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RUFFED GROUSE USE OF SUPRAORBITAL COMBS IN DISPLAYS

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Integumentary structures above the eyes, often termed "combs," are present in all grouse species and are emphasized in various displays. Both Wing (*Condor* 48:156, 1946) and Hjorth (Viltrevy (Stockh.) 7:510, 1970) erred in stating that these structures are absent or invisible in *Bonasa*. Bump et al. (The Ruffed Grouse, life history, propagation, management, Holling Press, Buffalo, p. 44-45, 1947) noted a red-orange "bare spot" over the upper eyelid in male Ruffed Grouse (*Bonasa umbellus*). This area is clearly illustrated in the frontispiece of their book but the authors did not say when these structures were exposed.

While studying and filming captive Ruffed Grouse at the Cedar Creek Natural History Area in east-central Minnesota (1971-1974), I frequently observed male birds exhibiting supraorbital combs during certain displays. The Ruffed Grouse is able to expose or conceal these structures at will. When exposed, they appear as a bright, red-orange band (about 2 × 12 mm) directly above the eye. These combs are not erectile and do not change color when exposed. Combs of yearlings and adults are similar. While the combs of Ruffed Grouse are smaller than those of other tetraonids, I was able to see them at a distance of at least seven m. Other grouse are undoubtedly able to see them as well. My observations indicate that male Ruffed Grouse expose their combs during the Upright cum Ruff Display, Bowing cum Head-twisting and Panted Hissing, and Rush cum Prolonged Hiss displays (names of displays follow Hjorth 1970). Only occasionally were they exposed during fighting postures similar to those illustrated by Bump et al. (1947:268). In one film sequence of an aggressive encounter between a resident male and an introduced male, only the dominant resident male exhibited his combs. I did not see these struc-

tures during neutral postures or Drumming. Based on these observations, I believe the illustration in Bump et al. (1947:41), showing a grouse in neutral posture with combs exposed, to be inaccurate. I never saw females exhibit combs even though they sometimes assumed display postures similar to those of males. In short, male grouse exhibited their combs whenever the ruff feathers were extended but very seldom during other circumstances.

The communicative significance, if any, of Ruffed Grouse combs remains to be determined. The contexts in which they are exposed suggest that combs may play some role in displays. The fact that only the more dominant bird exposed its combs during the fighting sequence noted above indicates that exposing these structures may reflect the motivational state of the bird. When a male is displaying with extended ruff the combs frequently are outlined against the dark ruff feathers and thereby are made more conspicuous as the head is oriented toward another grouse. The pronounced head shaking, bowing and ground pecking associated with these displays serves to emphasize both the extended ruff and the combs. While there is little doubt that the extended ruff and fanned tail constitute the major visual components of these displays the supraorbital structures may enhance the visual stimuli.

If these structures prove to be functional components of displays one would expect them to serve only in short-range communication. The displays during which I saw them occurred at distances up to several meters from other Ruffed Grouse. It is perhaps significant that during drumming, a long-range display which normally is not given in the presence of other grouse (Allen, *Auk* 51:184, 1934; pers. observ.), the combs are not exposed.

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