

POSSIBLE FUNCTIONS OF SINGING BY FEMALE ACADIAN FLYCATCHERS (*EMPIDONAX VIRESCENS*)

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Abstract.—Observations of Acadian Flycatchers (*Empidonax virescens*) in northern Arkansas revealed that females may sing when their nest is approached. Previous reports indicate that female Acadian Flycatchers may also sing in apparent response to the songs or presence of a mate. Such information suggests that singing by female Acadian Flycatchers may (1) serve an aggressive or defensive function and (2) play a role in the formation and maintenance of pair-bonds.

POSIBLE FUNCIÓN DEL CANTO EN HEMBRAS DEL PAPAMOSCAS DE ACADIA (*EMPIDONAX VIRESCENS*)

Resumen.—Observaciones sobre el papamoscas de Acadia (*Empidonax virescens*) en el norte de Arkansas revelaron que las hembras pueden cantar cuando sus nidos son aproximados. Informes previous indican que las hembras de esta especie pueden cantar aparentemente en respuesta a la presencia de su pareja o canto de este. Esta información sugiere que el canto de la hembra del papamoscas de Acadia puede: (1) desempeñar una función de agresividad a defensa y (2) juegan un papel en la formación y mantenimiento de la pareja.

Recent studies have revealed that females sing on a regular basis in several species of passerines (Beletsky 1982, 1983; Ritchison 1983, 1986). Despite such studies, relatively little is known about the structure and function of female song in most passerines. This is probably because females are often less conspicuous than their mates, and so their behavior is more difficult to observe and quantify (Beletsky 1982). This may be particularly true in sexually monomorphic species, unless individuals are marked it may be wrongly assumed that singing individuals are males. Such difficulties may in part account for the few reports of singing by female *Empidonax* flycatchers. Kroodsma (1984) reported that female Alder Flycatchers (*Empidonax alnorum*) and Willow Flycatchers (*E. trailii*) sang when given exogenous testosterone. Seutin (1987) found that female Willow Flycatchers also sing under natural conditions whereas female Alder Flycatchers apparently do not. Mumford (1964) reported singing by female Acadian Flycatchers (*E. virescens*), but included no sonagrams. We present a spectrographic analysis of the songs of a female Acadian Flycatcher and suggest possible functions.

METHODS

Observations of Acadian Flycatchers were made from mid-June through early July 1986 on the north shore of Lake Wilson, 4.2 km south of

Fayetteville, Washington County, Arkansas. Although four nests were located and monitored, only one female was observed to sing. This female, first captured and banded with a U.S. Fish and Wildlife Service aluminum band in 1985, was recaptured on 7 Jul. 1986 and color-banded. On the date of recapture, she had a well developed brood patch, with a rough, wrinkled apterium. Her mate was captured on 3 Jul. 1986 and also color-banded. Examination revealed no evidence of a brood patch. Although both birds were observed at the nest, only the female was observed to incubate.

Recordings were made on 30 Jun. and 3 Jul. 1986. On those occasions, the female was approached until she flew from the nest. The female uttered numerous call notes ("peet," Mumford 1964) interspersed with occasional songs. No other Acadian Flycatchers were observed during recording sessions. Songs were recorded by Kellner with a Panasonic cassette/recorder as he stood about 7 m from the female and the nest. Sonagrams were prepared using a Kay Elemetrics Model 6061A Sona-Graph (wide-band setting). Duration and frequency measurements were made directly from the sonagrams.

RESULTS AND DISCUSSION

The advertising or territorial song of the male Acadian Flycatcher has been transliterated as "tee-chup" by Mumford (1964), who also presented one sonagram of this song. Payne and Budde (1979) presented a more detailed analysis. The female Acadian Flycatcher that we observed uttered three types of songs, including the "tee-chup" song (Type A, Fig. 1). The other two song types were similar to each other, differing only in the structure of the first note (Types B and C, Fig. 1). The calls transliterated by Mumford (1964) as "wheel-chur" and "whee-chul" may correspond to our song types B and C. Duration and frequency characteristics of all three song types appear in Table 1.

Female Acadian Flycatchers appear to sing in a variety of circumstances. For example, Mumford (1964) reported that female Acadian Flycatchers sang ("tee-chup" and "wheel-chur") in apparent response to the songs or presence of their mate. These observations suggest that singing by females may play a role in the formation and maintenance of pair-bonds. Such antiphonal singing may also serve to keep the male and female aware of each other's location.

Mumford (1964) also observed singing by a female Acadian Flycatcher when a female Brown-headed Cowbird (*Molothrus ater*) approached a nest ("tee-chup") and when a Cooper's Hawk (*Accipiter cooperii*) was in the vicinity ("wheel-chur"). Our observations also indicate that female Acadian Flycatchers sing (all three types of song) when the nest is approached. These observations suggest that singing by female Acadian Flycatchers may serve an aggressive or defensive function. Although Mumford (1964) found little evidence that female Acadian Flycatchers take an active part in territorial defense, he noted that females did defend the area around the nest. Aggressive or territorial behavior by females

