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NOTES ON SAGE THRASHER NESTLINGS IN COLORADO

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Some information on the growth and development of nestling Sage Thrashers (*Oreoscoptes montanus*) was obtained incidental to a study by the Bureau of Sport Fisheries and Wildlife on the use of sagebrush by wildlife in Gunnison County, Colorado. Ten nests, four in 1964 and six in 1965, were studied, and data gathered on 11 nestlings in three of them. One 1964 nest (A) contained two nestlings; and two 1965 nests, contained four (B) and five nestlings (C). The nestlings in nests A and B were weighed and measured daily from the time of hatching until they left the nest. Those in nest C were weighed and measured on only the fifth day (tables 1 and 2) to determine if daily manipulation had any effect on growth and time of fledging.

Weights and measurements of nestlings were taken between 05:00 and 07:00. All measurements were made with a dial caliper; weights were taken with a triple beam balance sensitive to 0.1 g.

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Nesting materials, construction, and placement were similar to those described by Gilman (1907), Dawson (1923:728-729), Bailey (1928:561), Linsdale (1938), Bent (1948), Headstrom (1951), Jewett et al. (1953), and Bailey and Niedrach (1965).

Nests measured in this study averaged somewhat larger than those listed by Headstrom (1951). The

top outside diameter of the bowl averaged 7.2 (6-9) inches, the inside top diameter, 4.4 (3½-5½) inches, and the inside depth, 3.1 (2¼-3½) inches. Headstrom (1951) listed an average outside diameter of 5.6 inches, inside diameter of 3.5 inches, and inside depth of 2 inches.

Incubation apparently began on the day before the last egg was laid, for one nestling in each nest hatched one day after the others. Eggs were not all hatched at the same time of day. One nest contained only eggs at 06:00; at 18:30 three of the five eggs had hatched. The next morning at 06:00 a fourth egg had hatched. The nestling was still damp and very weak, indicating that only a short time had elapsed since its emergence.

At the time of hatching, nestling movements were limited to defecation, feeding responses, and uncontrolled wiggling. The tomsia and ricti were creamy white, and the inside mouth lining was yellowish to yellow-orange. The nestlings' eyes were closed at the time of hatching but did not appear to be sealed.

Nestling Sage Thrashers are typically altricial. At hatching the sparse down on the capital, spinal, caudal, femoral, and alar pterylae was dark bluish-brown. The color of the down and the dark brown pigment of the skin blended well with the nest material.

Weights and measurements are given in tables 1 and 2. With one exception, weighing began when nestlings were at least 15 hr old. The weight of one nestling that appeared to be 1 hr of age was 8.5 per cent of the average weight of two adult females (table 1).

The nestlings remained in the nest for about 11 days, despite the handling required to gather these data. The five nestlings in nest C left the nest between the eleventh and thirteenth day. Slight growth differences, perhaps related to disturbances, were noted

TABLE 1. Weights (g) of adult and nestling Sage Thrashers at different ages.

Age ^a (days)	n	Mean	Range
0*	1	3.2	
1*	6	4.6	4.1-5.2
2*	6	7.4	6.6-8.1
3*	6	10.9	10.0-11.9
4*	6	15.1	14.0-16.1
5*	6	19.0	17.5-20.8
5**	5	19.4	16.1-21.0
6*	6	23.7	21.3-24.8
7*	6	27.5	23.8-28.6
8*	6	30.2	26.7-32.1
9*	6	31.6	27.8-32.6
10*	5	33.1	28.8-35.3
11*	4	33.0	30.0-34.4
♀ ♀ ***	2	37.5	37.2-37.8

^a * Nests A and B; ** nest C; *** adult females taken in flesh 30 July 1964.

between the nestlings in nest C and those in nests A and B (tables 1 and 2).

Some nestlings appear to be capable of leaving the nest on the ninth or tenth day. A single nestling in nest B was missing 10 days after hatching. The next day this bird was relocated 30 ft from the nest and was placed back in the nest. It had lost 2.2 g, but its growth rate remained about the same as that of its companions. This bird could move rapidly to cover and called loudly to its parents. All of the nestlings of nest B had left the nest by the morning of the twelfth day.

The six nestlings in nests A and B gained an average of 3.4 (1.5-4.7) g per day for 11 days of observation. Their average weight on the eleventh day was nearly 87 per cent of the weight of the adult females (table 1).

