by mockingbirds were recorded. Not a single instance of cleaning by *Geospiza fuliginosa* was observed, however. MacFarland and Reeder (1974) have noted that another finch, *Geospiza fortis,* has been observed cleaning tortoises on Volcan Alcedo on Isla Isabela but not on the islands of Santa Cruz or Pinzon, despite the fact that *G. fortis* occurs in these regions both in single-species flocks and mixed with *G. fuliginosa.*

Many questions concerning cleaning/feeding mutualism between birds and reptiles remain to intrigue biologists. For example, to what extent are these behaviors genetically determined? If learning is important, how does it occur and what is the ontogeny of the behavior pattern? Are such behaviors invented by individual "geniuses" and then imitated by other individuals of the population and hence perpetuated by tradition (Wilson 1975)? The answers to some of these questions may be found by future scrutiny of the inter-island variability of mutualistic interaction found in the Galápagos Islands.

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First Description of the Eggs of the White-winged Guan, *Penelope albipennis,* with Notes on its Nest

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The White-winged Guan (*Penelope albipennis*) was thought extinct for almost 100 yr until its rediscovery in 1977 in the Department of Lambayeque, Peru by Gustavo del Solar and John P. O'Neill (Dejonghe and Mallet 1978; Macedo 1978, 1979a, b; O'Neill 1978; Eley 1979). The breeding habits of this species were previously known only from the brief account of Stolzmann, which I have translated here from Taczanowski (1886: 272): "About 10 January 1877, my companion [Jelski] shot a female that was perched quietly on a branch and noted that another small bird fell with her. This was a chick, hardly two days old; another remained unharmed on the branch. The mother had probably been holding them under her wings, and the one which was killed had been on the side toward the shooter. In the same bush a thick nest was found. It was carelessly composed of dry branches at a height of 3 m above the ground. My companion brought to the house the living chick which we have luckily raised." This captive bird was later carried to Lima where it died. It was probably made into the skin that the British Museum (Natural History) eventually received in exchange from the Museo de Historia Natural "Javier Prado" (Vaurie 1966). If so, this bird and its parent became the only specimens other than the type to exist during the century following the discovery of the species.

The nest found by Jelski may well have been that of *P. albipennis,* but it could possibly have belonged