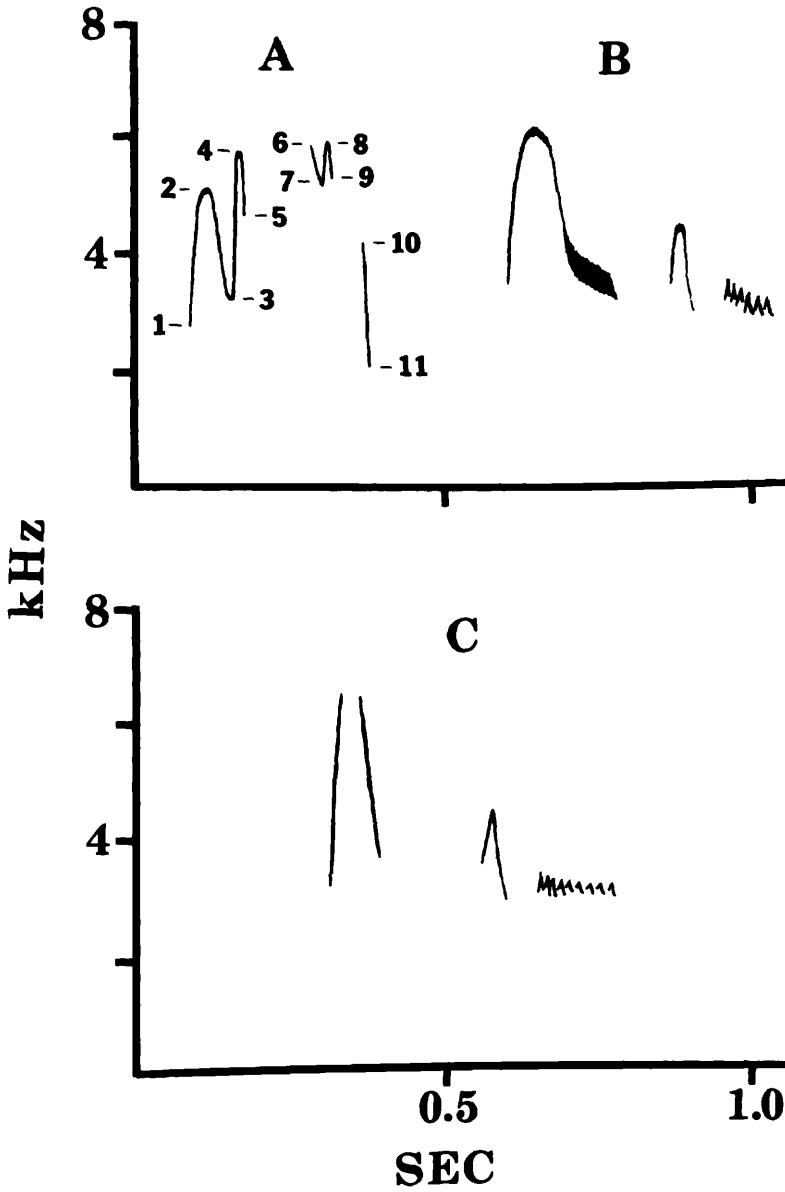


FIGURE 1. The three song types of a female Acadian Flycatcher.

TABLE 1. Duration and frequency characteristics of the three song types of a female Acadian Flycatcher.

Song type	n	Duration (msec)					
		Note 1		Internote		Note 3	
A	6	110	70	54	28	19	
B	23	178	78	42	45	79	
C	13	97	119	47	42	92	

Song type	n	Frequency (kHz)										
		Note 1					Note 2				Note 3	
		1	2	3	4	5	6	7	8	9	10	11
A ^a	6	2.6	5.2	3.1	5.6	4.0	5.3	5.7	4.9	5.8	4.3	1.9
		Ini-tial	Max.	End	Ini-tial	Max.	End	Max.	Min.			
B	23	2.8	6.1	3.3	3.5	4.3	2.7	3.4	2.7			
C	13	2.9	6.7	3.3	3.4	4.3	2.5	3.3	2.7			

^a Figure 1A illustrates the frequency variables measured.

has also been reported in other *Empidonax* species. For example, MacQueen (1950) reported that a female Least Flycatcher (*E. minimus*) assisted the male in territorial defense. Johnson (1963) noted that female Gray (*E. wrightii*) and Dusky (*E. oberholseri*) flycatchers defended small areas near the nest. Seutin (1987) suggested that singing by female Willow Flycatchers may be important in territorial defense.

Our observations and those of other authors (Smith 1969, Seutin 1987) suggest that singing by female *Empidonax* may be more common than currently realized. Further behavioral studies of marked birds are needed to clarify the functions of singing by females in this genus.

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LITERATURE CITED

- BELETSKY, L. D. 1982. Vocalizations of female Northern Orioles. *Condor* 84:445-447.
- . 1983. Aggressive and pair-bond maintenance songs of female Red-winged Blackbirds (*Agelaius phoeniceus*). *Z. Tierpsychol.* 62:47-54.
- JOHNSON, N. K. 1963. Biosystematics of sibling species of flycatchers in the *Empidonax hammondi-oberholseri-wrightii* complex. *Univ. Calif. Publ. Zool.* 66:79-238.
- KROODSMA, D. E. 1984. Songs of the Alder Flycatcher (*Empidonax alnorum*) and Willow Flycatcher (*Empidonax traillii*) are innate. *Auk* 101:13-24.
- MACQUEEN, P. M. 1950. Territory and song in the Least Flycatcher. *Wilson Bull.* 62: 194-205.

- MUMFORD, R. E. 1964. The breeding biology of the Acadian Flycatcher. Misc. Publ. Mus. Zool., Univ. Mich., No. 125.
- PAYNE, R. B., AND P. BUDDE. 1979. Song differences and map distances in a population of Acadian Flycatchers. *Wilson Bull.* 91:29-41.
- RITCHISON, G. 1983. The function of singing in female Black-headed Grosbeaks: family-group maintenance. *Auk* 100:105-116.
- . 1986. The singing behavior of female Northern Cardinals. *Condor* 88:156-159.
- SEUTIN, G. 1987. Female song in Willow Flycatchers (*Empidonax traillii*). *Auk* 104:329-330.
- SMITH, W. J. 1969. Displays of *Sayornis phoebe* (Aves, Tyrannidae). *Behaviour* 33:283-322.

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