Wilson Bull., 111(1), 1999, pp. 134–137

Singing in a Mated Female Wilson's Warbler

William M. Gilbert[1,3] and Adele F. Carroll[2]

ABSTRACT.—A female Wilson's Warbler, *Wilsonia pusilla,* was heard singing regularly on the territory of a male in middle inner-coastal California during early April, 1996, and occasionally after mid-April. Based on their behavior, the resident male and the singing female were paired. The female averaged about four songs/min during singing bouts, and was heard about 30% of the time during early April. The female's song was high pitched, and did not resemble typical male "chatter" song. In contrast to the functions of female song in many tropical and some temperate parulids, this song seemed to serve as a simple contact vocalization between mates, as call notes might. A single female song heard in a newly formed pair in 1997 raises the possibility that such songs might function in pair formation. *Received 10 April 1998, accepted 25 Aug. 1998.*

Singing by female birds, while common and perhaps characteristic among tropical species, occurs much less commonly among temperate species (Morton 1996). Tropical and temperate wood warblers follow this pattern. Songs of tropical parulid females commonly are used in "duets" with mates and may function in pair formation, communication with mate, and territorial defense (Spector 1992). To serve such functions, consistency in occurrence and stereotypy in form of song seem to be required. Song in temperate parulid females, where reported, has typically occurred in few females within a population, and in some cases song patterns have varied among females (e.g., Nolan 1978, Hobson and Sealy 1990). This suggests that song in temperate parulid females is idiosyncratic, and/or serves very limited and infrequent functions. To our knowledge, female song has been reported in ten temperate parulid species from six genera: *Vermivora, Parula, Dendroica, Setophaga, Seiurus,* and *Geothlypis* (Spector 1992, Moldenhauer and Regelski 1996). Here we report singing in a mated female Wilson's Warbler, *Wilsonia pusilla.*

We first heard the female song on 3 April, 1996, from the territory (ca 0.2 ha) of a color-banded resident male (the "male") Wilson's Warbler in the Nature Study Area of Tilden Regional Park, Contra Costa Co., California. We subsequently heard this unusual (compared with typical male "chatter" song; Fig. 1B) and distinctive song at various times between 07:15 and 11:40 PST through 18 April. The high frequency song sounded "sharp" and "squeaky" (Fig. 1A, C). It was delivered at a rate of 4.0 ± 0.6 songs/min (range = 2–6, n = 7) within singing bouts (we considered a singing bout to be continuous singing with no pause greater than one minute between songs). On four separate occasions, we observed the beak of a Wilson's Warbler to open and move as the female song was heard, confirming that the song came from the species. Behavioral observations (see below) indicate that the singer was the resident female (the "female") in the territory she occupied. This female also frequently chipped within this territory (Fig. 1C).

From 3 through 12 April we located the female during 30% of our observation time (490 min) based on hearing her song and/or sighting the singing bird. We confirmed that the male was in her proximity 20% of our observation time (the male usually did not sing and often was more difficult to locate). Bouts of female song that we monitored lasted 11.5 ± 3.0 min (range = 1.5–27, n = 11), and male-female separation distance was 6.8 ± 1.2 m (range = 2–20, n = 22). From 13 through 30 April, we located the female just 5% of our observations time (825 min), and located the male in her proximity only 2% of that time. Bouts of female song that we monitored lasted 3.1 ± 1.3 min (range = 1.5–7.0, n = 4), and mean male-female separation distance was 4.4 ± 1.2 m (range = 0–12, n = 11). Three consecutive singing bouts monitored on 18 April

[1] 4630 Driftwood Ct., El Sobrante, CA 94803; E-mail: wmglbrt@aol.com

[2] 1147 Fresno Ave., Berkeley, CA 94707.

[3] Corresponding author.