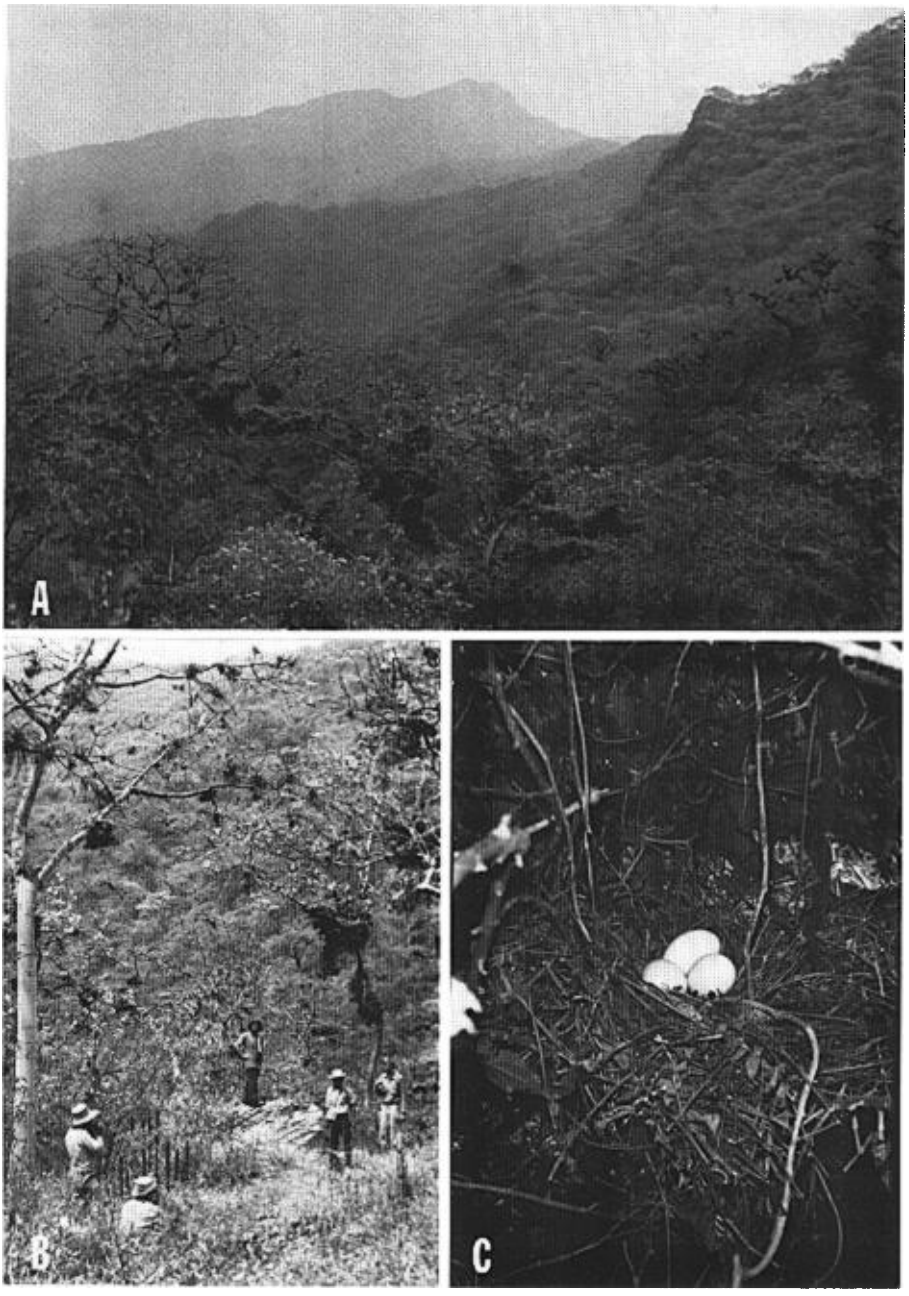

Fig. 1. Habitat (A, B) and nest (C) of the recently rediscovered White-winged Guan. A and B show the heavy epiphytic growth characteristic of the dry tropical forests of the western foothills of the Peruvian Andes (photos by M. D. Williams).

to some other species. The fact that a female and two young were found in the same tree with a nest is not proof of ownership. Shortly after hatching, young cracids are easily able to leave their nest and climb or flutter through trees (Delacour and Amadon 1973: 15). Further, the description does not fit a cracid nest any better than an ardeid nest. The breeding ranges of several species of herons include the vicinity

of Piura where Jelski found the nest. Significantly, no mention was made of green nesting material, a common feature of cracid nests.

On 27 May 1978, Bernard Peyton and his two Peruvian guides, Daniel Cruz Quispe and Bernabé Florez Cobos, found a nest containing three eggs in northern Lambayeque, about 36 km north of Olmos near the border with Piura. The nest was near the head of a small stream named, appropriately enough, "Quebrada de Pavas" (5°39′S; 79°43′W; elev. 470 m).

Two days later I visited this nest with J. William Eley, Enrique Ortiz, and the three original discoverers. The steep slopes above the stream in the vicinity of the nest were covered with dry tropical forest (Fig. 1A, B). The more conspicuous tree and shrub species in this area are given by Macedo (1978, 1979a, b). As we approached the nest, a guan flushed, but the vegetation was so dense that we could not tell whether it had actually been on the nest. It flew to a tree about 75 m from the nest and alighted on a limb several meters above ground. The bird then walked rapidly up the leaning trunk to the uppermost branches and flew away.

The nest was about 2.5 m above ground in a small vine-covered tree that leaned down the slope so sharply that the nest was only a little higher than the base of the tree. I climbed out to the nest and measured and photographed the eggs (Fig. 1C). The nest was about 30 cm across and about 20–25 cm deep. It was composed of twigs and leaves; some of these materials were still green. The eggs rested in a slight depression, but there was no appreciable nest cup. The nest site, nest, and eggs appear to be typical of cracids in general and guans in particular (Delacour and Amadon 1973: 15, 62).

During the month following our visit, Heinz Plenge, a professional wildlife photographer from Chiclayo, spent several days in this area photographing the guans. These guans abandoned their nest on 29 June while Plenge had the nest under observation. A full clutch of eggs had been present for at least 33 days. Delacour and Amadon (1973: 15) gave 28 days as the average incubation period for guans. Plenge waited 2 days and then collected the eggs.

Del Solar took the eggs to Chiclayo where he had them weighed and their volumes determined by water displacement. The eggs measured as follows: (1) 76.4 × 52.8 mm, 84 g, 107 ml; (2) 74.9 × 51.9 mm, 83 g, 100 ml; and (3) 72.6 × 51.4 mm, 69 g, 93 ml. On 5 July, I drilled and cleaned these eggs; there was no evidence of an embryo in any of them. My notes of 5 July state, "The eggs were a dark cream color—almost tan." The color photographs (LSUMZ Photograph File #118) I made on 29 May, however, show the eggs to be almost white. Apparently these eggs became slightly stained by the nest and incubating bird during June. They had a rough surface similar to the eggs of other large cracids I have examined. Del Solar retained these eggs for an exhibit planned for the Museo de Historia Natural in Lima.

