

suggests rapidly deteriorating foraging conditions that could eventually threaten the Caripe colony. The existence of local movements of Oilbirds has important consequences on the design of conservation strategies for this species as refuge areas created around caves might prove to be insufficient for its proper conservation.

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The shoulder spot in Gray Partridge.—The shoulder-spot display has been described in all grouse species (Tetraoninae), except several species of ptarmigan (*Lagopus* spp.) and the Hazelhen (*Tetrastes bonasia*) (Hjorth 1970, Lumsden 1970, Garbutt 1981, Jamieson 1983). However, the shoulder-spot display has not been described for other species within the family Phasianidae.

In grouse, the shoulder spot consists of a small light-colored patch of feathers on the

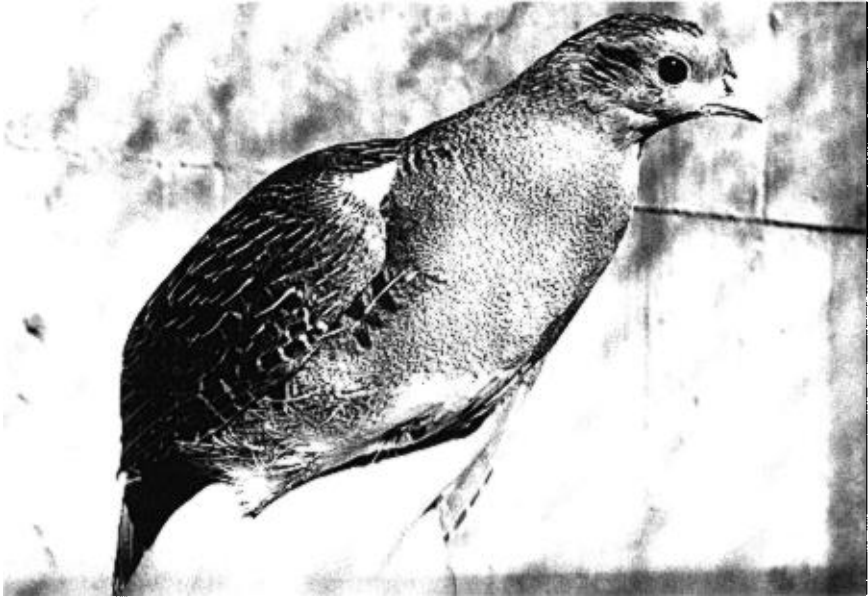


FIG. 1. Gray Partridge displaying shoulder spot during handling.

shoulder area of the bird that may be exposed by shifting the position of underwing coverts on the patagium to an exposed position on the upper surface of the wing (Lumsden 1970, Garbutt 1981). These feathers usually are white or gray in color and contrast with the darker color of the bird's contour feathers (Fig. 1). The shoulder spot occurs in both sexes of many species and is variable in size among species (Lumsden 1970). In grouse, the shoulder-spot display is thought to have evolved from flight intention movements as a signal of fear. In some species the display is also associated with intraspecific aggression and courtship (Lumsden 1970).

The Gray Partridge (*Perdix perdix*), introduced to the northern plains of North America during the early 1900s, is now distributed widely across the northern prairie region (Potts 1986). While trapping Gray Partridges in North Dakota during the winters of 1985–1987, I observed many trapped partridges displaying shoulder spots. Observations were made while the birds were in baited walk-in funnel traps similar to those described by Gaither (1969). Partridges were generally not alarmed while in the trap, and I observed many birds feeding and roosting. When I approached the traps, birds on the outside would quickly flush while those inside attempted to escape by flying, then running, along the trap margin. It was during this time that some birds displayed a shoulder spot. Several individuals also displayed while being handled. During 1986, a sample of 9 of 10 partridges captured from four coveys displayed a shoulder spot while in the trap or during handling. Both sexes and both adults and subadults were observed to display. Four partridges raised in captivity revealed shoulder spots when disturbed by human presence in the pen area. However, not all birds in a pen displayed simultaneously, and use of display or size of the spot was not related to level of disturbance. The display was not observed during aggressive interactions between captive males. Jenkins (1961) and Beani and Dessì-Fulgheri (1984, 1986) did not report seeing a

shoulder-spot display during their observations of behavior in partridges. In all cases that I observed, the shoulder spot appeared to be a fear or flight intention display as described by Lumsden (1970). However, the display seemed secondary in importance compared to vocalizations and "tail flicking" during periods of extreme alarm. Examination of the shoulder spot of a partridge confirmed the realignment of white underwing coverts to the top of the wing in the patagial region. The manipulation by the bird of underwing feathers appeared to be identical to that of Ruffed Grouse (*Bonasa umbellus*) (Garbutt 1981). Since "display" implies actual communication between individuals further investigation is needed to determine if, in fact, the shoulder spot actually is serving a communication function in Gray Partridge.

The shoulder spot in Gray Partridges and the display seen in grouse are morphologically similar. Lumsden (1970) concluded that the widespread occurrence of this display among grouse indicated it appeared relatively early in evolution. The morphological and behavioral similarities between the display in grouse and partridges suggest that the shoulder spot may have evolved even earlier. Since this is an escape behavior, and since many species of partridges and pheasants are difficult to observe in the wild, it may have been overlooked.

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Head-scratching method in swallows depends on behavioral context.—Birds scratch the head by raising the foot dorsal to the lowered wing (overwing or indirect method) or by passing the foot ventral to the folded wing (underwing or direct method). The adaptive significance of the two methods has puzzled ornithologists since Heinroth (1917) first de-