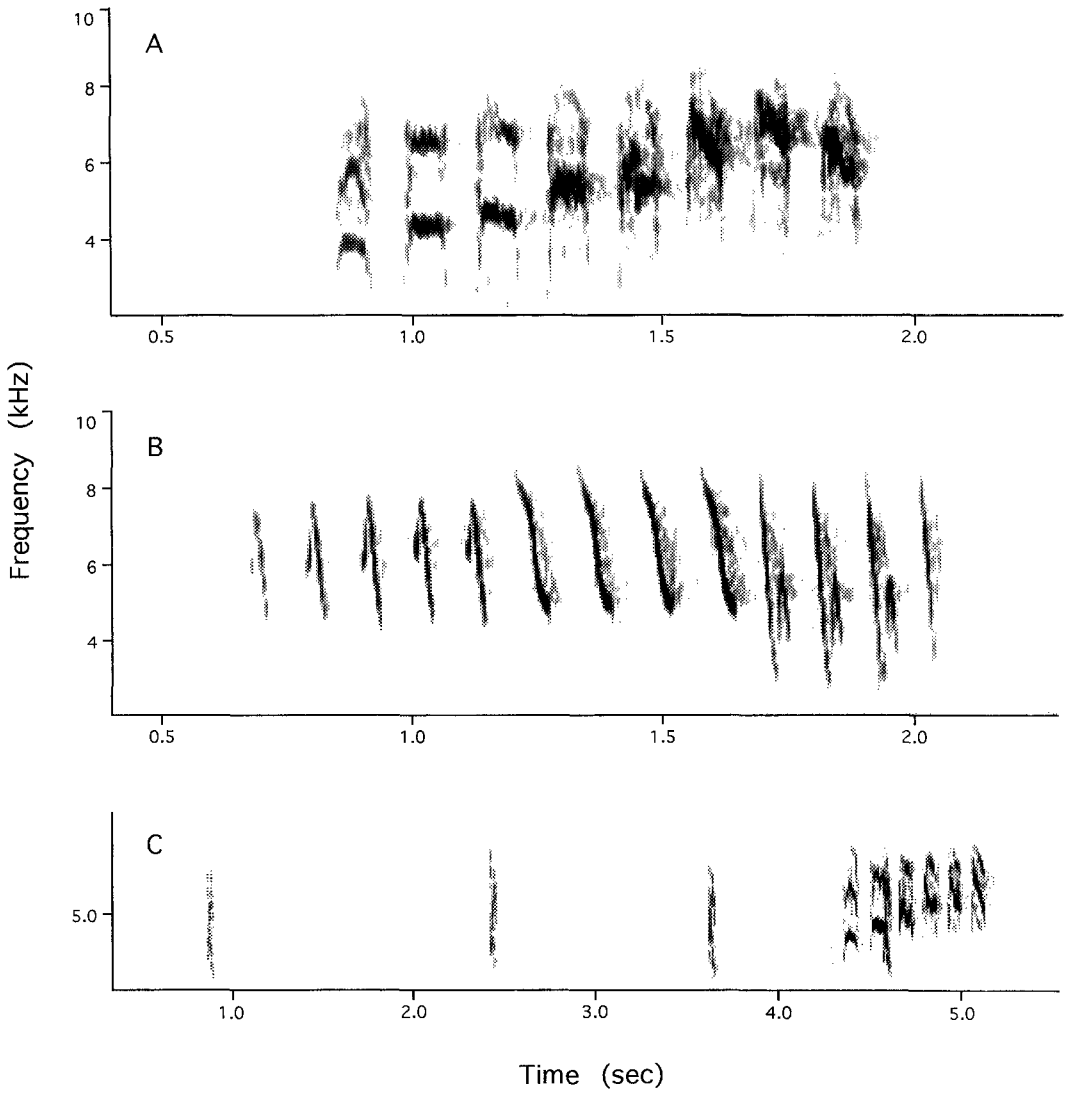

FIG. 1. Wilson's Warblers vocalizations recorded in April, 1996, within a breeding territory at a study site in Contra Costa Co., California. A. Eight-note song, sung by resident female, with resident male in close proximity. B. A typical "chatter song" of resident male. C. Three call notes, followed by a 6-note song, by resident female. Recordings made by W. M. Gilbert using a SONY TCD-D8 recorder and a Sennheiser K3U microphone. Spectrograms made with Canary 1.2.1 software (Cornell Laboratory of Ornithology) using a Macintosh 7.5 system computer.

had separation intervals of 30 and 44 min. At no time during our observations did we notice unusual resident male behavior (compared with other mated males) that might have elicited singing in the female.