Between the fourth and fifth days after hatching, the sheaths started to emerge from the papillae on most of the pterylae. Rectrices measured about 1 (0.9-1.1) mm on the fifth day. This measurement may provide a method for aging Sage Thrasher nestlings from the fifth day on, because ranges of daily measurements without overlap were found after

the fourth day (table 2). All feather sheaths had emerged from the papillae by the sixth day.

The teleoptiles were sufficiently developed to nearly cover all the apteria by the time the nestlings had left the nest. Those that left on the tenth day still had a small portion of the midventral apterium showing. On the eighth day they made chirping sounds for the first time when handled. By the eleventh day all traces of the egg tooth had disappeared, and some color characteristics, such as streaking on the ventral breast feathers and a general darkening of body feathers, were evident.

The nestlings' eyes opened partially on the fourth day, but remained open for only short periods of time. On the sixth day nestlings kept their eyes open the entire time they were being handled. At this time they seemed to be more alert and more responsive to feeding stimuli. They cowered when danger threatened, pointing their bills upward against the rim of the nest. Nestling Sage Thrashers did not seem to have the tendency to jump out of the nest when approached, as I have noted for Brewer's Sparrows (*Spizella breweri*) and Vesper Sparrows (*Poocetes gramineus*).

Nesting success was variable. In nest A only two of the four eggs hatched and both nestlings left the nest. In nest B four of the five eggs hatched and all four nestlings left the nest. One of the ground nests had five eggs when located. When checked six days later the eggs were missing and tracks of a coyote were noted near the nest. No sign of egg shells was found near the nest, nor had it been damaged. All five eggs in nest C hatched and all nestlings fledged.

A few behavior patterns of the adults were also noted. They were very secretive in coming into and leaving the nest. An effort was made to count the visits to the nest with the aid of a spotting scope and 8× binoculars at a distance of about 70 yards. Eleven trips to the nest by the parents were verified in a one-hour period. During another two-hour watch, the adults apparently came in and out without detection. Adult birds blended very well with the branches and stems of the sage. When approaching the nest, the adult perched atop a sage bush 10 or more feet from the nest site. It then dropped down under cover, approaching or leaving the nest from

TABLE 2. Measurements of adult and nestling Sage Thrashers at different ages.

Age ^a (days)	n	Length (mm)									
		Total		Wing		Tail		Tarsus		Bill ^b	
		Mean	Range	Mean	Range	Mean	Range	Mean	Range	Mean	Range
1*	6	50	48-53	9.9	9.5-10.2			10.4	9.5-10.9	3.4	3.4-3.5
2*	6	57	55-61	10.3	9.6-11.0			12.6	12.1-13.6	3.8	3.7-3.9
3*	6	61	58-67	12.2	11.0-12.9			15.4	14.4-16.4	4.4	4.0-4.6
4*	6	70	67-72	15.2	13.4-16.3			18.6	17.5-19.8	4.8	4.6-5.0
5*	6	77	70-84	18.6	16.7-20.4	1.0	0.9-1.1	21.3	20.4-21.8	5.5	4.9-5.9
5**	5	85	80-88	20.8	17.5-24.1			22.7	20.9-24.4	5.6	5.5-5.8
6*	6	83	79-88	23.1	21.4-25.1	1.6	1.5-1.8	24.2	23.1-25.6	5.8	5.2-6.1
7*	6	90	87-94	28.4	27.4-29.8	3.2	2.3-3.9	27.0	26.0-27.5	6.1	5.6-6.3
8*	6	95	90-100	34.5	31.5-37.4	6.0	4.5-7.0	29.3	27.8-30.2	6.5	5.9-6.9
9*	6	101	98-102	39.5	37.3-42.5	9.5	8.4-11.2	30.9	28.9-32.9	6.8	6.1-7.1
10*	5	106	103-110	43.6	41.8-46.5	12.3	11.3-13.5	32.4	31.4-33.5	7.1	6.4-7.4
11*	4	110	105-116	48.8	47.5-50.2	17.0	14.2-19.2	33.0	31.5-34.5	7.6	6.9-9.3
♀ ♀ ***	2	201	200-201	93.7	93.3-94.0	87.6	87.5-87.6	31.9	30.8-34.0	12.4	12.3-12.4

^a * Nests A and B; ** nest C; *** adult females taken in flesh 30 July 1964.

