

## FURTHER NOTES ON THE FLIGHT PERFORMANCE OF THE SNIPE

By LIONEL E. TAYLOR

IN THE CONDOR of September, 1924, there is an interesting article by Mr. Ralph Hoffmann on the "Flight Performance of the Wilson Snipe". This so called drumming or bleating of the Snipe has been the subject of careful study by European observers during the last sixty-five years, and for the benefit of those to whom the full literature is not available it may be interesting to quote the findings of some of these observers.

In the Proceedings of the Zoological Society of London for 1907, pp. 12-35, there is an exhaustive paper by Mr. P. H. Bahr, B.A., F.Z.S., "On the 'Bleating' or 'Drumming' of the Snipe (*Gallinago caelestis*)": In this paper the literature on the subject is reviewed, followed by Mr. Bahr's own observations in the field, together with an account of microscopic examination of the tail feathers of various species of *Gallinago*. Mr. Bahr's conclusions are that the two outer tail feathers are the active agents in causing the bleat, although the mechanism varies considerably with different species. In *G. caelestis* it is produced by the vibration of the inner web as a whole, in *G. frenata*, *G. nobilis*, and *G. australis*, by vibrations of the individual rami, in *G. megala* and *G. solitaria* by vibrations of the feathers as a whole.

The first exponent of the theory that the drumming was produced by means of the outer rectrices was Mr. Meves, of Stockholm, who in 1858 communicated a paper on the subject to the Zoological Society of London, through Mr. Wooley, who also confirmed Meves's experiments. These are the experiments referred to by Prof. Newton in his "A Dictionary of Birds".

Mr. Bahr further elaborated on Meves's experiment, and the following quotations from his (*loc. cit.*, pp. 17-19) paper may be of interest.

"I find that ordinarily the bird flies up to a height of 60-100 feet above ground, in windy weather going higher, with its tail held in the ordinary position of flight . . . , then, turning, it spreads its tail out like a fan, *the two outer tail-feathers* being spread out well in front of the other twelve and held firmly there. . . . Immediately the bird begins to descend the bleat is heard (making due allowance for the time it takes for sound to travel). While descending the bird makes tremulous motions with its wings from the radio-carpal joint. The descent is made from 30-40 feet and occupies 2-3 secs., the bleat lasting the same time. The bird does not drop head foremost through space, but at an angle of from 45°-60° with the horizon. The tail as a whole is not vibrated, but it is quite easy to see the two outer tail-feathers with a strong glass vibrating to such an extent that their terminal portions become indistinguishable."

"Once having convinced myself that the two outer tail-feathers are invariably spread out beyond the others, a fact which is now obvious to me with the unaided eye, it seemed to me that the two outer tail-feathers must be the active agents in causing the bleat. I accordingly procured several tails of the Common Snipe, and taking the two outer tail-feathers, pierced the shaft with a pin, to which I firmly bound it with cotton and inserted the feathers into a cork at the end of a stick some six inches long. A hole is bored at the other end of the stick and a long string attached. This is whirled round the observer's head and a typical bleat is produced. The second outer tail-feathers (sixth pair) produce a fainter sound, though this varies much in individual tails, the others make no sound at all.

"In order to ensure the success of the experiment it is necessary (1) that the feathers be placed so that the narrow edge, the outer web, shall encounter the resistance of the air; (2) that the feather be firmly bound to the pin, so that it cannot turn

on its support; (3) that the string be tied to one end of the stick, so that the long axis of the stick makes an angle with the direction of the string, if I may so put it, so that a vibratory motion is imparted to the stick as a whole, thus simulating the tremulous motion of the Snipe's wings during the descent; (4) lastly, that the apparatus be moved at a uniform rate and not too fast."

Many years ago I tried this experiment myself with the African species, *G. nigripennis*, and obtained satisfactory results. I hope others on reading the above may be led to experiment with *G. delicata*, which Mr. Bahr mentions as producing a sound of a far higher pitch than that of *G. caelestis*, as might be inferred from the different character of the feathers, which are narrower and somewhat attenuated.

It is interesting to note that Audubon in his "Birds of America," referring to the drumming of the snipe, says: "The sounds produced are extremely pleasing, though they fall faintly on the ear, but I am assured that they are not produced by the beatings of the wings, as at this time the wings are not flapped but are used in sailing swiftly in a circle not many feet in diameter."