We relied on several contextual clues to determine the sex of the bird singing the unusual song (the sexes of west coast Wilson's Warblers often are indistinguishable in the field), and that bird's relationship to the resident male on whose territory it sang: (1) the male was mated (although we found no direct evidence of breeding, unpaired males tend to sing persistently, often from exposed perches, while this male sang sporadically, often from undergrowth); (2) we consistently heard the

unusual song from within the male's territory, but not from beyond its borders; (3) about two-thirds of the time that we heard the unusual song, the male was sighted within 25 m of the singer, and the male and the singer often foraged in the same tree, in adjacent trees, or in the same restricted area of undergrowth; (4) even though the two birds frequently were close, they never were in conflict; (5) we never simultaneously sighted nor heard the two birds at opposite ends of the territory; and (6) we never consistently sighted a third Wilson's Warbler within the male's territory, as we would have had the male been mated to a bird other than the one singing the unusual song. Based on this evidence, we concluded that the bird singing the unusual song was a female mated with the resident male on the territory where she sang.

On 27 March, 1997, WMG observed a newly formed (<3 h) pair of Wilson's Warblers on a territory adjacent to that in which we heard the female song in 1996. The new pair was in view for 41 min and the color-banded male followed the unbanded female through vegetation ranging from undergrowth to tree canopy. Amid continuous chipping from the pair, WMG heard one song indistinguishable by ear from the female songs heard in 1996. It could not be determined which bird delivered the song, nor if the female of the pair was the same bird that sang the female songs in 1996.

Information on female song in temperate parulid species is limited. In female Prairie Warblers (*Dendroica discolor*), a limited number of females' songs heard were all simple and perhaps "primitive," highly variable among individuals, and unlike normal male songs (although some were identifiable to species). These songs were delivered early in the season, were heard sporadically, and may have been delivered by older females displaying more male-like behavior (Nolan 1978). In Yellow Warblers (*Dendroica petechia*), Hobson and Sealy (1990) suggest that female song can function in intrasexual conflicts within very dense breeding populations.

The singing we heard from a female Wilson's Warbler(s) occurred early in the season and possibly came from an older bird(s), as would be consistent with some findings of Nolan (1978) for the Prairie Warbler and with some correlates of female song in other species where usually only the male sings (Nice 1943). Other aspects of the singing we heard appear to differ from what occurs in females of some other parulids, however. The songs we heard were not used in duets with mates, as in many tropical species (Spector 1992). There was no evidence that they functioned in intrasexual conflicts within dense populations (Hobson and Sealy 1990). Finally, we heard the female consistently for more than a week in early April, 1996, as opposed to isolated bouts of singing heard on single days (Nolan 1978).

The female songs we heard in 1996 (as well as the single song heard in 1997) were interspersed between chip notes and usually delivered with the resident male close to the female. This suggests the songs may have functioned to communicate with a mate. The single song heard in 1997 (if delivered by a female and one different from the singer of 1996) introduces the additional possibility that the song could serve a special communicatory function during early Wilson's Warbler pairing. If so, then the persistent female singing heard in 1996 would have been an abnormal carry-over of that behavior into the nesting period. Singing in that female may have reflected an abnormal hormonal balance, similar to effects of testosterone injection in stimulating song in female birds that normally don't sing (e.g., Baptista and Morton 1988).

ACKNOWLEDGMENTS

We thank the East Bay Regional Park District for authorization to conduct research in the Tilden Nature Area of Tilden Regional Park. We thank D. Kroodsma and an anonymous reviewer for their comments and critical review of this paper.

LITERATURE CITED

BAPTISTA, L. F. AND M. L. MORTON. 1988. Song learning in montane White-crowned Sparrows: from whom and when. Anim. Behav. 36:1753–1764.

HOBSON, K. A. AND S. G. SEALY. 1990. Female song in the Yellow Warbler. Condor 92:259–261.

MOLDENHAUER, R. R. AND D. J. REGELSKI. 1996. Northern Parula (*Parula americana*). *In* The birds of North America, no. 215 (A. Poole and F. Gill, Eds.). The Academy of Natural Sciences, Philadelphia, Pennsylvania; The American Ornithologists' Union, Washington, D.C.

