

## DRUMMING FLIGHT IN THE BLUE GROUSE AND COURTSHIP CHARACTERS OF THE TETRAONIDAE

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An observer who has witnessed the courtship of various grouse can hardly help but become interested in their comparative actions. My interest in the courtship of the Tetraonidae has been aroused further by the drumming flight of the Blue Grouse (*Dendragapus obscurus*), to which but one reference has been found in the literature. I have had a number of opportunities to witness this drumming flight, but it was not until the spring of 1945, when I was in the field along the east side of the Blue Mountains above the Grand Ronde River near Troy, Oregon, that I was able to study it in some detail. These observations have led me to re-examine the courtship performances of our New World grouse from a comparative point of view. I have had opportunity to witness and study the courtship of all North American members of the Tetraonidae except Ptarmigan and Sage Grouse. For these, I have had to depend upon conversations with field men who have observed their displays, upon published descriptions and photographs, and upon still and motion pictures taken by fortunate observers.

The drumming flight of the Blue Grouse begins before dawn, often with a roar as the bird drops from its roost in a tree. Evidently the opportunity presented by the descent is utilized for drumming. From then on, all flights seem to be performed from the ground, at least in the *obscurus* group; they cease about daylight and are taken up again late in the day. On April 3, 1945, I heard the first flight from the ground at 5:58 a. m. (Pacific War Time) in the woods behind my tent, when the temperature stood at 29° F. and a trace of snow covered the ground. A Weston exposure meter registered 4 against the open sky above; it would not register in the dim light of the timber. The last drumming flight that night took place at 7:14 p.m. when the sky reading was 6.5. The next day was clear, and grouse began drumming flights at 5:57 a.m. and stopped at 7:50 p.m. April 5, however, dawned cloudy; no grouse hooted or drummed until 6:45 a.m., and the last occurred at 7:30 p.m.

The drumming flight is rather well known to ranchers, cowpunchers, and others who visit the breeding grounds of the Blue Grouse in spring. They generally describe it as "sommersaulting," which it proves not to be. I have watched the performance many times, both with and without binoculars. The birds initiate drumming from display or partial display posture between hooting. Although the birds hoot throughout the day in varying degrees, I have so far not observed drumming flight except in the morning or evening.

There seem to be no preliminaries to the flight; the bird springs into the air, the wings beat rapidly and loudly as he rises, there is a pause as the bird coasts on set wings and starts to descend, then a last burst of the wings occurs as he approaches the ground. The sound of the wing beats may be rendered "burr-r-r-urrrp." In all cases that I have witnessed, the hooter reached a height of about a yard and alighted within a couple of yards or so of the starting point. Some flights rotate to the right, but most that I have seen rotate to the left in an arc of about 180°. There may be some relation to wind, for one that I watched perform on the evening of April 27, 1945, rotated to the right against the wind and always reached ground behind and down-wind from his former position and facing the opposite way. Whether the head is always outstretched and held upward on the rise and downward on the descent, I am unable to

say, but it was held that way in all flights which I observed with binoculars at close range.

The only published description of the drumming flight known to me is that of Green (Murrelet, 9, 1928:67). His observations, however, do not agree altogether with mine. His report implies that the grouse begins its drumming flight by dropping from tree limbs. On occasion this happens, but the performance is begun more frequently from the ground.

Hooters engage in drumming flight when hens are absent from their hooting territories. Once I flushed a female near the junction of three hooting territories; the noise of her wings as she departed was followed by drumming flights from the three males.

The nearest similar performance to the drumming flight of the Blue Grouse is that of *Canachites*, and this naturally leads to a comparison of courtship characters between the several grouse. One phase of the two flights is similar: *Canachites* indulges in a spirally ascending drumming flight when in the open, which is probably the same action as the rotating in 180° of arc by the Blue Grouse.

The courtship performance of the members of the Tetraonidae seems to fall into seven general categories: vocal performance, display, dancing, drumming, distention of throat sacs, erection of special feathers, and erection of combs. All tetraonids except *Bonasa* have vocal notes as part of courtship. Notes vary in quality and volume from the rolling boom of the Prairie Chicken (*Tympanuchus*) to the soft, low hoot of the Blue Grouse. I have never heard any call notes from a Ruffed Grouse while drumming or in display. They are not mute birds, however, for a disturbed grouse will utter "plaintive" notes. The notes of *Tympanuchus* and *Dendragapus* are particularly noteworthy and have received special onomatopoeic names, *hooting* (*Dendragapus*) and *booming* (*Tympanuchus*). Occasionally other names have been applied, such as "gobbling," but they seem inappropriate.

