some of the design features suggested by Marler (1955) that may minimize the localizability of the caller—a relatively pure tone fading in and fading out and containing few discontinuities. The other form of the alarm call (fig. 1b), into which the first form rapidly shifts after the initial discovery of the predator, is distinctly different. Its discontinuities and frequency modulations suggest that it has functions in addition to those noticed during the playbacks. This call has similarities to the mobbing calls of other birds. It may enhance the localization of the sender, thereby distracting some predators from the brood to the adults buzzing around them. This call may also signal to nestlings in their burrows that the danger is not yet over.

The number of interactions observed by both Freer (1973) and us suggests that kestrels may frequently visit Bank Swallow colonies and prey on their nestlings. The impact of this predation appears to be minimized by (1) a vocal alarm system, which stimulates the retreat of young back into their burrows, and (2) a within-colony synchronization of reproductive efforts, which minimizes the period of vulnerability (Emlen 1971, Emlen and Demong 1975, and unpubl. data).

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POSSIBLE IMPAIRMENT OF NEST-BUILDING OF HUMMINGBIRDS BY ACETATE LEG TAGS

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Hummingbirds are difficult to color-mark for field study because color bands do not show on their short, retracted tarsi, and because they preen painted spots from their plumage. Stiles and Wolf (Condor 75: 244, 1973) reported a useful marking technique which employs acetate leg-tags. These did not seem to impede normal behavior including copulation. However, the authors did not use leg-tags on nesting females.

For the past three summers, we have been studying the nesting ecology of Broad-tailed Hummingbirds (*Selasphorus platycercus*) in Gothic, Colorado. The nest of this species is normally a tight, vertical-walled cup, with an inside diameter of approximately 2 cm, and is so maintained until after hatching, when the growing chicks cause stretching of the cup.

In 1973, 14 adult, female Broad-tailed Hummingbirds were leg-tagged according to the method of Stiles and Wolf. Only two nests were located which belonged to tagged females (out of 27 nests located). Confusion of a light orange and a dark yellow chosen for color-marking tags makes it ambiguous whether these nests were built by the same or by separate females ("red/orange" and "red/yellow"). Both nests were abnormally loose and flat during incubation (inside diameter approximately 3 cm), and daylight could be seen through holes in the walls, which were not repaired in either nest. It is possible that the female(s) involved were intrinsically poor nest-builders. Both nests were abandoned after disturbances in which the eggs were removed or knocked out of the nest. On the other hand, tags are relatively large and extend conspicuously up the inside of the nest cup and forward out of the nest during incubation (fig. 1). In this position they may interfere with use of the legs in shaping the nest interior or with use of the wings and bill in forming or repairing the nest interior, behaviors we often observed in other females.

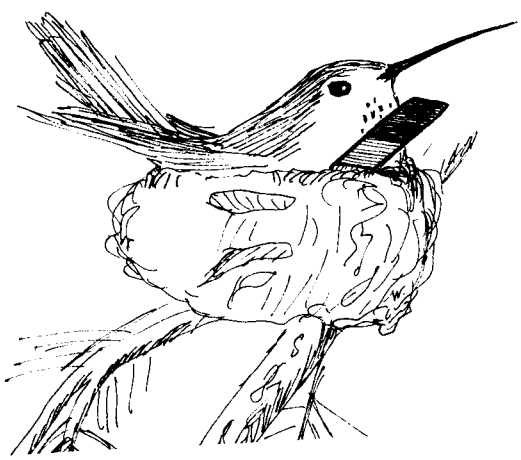

FIGURE 1. A leg-tagged female on the nest.

Two observations alone are not enough to condemn what is otherwise a very useful technique. The high visibility and good retention of leg-tags suggest that they be chosen for studies requiring intense or long-term observation of individuals. However, it seems necessary to caution that other marking techniques may be more appropriate for reproductive females. If acetate leg-tags do in fact impair nest construction and repair, they could lower breeding success, as well as disrupt normal nesting behavior, invalidating data and observations thereof.

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