27'S, 80°52'W; 14.3 km²) at different seasons from 1997 to 2000. At those times, I observed from three to six birds each breeding season that, by their plumage colour, appeared to be intermediate in appearance (afterwards referred in text as "aberrant boobies"; Fig. 1) between Blue-footed and Peruvian boobies.

The aberrant boobies had light brown heads (lighter coloured than those of the typical Blue-footed Booby), orange eyes (the Peruvian Booby has red eyes and the Blue-footed Booby has yellow eyes) and grey legs (typical of the Peruvian Booby); otherwise, they were similar to the Blue-footed Booby. I noted that these aberrant boobies interbred with Blue-footed Boobies, successfully laying eggs and raising chicks. The chicks looked very similar to the ones produced by Blue-footed Boobies. The number of such pairs was small and always consisted of a male Blue-footed Booby and a female aberrant booby. I identified the sex of the Blue-footed Booby from its small pupil, its long drawn-out whistle and its small size (adult females are 32% heavier than males [Nelson 1978, Torres & Drummond 1997]). I tried several times to catch these aberrant boobies, but they were extremely nervous (a behaviour very similar to that seen in Peruvian Boobies), which contrasts with the easy-to-handle Blue-footed Booby.

In December 2000, at the beginning of the 2000/01 Blue-footed Booby breeding season, I observed for the first time a Peruvian Booby and an aberrant booby that were incubating two eggs. In this particular pair, the Peruvian Booby was the female. The determination of sex was based on the nasal honk vocalization typical for females of this species.

I am unaware of any published reports or unpublished observations of aberrant boobies as described here occurring at other localities (H. Drummond in Mexico, D. Anderson in Galapagos, J. Jahncke in Peru, all pers. comm.). It is interesting to note that this aberrant booby has so been found only on Lobos de Tierra, where Peruvian and Blue-footed boobies overlap.

Parapatric speciation is the most parsimonious model for the lineage leading to Peruvian and Blue-footed boobies, although peripatric processes are also possible if speciation were to have been followed by a slight increase in breeding ranges. Thus, within the last 0.2 million years, possibly during the Sangamonian Interglacial, an ancestral species appears to have diverged parapatrically (or peripatrically) into a northern, Blue-footed population and a southern, Peruvian population (Friesen & Anderson 1997). Alternatively, Nelson (1978) proposed that the Peruvian Booby was merely a specialized form of the Blue-footed Booby, which became adapted through time to the particular conditions of the Peruvian cold upwelling system.

In any case, despite the presumed short time since divergence, no antecedents of hybridization are evident, indicating that pre-mating barriers could already be well established. This fact would explain



Fig. 1. An aberrant booby (left) and Blue-footed Booby (right), Lobos de Tierra, Peru. (Photo: C. Mendoza)

the low number of aberrant booby and Blue-footed Booby pairs found on the island. The pairs formed by an aberrant booby and a Peruvian Booby would be scarce in any case, because of the low numbers of Peruvian Boobies on Lobos de Tierra. Further study on behaviour and reproduction and DNA sequencing of the aberrant boobies found on Lobos de Tierra island are necessary to obtain more clues to the relationships between Peruvian and Blue-footed boobies, and their presumed common ancestor.

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