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FLIGHT SONG AND SONG FLIGHT IN THE ORANGE-CROWNED WARBLER

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Birds of many species commonly sing while flying. The behavior is characteristic of many open-country species, such as larks, pipits, and Bobolinks (*Dolichonyx oryzivorus*) and also occurs among some woodland species, including several wood warblers (Parulidae; Ficken and Ficken 1962). In some of these warbler species, both the song given during flight, and the flight itself, are distinctly different from perch song and "normal" direct flight. Ficken and Ficken described such songs as "usually a variable warbling [accompanied by a] rising flight on slowly flapping or quivering wings [and] typically a direct and silent descent."

Workers have reported "flight songs" and "song flights" occurring in several species of *Vermivora,* including the Tennessee Warbler (*V. peregrina*; Bowdish and Philipp 1916), Nashville Warbler (*V. ruficapilla*; Bowles and Bowles 1906, and Thayer, reported in Chapman 1907), Bachman's Warbler (*V. bachmanii*; Howell 1924, reported in Bent 1953), and Blue-winged Warbler (*V. pinus*; Pitelka 1939). The songs and flights described for these species, however, appear to be less modified than those described by the Fickens for non-*Vermivora* warblers.

I observed flight songs and song flights occurring in the Orange-crowned Warbler (*V. celata*) during behavioral studies of the species in its typical nesting habitat in Contra Costa County, central coastal California. I followed the behavior of unmated territorial males prior to 12:00, during March, April, and May of 1980, 1981, and 1982. Although I may have overlooked the behaviors, I did not observe flight songs and song flights in unmated birds during late February, June, and early July, nor among mated birds during any month. Populations of these warblers were relatively dense in my study areas, with all males having at least two territorial neighbors. Territorial disputes were common.

Most flight songs I heard were begun in mid-flight, and completed on a perch. Occasionally the entire song was rendered in the air. I could detect, by ear, no difference between songs sung during flight and those sung entirely while perched. When in song flight, the wings of a warbler characteristically "fluttered" or "quivered" in a way I never saw in normal direct flight. I observed nothing resembling the rising flight and direct descent described by the Fickens. I noted nine instances of birds singing while in flight during 260 min of observation in which the individual Orange-crowned Warblers were in sight. Since these birds usually sang four to six songs per minute, it is apparent that flight songs occurred much less frequently than perch songs. Flight songs and song flights apparently occurred at random, and I noticed no associated special circumstances, such as the presence of a female or a competing male.

The flight songs and song flights I observed in Orange-crowned Warblers differed from those described by the Fickens. They generally resembled those described for other species of *Vermivora,* although the fluttering in song flight has hitherto been reported only for the Nashville Warbler (Bowles and Bowles 1906). I am aware of only two reports of song and flight behavior resembling those I have reported here occurring in parulids other than species of *Vermivora.* The American Redstart (*Setophaga ruticilla*) apparently has an "unmodified" flight song and song flight often associated with encounters with females or rival males (Ficken 1962). The Kirtland's Warbler (*Dendroica kirtlandii*) also has such songs and flights, but they do not seem to be associated with any special environmental context (Mayfield 1960:133).

Relatively unmodified flight song and song flight now are reported for the majority of North American *Vermivora,* suggesting that these forms of behavior are characteristic of the genus.

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