In the volume on Snipe and Woodcock in the Fur and Feather Series published in 1903, fifteen pages are devoted to the drumming of the snipe, and the credit for originating the tail theory is given to Mr. G. H. Storer who wrote as follows in the Badminton Magazine of June, 1899: "I do not imagine that the wings can in any way be considered the musical instruments. Rather is the apparatus to be looked for in the tail. Examine the outer tail feathers of a snipe, and you will see at once that the shaft is strong and bent like a sabre, and that the outer web is stiff and very narrow, whilst the inner web is broad. Pluck out one of these feathers and fix it upon a stick. Now move the stick quickly, so that the outer web strikes the air obliquely, as did the tail of the bird in life, and you will obtain a good, if not powerful, imitation of the Snipe's bleat."

The editor is of course at fault in crediting this discovery to Mr. Storer and overlooking the paper of Mr. Meves, quoted above, and written forty-five years previously.

In the English "Field" of December 16, 1916, there appeared an article by "Cheviot", a very well known writer, on the drumming of the Snipe, in which he corroborates the tail theory, and adds an account of a further variation to the experiments of Meves and Bahr by fastening the outer tail-feathers in the shaft of an arrow. He says in part:

"If you drill two little holes just above the feathers of an arrow and fix the two outer tail-feathers into the holes in the position in which the bird places them when he drums—that is, at right angles to the shaft—and if you shoot the arrow high in the air, you will get, when the arrow has turned and is falling fast, exactly the sound of a snipe drumming. You cannot tell the difference except that it ends abruptly as the arrow strikes the ground."

He further points out that the breaks or waves in the drumming can be heard quite distinctly when the arrow is falling and this he believed was due to the play of air along the web of the feathers. On picking up the arrow, he points out, the web of the tail feathers was always found to be bent in a curve, like the blade of a propeller, but not always in the same curve. From this he adduces that the curve, not always having reached the same stage in its play along the web, produces the "break" from the running out of the curve or ripple along the web to the end of the feather and the beginning again at the base of the shaft.

Mr. W. P. Pycraft in his "History of Birds", 1910, also bears out the tail theory and points out the structural differences between the vanes of the outer tail-feathers and those of the other feathers: "The difference consisting in the greater number of

hooklets, and in the larger size of those belonging to the barbs of this region of the feather, whereby the vane becomes more resistant to the rush of air caused by the wings during the descent."

There are doubtless other references to which I have not access, but I think those which I have quoted are sufficient to leave little doubt that the phenomenon of drumming or bleating in Snipe is entirely attributable to the action of the outer tail-feathers and has nothing whatever to do with the remiges as was formerly supposed.

*Kelowna, British Columbia, December 2, 1924.*

## THE HOOTERS OF SKYLINE RIDGE

By JOHN M. EDSON

**S**KYLINE RIDGE is a steep-sided elevation that extends north-northwesterly from Mount Baker for a distance of about two miles. It has an altitude of some 5400 feet at its northerly extremity, and with some intervening irregularities and undulations trends upward to over 7000 feet as it merges with the snow fields of the big mountain. Throughout its length the snow lingers in sheltered spots till late in summer. Lupine, heliotrope, the dog-tooth violet and dozens of other flowers make the open spaces radiant with color as rapidly as the snow recedes. The dark forests that clothe the lower slopes send up a ragged fringe of alpine hemlock and sub-alpine fir wherever they can break into the snow-line. These stunted trees dwindle to mere shrubs, matted in dense patches, mingling with the heather along the higher reaches. Besides the park-like beauty of the foreground, the higher eminences afford a remarkably wide and inspiring cyclorama of the wild mountain scenery of northern Washington and southern British Columbia.

From July 9 to 16, 1925, Doctor W. T. Shaw, professor of zoology of the State College of Washington, and myself, were encamped on the most northerly brow of Skyline, where there were a few square rods of ground sufficiently horizontal for the purpose. A mass of snow lay along the east side of the camping spot and extended far down the slope. This afforded convenient refrigeration for our eatables, also for mammal and bird specimens, a few of which we collected. On the north the ridge sloped downward sharply, presenting a rocky spine scantily covered with soil and herbage. To the west the slope was less steep and there were scattered clusters of trees, to which we looked for fuel. South of us was an open space just vacated by the retiring snow, where the heliotrope and other plants were pushing up to the sunlight. This extended on up the ascent that led to the main ridge.

Skyline offers an acceptable summer home for Juncos, Pipits, Slate-colored Sparrows and Solitaires, with occasional Rosy Finches and Ptarmigan, not to mention frequent visitors from the lower levels. But it is the Sooty Grouse (*Dendragapus obscurus fuliginosus*) that is the special subject of this paper, and particularly the hooting of the male of the species. Our opportunities happened to be somewhat unusual for observing the vocal efforts and accompanying behavior of the cock bird. We saw a number of single grouse of both sexes at different points along the ridge, all apparently adult birds, and at favorable times heard from various quarters the more or less distant hooting that is characteristic of the species. We were unable to determine just what weather conditions were most favorable for hooting, nor could