MORTON, E. S. 1996. A comparison of vocal behavior among tropical and temperate passerine birds. Pp.

258–281 *in* Ecology and evolution of acoustic communication in birds (D. Kroodsma and E. Miller, Eds.). Cornell Univ. Press, Ithaca, New York.

NICE, M. M. 1943. Studies in the life history of the Song Sparrow, part 2. Trans. Linnaean Soc. N.Y. 6:1–328.

NOLAN, V., JR. 1978. The ecology and behavior of the Prairie Warbler *Dendroica discolor*. Ornithol. Monogr. 26:1–595.

SPECTOR, D. A. 1992. Wood-warbler song systems: a review of paruline singing behaviors. Curr. Ornithol. 9:199–243.

Wilson Bull., 111(1), 1999, pp. 137–139

Laying Time of the Bronzed Cowbird

Brian D. Peer[1,2,3] and Spencer G. Sealy[1]

ABSTRACT.—We report the first observations of egg laying by the parasitic Bronzed Cowbird (*Molothrus aeneus*). Three direct observations and two estimates of laying times were made at two Northern Cardinal (*Cardinalis cardinalis*) nests. Bronzed Cowbirds laid at 18.2 min ± 1.7 (SE) before sunrise (range 14–24 min). Laying lasted 5–10 seconds. Although the parasitic Brown-headed Cowbird (*M. ater*) and sometimes Shiny Cowbirds (*M. bonariensis*) also lay before sunrise, direct observations of laying by other cowbirds are required before it can be concluded that pre-sunrise laying is an adaptation for brood parasitism. *Received 9 June 1998, accepted 5 Sept. 1998.*

Avian brood parasites that are surreptitious when parasitizing nests may avoid detection by their hosts. Indeed, they often lay their eggs in a matter of seconds; Sealy and coworkers (1995) found this behavior to be unique to the diverse groups of brood parasites. The parasitic Brown-headed Cowbird (*Molothrus ater*) generally lays in the minutes prior to sunrise and it has been suggested that laying at this time, presumably when hosts are less likely to be at their nests, is an adaptation for brood parasitism (Chance and Hann 1942). Scott (1991) found that female Brown-headed Cowbirds lay their eggs an average of 9 min before sunrise, whereas seven potential host species all lay their eggs after sunrise. Shiny Cowbirds (*M. bonariensis*) and, possibly, the nonparasitic Bay-winged Cowbird (*M. badius*) also sometimes lay before sunrise (see Scott 1991), but the data available to Scott (1991) were insufficient to conclude that sunrise laying is an adaptation for brood parasitism. There were no direct observations of laying for the Bronzed Cowbird (*M. aeneus*). Carter (1986) stated only that this brood parasite lays "during dawn hours". Here we report, to our knowledge, the first recorded observations of laying times for the Bronzed Cowbird.

METHODS

Our observations were made at the Welder Wildlife Refuge in San Patricio County, Texas (28° 0′ N, 97° 5′ W) in 1994. Both Bronzed and Brown-headed cowbirds were present during the breeding season. After locating a nest at which a host apparently had not completed laying, we watched it the following morning beginning approximately 30 min before sunrise. We hid far enough away so that hosts or visiting cowbirds were not disturbed. The nests were observed with binoculars when necessary. Sunrise (SR) times were obtained from the website of the United States Naval Observatory Astronomical Applications Department (http://aa.usno.navy.mil/AA/). All times are Central Standard Time.

RESULTS

Three Bronzed Cowbird laying events were observed directly, all at Northern Cardinal (*Cardinalis cardinalis*) nests. On 30 May 1994 we located a cardinal nest (94-16) containing one cardinal egg. The following morning, BDP arrived at this nest at 05:14 (SR − 20 min) and found a Bronzed Cowbird egg that was slimy, suggesting it had been laid recently, plus one cracked cardinal egg. Later the same day the nest contained two cardinal eggs plus the cowbird egg. At 05:06 (SR −

[1] Dept. of Zoology, Univ. of Manitoba, Winnipeg, MB, R3T 2N2, Canada.

[2] Present address: 3163 5th St., East Moline, IL 61244; E-mail: bdpcowbird@aol.com

[3] Corresponding author.