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Incomplete songs and associated behavior of Sage Sparrows.—The Sage Sparrow (*Amphispiza belli*) is a locally-common breeding bird of sagebrush (*Artemisia tridentata*) in the intermountain west. Vocalizations of this species have only recently been described in detail (Rich, *Condor* 83:113–119, 1981; Wiens, *Auk* 99:208–229, 1982). The intent of this note is to provide additional information on Sage Sparrow vocalizations, especially in regard to incomplete songs.

In 1976 and 1977 I studied the behavior of four unmarked, neighboring, territorial males from March to July in Bingham County, Idaho. Males are identified by numbers; male 3 was present in both years and is referred to as male 3–6 for 1976 data and male 3–7 for 1977. For details see Rich (1981). Each male had one song type that did not vary appreciably throughout most of the breeding season or, apparently, from year-to-year.

Males also had calls that Miller (U.S. Natl. Mus. Bull. 237, Pt. 2, 1004–1013, 1968) referred to as *tsip* and “harsh” notes. The *tsip* note was a high, thin call note typical of sparrows. The “harsh” note was a rapidly repeated note of rasping quality, each with a rising inflection. These calls were usually used separately, but on a few occasions I heard the *tsip* notes intensify to “harsh” notes in a graded manner. Females did not sing and may or may not use the “harsh” notes. Females did use *tsip* notes.

The only significant exception to the stereotyped song of the male was the incomplete song wherein only a few syllables to about half the full song were sung. The incomplete song always began with the first syllables of the complete song and had the quality of being abruptly truncated. There were well-defined behavioral relationships in the four males that used it (Table 1). The common factor was the close association with the female. However, there was also an influence from the stage of the breeding cycle as all four males were observed with the female at other times during the breeding season but did not sing incomplete songs when with her at that period. Incomplete songs were never heard after spring arrival and prior to nest-building, during incubation, during the nestling period, or after the fledging and dispersal of the last brood when complete songs were sung. Two other males, 1–7 and 17, gave both *tsip* and “harsh” notes while with the female prior to nest-building and in territorial conflicts where contact and visual displays (unilateral wing raise, head bobbing) occurred. The *tsip* and “harsh” notes were associated with agonistic situations and were secondarily associated with incomplete songs which seemed to occur in sexual contexts.

Incomplete songs, when sung, either comprised the entire song bout or were distributed among the complete songs of the bout. In the four males the distribution of complete and incomplete songs in 60 bouts with both types was random (one-sample runs test, all $P \geq 0.05$, Zar, *Biostatistical Analysis*, Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1974). But in males 3–6, 3–7, and 6 incomplete songs occurred more frequently early in the bouts; 60% of first songs were incomplete, 43% of second songs, 31% of third songs, and an average of 18% of the songs at later positions. Perhaps motivation was highest at the onset of a bout and dropped off during the bout. The percentage of incomplete songs in all bouts in which they occurred was similar for the four males: male 3–6, 22%; male 6, 22%; male 3–7, 20%; male 4, 40%. The higher percentage was given by male 4 mainly on one day when he sang incomplete songs while he accompanied the female and young of the first brood around the territory.

The Eurasian Blackbird (*Turdus merula*) sings only part of its song when inviting the female to leave the nest and forage (Stork, *Z. Tierpsychol.* 28:54–58, 1971). Brémond (*Behaviour* 58: 99–116, 1976) experimenting with truncated songs of Bonelli's Warbler (*Phylloscopus bonelli*) noted that they were less effective in arousing aggressiveness in males than were full-length

TABLE 1
BEHAVIORAL RELATIONSHIPS OF INCOMPLETE SONGS OF SAGE SPARROWS

Condition	Male			
	3-6	3-7	4	6
Near female during nest-building	X ¹	X	X	X
Chasing female	X	X	0 ³	0
After young fledged from first nest	X	—	—	—
With fledged young and female	— ²	—	X	—
Immediately after desertion of nest	X ⁴	—	—	X ⁵
With <i>tsip</i> notes	X	X	0	X
With "harsh" notes	X	X	0	X

¹ Incomplete songs occurred (X).

² Condition not observed (—).

³ Condition observed but incomplete songs not sung (0).

⁴ Desertion of second nest due to Brown-headed Cowbird (*Molothrus ater*) parasitism.

⁵ Desertion of first nest, cause unknown.

songs. In some warblers (*Dendroica* spp.) (Morse, Nature 226:659–661, 1970; Anim. Behav. 24:764–771, 1976), the Grasshopper Sparrow (*Ammodramus savannarum*) (Smith, Wilson Bull. 71:141–152, 1959), Clay-colored Sparrow (*Spizella pallida*) (Knapton, pers. comm.), Cuban Grassquit (*Tiaris canora*) (Baptista, J. Orn. 119:91–101, 1978) and White-eyed Vireo (*Vireo griseus*) (Bradley, Auk 98:80–87, 1981) there are two songs, one of which is used primarily in epigamic situations and the other in territorial or agonistic contexts. The Sage Sparrow, not having a varied vocal repertoire, may use the incomplete song under certain conditions of high motivation as an alternative to his one stereotyped song. Perhaps communication of aggressive tendencies to the female is reduced. Alternatively, incomplete songs may simply result from a conflict between approach and avoidance (Ficken and Ficken, Behaviour 46:114–128, 1973; Wunderle, Anim. Behav. 27:982–996, 1979; J. B. Falls, pers. comm.). In this respect I have also observed Brewer's Sparrows (*S. breweri*) begin truncating songs when another male flew to a nearby perch and also in response to playback of full song. Several vireos (*Vireo* spp.) also sing truncated but faster songs in response to playback (Barlow, pers. comm.). Thus, conditions of increased stimulation, coupled with uncertainty, may obstruct full-length songs in the Sage Sparrow.

It would be interesting to document the presence or absence of incomplete songs in other species that are known to have a single stereotyped song. If incomplete songs are not used perhaps other variations of full song occur to enhance communication of different motivational states.

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