Display is common to all members of the Tetraonidae, both Old and New World. It consists of spreading the tail and wing feathers and ruffling out the body feathers in varying degree. The amount of spreading or ruffling differs but seems to reach highest expression in *Dendragapus*, where it is indeed a gorgeous thing. An important part of the display is the attitude or posture assumed, which may result in a complete strut, as in the Blue Grouse where it is no less complete than that of the turkey.

Dancing is observed in Prairie Chickens, Sharp-tailed Grouse (*Pedioecetes*), and Sage Grouse (*Centrocercus*). Most grouse will step some during the display, but we can hardly call it dancing.

Birds that drum are Ruffed Grouse, Ptarmigan (*Lagopus*), Spruce and Franklin grouse (*Canachites*), and Blue Grouse. Drumming is absent in those that dance, and dancing is absent in those that drum. This leads to the natural inference that drumming and dancing are different expressions of the same physical act. The fore limbs are prominent in one, the hind limbs in the other. A rather intermediate condition occurs in the Sage Grouse which moves its wings during the inflation-deflation of its throat sacs and the Sharp-tailed Grouse which holds the wings out from the body and occasionally vibrates them as it dances. The wing movement of the Sage Grouse and the Sharp-tails occurs with the vocal action, which is contrary to that of others and may not be similar to drumming. It seems obvious that a bird which uses its wings for drumming would have to keep its feet still if on the ground; if in the air, the foot treading would be rather waste effort. The Ruffed Grouse is the only one that drums from a fixed position; all others rise into the air and drum on the wing.

Distensible throat sacs are found in *Dendragapus*, *Canachites*, *Pedioecetes*, *Tym-*

*panuchus*, and *Centrocerus*. Those of *Dendragapus*, *Tympanuchus*, and *Centrocerus* are the largest and most distensible, but the throat sacs of *Centrocerus* differ markedly in shape. A trace or rudiment of a throat sac seems present in *Bonasa*.

Special erectile feathers of the neck are present in *Tympanuchus*, *Bonasa*, and *Centrocerus*. They vary, of course, in shape and position. Species having throat sacs but not erectile feathers (*Dendragapus*, *Canachites*, and *Pedioecetes*) open a rosette of feathers as they distend the air sacs, and these may be the equivalent of erectile feathers. Erectile feathers or a rosette apparently are absent in *Lagopus*.

The seventh characteristic is the possession, immediately above the eyes, of combs that are under some control of the bird. Those of *Dendragapus* are perhaps the largest and most highly developed. In *Dendragapus*, the combs are normally yellow, but they change color under stress of sexual fervor and may become bright red. Those of *Canachites* always retain the red color. The combs of *Lagopus* are rather developed as in *Dendragapus*, but those of *Pedioecetes*, *Tympanuchus*, and *Centrocerus* are reduced. They are absent in *Bonasa*.

If we look at the seven courtship characteristics of our grouse, we find that display alone is common to all. Six have vocal notes, five possess throat sacs, three have well developed combs, and three have combs variously reduced; one has no combs. Drumming is common to four genera; three do not drum but dance instead. Erectile feathers occur in but three genera.

*Dendragapus* and *Canachites* possess the same three characteristics; *Centrocerus* and *Tympanuchus* share the same four with each other and three with *Pedioecetes*. *Tympanuchus*, *Centrocerus*, and *Pedioecetes* seem to form a group having characters in common. *Dendragapus*, *Canachites*, and *Lagopus* form another. *Bonasa* forms a third group by itself.

Table 1  
Summary of Display Characters in Tetraonidae

Genus	Dancing	Drumming	Throat sacs	Erectile feathers	Combs
<i>Tympanuchus</i>	Present	Absent	Present	Present	Reduced
<i>Centrocerus</i>	Present	Absent	Present	Present	Reduced
<i>Pedioecetes</i>	Present	Absent	Present	Absent	Reduced
<i>Dendragapus</i>	Absent	Present	Present	Absent	Very large
<i>Canachites</i>	Absent	Present	Reduced	Absent	Large
<i>Lagopus</i>	Absent	Present	Absent	Absent	Present
<i>Bonasa</i>	Absent	Present	Trace	Present	Absent

There are a few points left that should be commented upon. The courtship performance is a communal affair in *Centrocerus*, *Pedioecetes*, and *Tympanuchus*; it is solitary in all others. Members of the three genera named gather at favored dancing grounds for courtship performance. Even on these communal courtship grounds, however, each male takes up an individual and personal post to which he returns regularly once it has become fixed. All other grouse drum or display in solitary courtship.