^b Anterior edge of nostril to billtip.

the ground, and did not come up into view within 6–10 ft of the nest site.

Parental brooding seemed quite efficient during periods of inclement weather. After a night of hard rain, a check of nest A revealed that the inner nest and nestlings were dry even though the morning was damp and the surrounding vegetation soaked.

SUMMARY

Nestling Sage Thrashers usually stayed in the nest for 11–13 days. Incubation seemed to start on the day before the last egg was laid, since there was usually one nestling that hatched one day after the others. Nestling Sage Thrashers weighed about 8.5 per cent of the weight of two adult females on the day of hatching and attained approximately 87 per cent of the adult weight before leaving the nest. The rectrices emerged from the papillae between the fourth and fifth days. After the fifth day, rectrix length may be a means of aging nestling Sage Thrashers. Constant disturbance did not seem to cause the nestlings to leave the nest more than a day or so sooner than if they had not been disturbed.

COURTSHIP AND TERRITORIAL DISPLAYING IN THE VERMILION FLYCATCHER, *PYROCEPHALUS RUBINUS*

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In 1968 I observed courtship activities in two pairs of Vermilion Flycatchers, *Pyrocephalus rubinus*, and also persistent patrolling of territorial boundaries by three males, all in the vicinity of Portal, Arizona. The observations provide information not available when I earlier commented (Smith 1967) on the displays of this species at the same sites. Together with the previous material these observations make possible systematic comparisons of the display behavior of this and related species.

The *Nest-Site-Showing* display (N-S-S) was seen during three days in one pair and one day in the second, in the period in which the female was selecting a nest site and beginning to build. (It could also have occurred in pair-formation, a phase I have yet to see.) Most observations were of one male, who displayed repeatedly. The form is similar to that in *Sayornis phoebe* (Smith 1969) in that the male would crouch in a potential nest site, make slight nest-forming movements, and flutter his wings close over his back in a small-amplitude movement while calling. This was done at several sites in the nest tree and in a nearby tree; one site was used more than half the time. His mate initially began to build about 10 m from this site in the same tree, but eventually completed her nest within 2.5 m of the male's preferred site.

During several hours of observation on one morning, this male displayed very frequently, and somewhat more often in his mate's absence than in her presence. He frequently responded to her return to the nest tree by going to one of his sites and beginning N-S-S. She often appeared to ignore him, but several times joined him at the site, crouched down

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beside him, and then supplanted him over a period of a few seconds, during which both individuals did N-S-S with Chatter Vocalization side-by-side. He would fly off a few feet and watch as she continued the display in his site. Her display appeared identical to his except that it lacked the wing movements. Further, she sometimes displayed when actually building at one of her sites. In events in which she initiated the displaying he rarely joined her, and he never supplanted her.

The principal vocalization during N-S-S was the *Chatter Vocalization* (CV), not previously reported for this species. In form (fig. 1) it resembles the initial elements of the RRV (see below), but it was uttered at various rates and often more slowly than those elements. It resembles the CVs of closely related tyrannids (e.g., apparent homologues in *Muscisaxicola* species, Smith, in press, and that of *Sayornis nigricans*, Smith 1970a), as well as those of some more distantly related species (such as *T. tyrannus*, Smith 1966). Although sometimes absent from very brief bouts of N-S-S, it was inevitable and nearly continuous in prolonged bouts.

When used by this male, CV was frequently accelerated and developed into a *Regularly Repeated Vocalization* (RRV), which then might be repeated once or twice. RRV was also used once by the male of the other pair, in flight toward his mate.

During the early phases of breeding activity in late May, and again early in July after the rains began and some males renewed active patrolling of territorial boundaries, the RRV was used frequently throughout the morning, and sporadically later in the day. Thus it is less restricted to predawn and evening bouts than I had previously thought. It was more often uttered from a perch than in a flight display. When patrolling and countercalling with RRV, males tended to perch relatively high, but they sometimes used RRV from perches as low as one meter.

RRV thus has at least two quite different usages: in courtship (with N-S-S), and in territorial proclamation (patrolling, calling from station, countercalling, and flight displays). I was also able to elicit it from one male in response to a stuffed owl decoy (see below).