Regarding breeding habits of this guan, Macedo (1978, 1979a, b) was told by local informants that these birds laid two white eggs and that when the nest was discovered the female threw her eggs to the ground. If such a large bird were flushed directly from its nest, it could accidentally knock the eggs from their shallow depression; a deliberate effort, however, to throw the eggs from its nest appears too maladaptive to be plausible.

Since the very moment of rediscovery of the White-winged Guan, my friend Gustavo del Solar has been a central figure in all of the efforts to study and protect this species. Indeed, without his interest, this guan could well have remained "extinct." In addition to the help I received in the field from all of the people mentioned in this paper, I wish to acknowledge the help I received in Lima from Manuel A. Plenge and Hernando de Macedo. Dean Amadon, J. W. Eley, Lloyd Kiff, J. P. O'Neill, J. V. Remsen, Jr., and T. S. Schulenberg provided useful comments on early drafts of this paper. Financial support for Peruvian field work came from John S. McIlhenny, Babette M. Odom, H. Irving Schweppe, and Laura R. Schweppe. A grant from the Frank M. Chapman Memorial Fund provided me with the opportunity to examine cracid specimens in the American Museum of Natural History in 1979.

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Wind Direction and the Species Composition of Autumn TV Tower Kills in Northwest Florida

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Radar studies of autumn bird migration in eastern North America show geographic variation in the orientation behavior of birds with regard to wind direction. In New England and the Canadian Maritimes there are down-wind flights with northwesterly or westerly winds over the Atlantic Ocean and a southwest flight along the east coast of North America with in-flight correction for wind effects. There are occasional reverse northeast flights with southerly, southwesterly, or westerly winds (Richardson 1972, Williams, Williams, Ireland, and Teal 1977). Autumn migrants departing overwater from Miami, Florida fly essentially southeast in all winds, and there are no reverse flights (Williams, Berkeley, and Harris 1977). Thus, some migrants appear to be able to navigate on a goal-directed flight and to adjust for the effects of abeam or head winds. In Louisiana and Georgia, however, Gauthreaux and Able (1970, 1971) and Able (1972, 1974) found that nocturnal passerine migrants fly consistantly down-wind regardless of wind direction and with frequent reverse flights to the north. Because the magnitudes of flights with north winds are greater than those of flights with south winds (Able 1973), the result is presumably a strong net movement in the "proper" direction (Able 1972). Another interpretation of Gauthreaux's and Able's data is that the changes in flight direction in response to wind changes is actually selection by different populations for following winds relative to different goals (Evans 1970, Emlen 1975: 187, Richardson 1978: 237). Gauthreaux and Able have not rejected the latter interpretation (Gauthreaux and Able 1971, Able 1974: 227), but the hypothesis has not been tested because radar cannot distinguish between species or between populations with potentially different goals.

Birds killed during night migration flights with known wind directions could provide a suitable test, however, as species and relative abundances are known. Bird casualties at the 308-m WCTV tower in northwest (Leon Co.) Florida are recorded daily, and during 1955–1967 Herbert L. Stoddard, Sr. and his associates plotted on maps of the tower grounds the location of each dead bird for most days when five or more birds were found. These maps clearly show the wind direction at the time the birds were killed (see examples in Stoddard 1962, Stoddard and Norris 1967), because the birds lie down-wind on the tower grounds. I chose from these tower-kill plots (on file at Tall Timbers Research Station) all that showed a clear southeast or southwest cluster of 15 or more birds on the grounds of the WCTV tower during August–October 1956–1963 and 1965–1966 (plots of kills for 1964 are lost). A southeast cluster on the ground implies northwesterly winds; a southwest cluster implies northeasterly winds. I compared wind data from Local Climatological Data sheets for Tallahassee, Florida (33 km south of WCTV) with the selected WCTV tower plots; for this analysis, I rejected nights for which the Tallahassee and WCTV wind data seemed different. Relatively few nights were left, but, for each, the wind direction at the time the birds were killed was well-defined. I rejected one additional night (with northeasterly winds: 4–5 October 1957), because the aberrant sample then (2,300+) was nearly three times greater than that of any other night. Seventy-six nights met my criteria (Table 1). Numbers for species with large sample sizes (usually equal to or greater than 20) are listed for northeasterly or northwesterly winds; italicized totals are significantly at variance from equality by Chi-squared tests ($P < 0.05$) weighted for the disparity between the number of nights for each wind class.