The drumming or dancing performance likewise has definite positional relationships in some, although these are less definite in others. *Centrocerus*, *Pedioecetes*, and *Tympanuchus* always dance on the ground. Only three times have I witnessed any variations in this procedure. On June 20, 1935, near Babcock, Wisconsin, the late Franklin Schmidt and I constructed a tar-paper blind from which to study and photograph the courtship of the Prairie Chicken. Evidently we placed it upon the dancing position of a chicken, for the next morning one bird walked around and around the blind. Then it hopped upon a thirty-inch high jackpine stem a few yards away and

craned its neck and looked at the blind. All other chickens on the booming ground boomed and paid no attention. Finally the lone male on the jackpine boomed from the pine, but he omitted the preliminary dancing steps. I was able to obtain several photographs of this unusual performance.

In the spring of 1924 near Jackson, Michigan, I saw several Prairie Chickens booming from atop a low rounded straw stack. The surrounding ground was wet from melting snow and rain and may have caused the birds to move to the straw stack.

On May 3, 1935, Franklin Schmidt and I were observing the courtship dance of Sharp-tailed Grouse several miles from the blind already mentioned. The blind we used on the Sharp-tail dancing ground was likewise of tar-paper, but it was a low dome-shaped structure four feet high. Sharp-tails danced on all sides of us, and one male danced upon the roof of our blind. The roar of his vibrating feet upon the hard surface of the tar-paper was deafening to our ears.

The Ruffed Grouse drums from a platform, which is most generally a fallen log, but I have seen them use stumps, roots, stones, and even clods and ant hills.

*Dendragapus*, *Canachites*, and *Lagopus* are intermediate. They may display from the ground, a clod, stump, log, or from a tree. They are also less restricted, for they may wander over several acres of ground during courtship.

The consideration which I have given to the courtship of Tetraonidae suggests intra-familial relationships, which I have indicated by means of a chart (fig. 37). Suggestions of relationships on the basis of habits may be open to question, but I believe that they do have some merit. The chart, although based on presumed relationships, also arranges the several grouse in about the order of preference of forest versus open habitat. My knowledge of courtship performances of the Blue Grouse suggests that the *obscurus* group (*obscurus*, *richardsoni*, *pallidus*) are somewhat farther from probable common

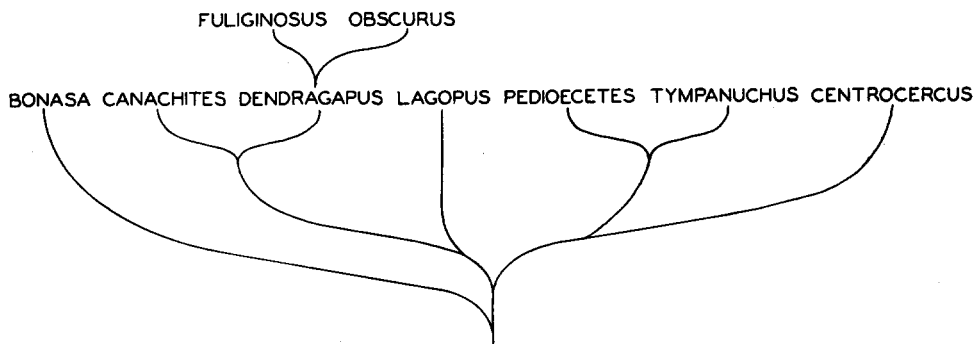


Fig. 37. Chart showing relationships among members of the family Tetraonidae, based upon courtship characters.

ancestral stock than the *fuliginosus* group (*fuliginosus*, *sierrae*, *howardi*). *Fuliginosus* has a heavier hooting note, which is more like that of *Tympanuchus*, for example, than the note of *obscurus*. It hoots more from trees than does *obscurus* and thereby more like *Canachites*. *Obscurus* probably can be considered as on the way towards losing the well-developed throat sac and progressing in the direction of *Lagopus*. I have indicated this on the chart.

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