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The shoulder-spot display in Ruffed Grouse.—Although the "shoulder-spot" display is widespread in Tetraonidae, Lumsden (Living Bird 9:65–74, 1970) and Hjorth (Viltrevy 7:184–596, 1970) were both unable to find evidence of this display in Ruffed Grouse (*Bonasa umbellus*). The shoulder-spot display is most frequently seen in ambivalent (also termed conflict by Lumsden 1970) situations containing strong elements of fear. The behavior patterns associated with fear are difficult to observe in wild Ruffed Grouse because of the general wariness of the species and the restricted visibility characteristic of Ruffed Grouse habitat. These observational difficulties may have resulted in this behavior being overlooked when Ruffed Grouse were observed in a natural setting.

A colony of captive Ruffed Grouse at the University of Guelph, Guelph, Ontario, provided

FIG. 1. A male Ruffed Grouse displaying a shoulder spot.

the opportunity for extended observations of grouse behavior. The shoulder-spot display was observed in many males on numerous occasions. By contrast, no females were observed using this display.

Copulation is the activity during which the shoulder-spot display has been most frequently seen in females of other grouse species (Lumsden 1970). However, our captive females rarely permit normal copulation, and the observation of copulation is very rare in captivity. Therefore, failure to observe the shoulder-spot display in female Ruffed Grouse may be attributable to the rarity of copulation by captive hens rather than to the absence of this display in female Ruffed Grouse.

The shoulder-spot display was most frequently observed in captive males performing what has been termed the "intimidation" display (Aubin, M.Sc. thesis, Univ. Alberta, Edmonton, Alberta, 1970) or "upright-cum-ruff" (Hjorth 1970) display. When a male performing the intimidation display is approached by an observer, the male usually attacks or retreats within a short time. However, some males are reluctant to do either, leading to an ambivalent situation. If the ambivalence is sufficiently intense, the male assumes a semi-upright posture, with all feathers except the crest sleeked. In this posture, he alternately approaches and retreats from an intruder, with his body held at a slight angle to the intruder. He may threaten to strike with his bill. Before this strike intention movement is made, the wings are withdrawn from beneath the contour feathers, and are slightly extended. The shoulder-spot display is performed just before the wings are extended (Fig. 1).

Close examination of birds performing this display revealed that the shoulder-spot is formed by exposure of the underwing coverts on the upper surface of the wing, as Lumsden (1970) thought. From examination and manipulation of the wings of live birds, it does not seem possible that a simple re-alignment of the underwing coverts could produce a shoulder-spot of the dimensions seen on many males. The exposure seems to be effected by movement of the patagial skin, accompanied by repositioning of the feathers. Apparently, the skin is drawn over the leading edge of the wing, and onto the upper surface. The coverts are then exposed to form the shoulder-spot. By varying the degree of skin movement and feather rearrangement, it would be possible for the bird to alter the dimensions of the shoulder-spot displayed.

Similarities between Ruffed Grouse and other grouse species in the method of effecting this display, and the context within which it is performed indicate the origin of the shoulder-spot display is similar in all grouse. These observations support the suggested evolutionary development, whereby the display is derived from what was originally a flight intention movement (Hjorth 1970, Lumsden 1970).

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The agonistic repertoire of Sandhill Cranes.—Detailed descriptions of agonistic displays are lacking for wild Sandhill Cranes (*Grus canadensis*). Walkinshaw reports that all cranes have some of the same aggressive displays (Walkinshaw, Cranes of the World, Winchester Press, New York, New York, 1973). Masatomi and Kitagawa (J. Fac. Sci., Hokkaido Univ., Ser. IV, Zool. 19:834–878, 1975) give a thorough description of agonistic behavior in the Japanese Cranes (*G. japonensis*) that facilitates description of such behavior in Sandhill Cranes. Voss (pp. 63–85 *in* Eastern Greater Sandhill Crane Symposium, R. D. Feldt, com-