

Predatory behavior of Smooth-billed Ani.—On 26 July 1972 we found a Vermilion Flycatcher (*Pyrocephalus rubinus*) nest on Munves' finca in Santandercito, Cundinamarca, Colombia. From then until 9 August, when it was abandoned, we watched the nest for 40 hours. The nest was about 9 m above the ground in a small fork of a tree bare of leaves. (Another Vermilion Flycatcher nest found on this finca was also in a bare tree.) Young were first seen on the afternoon of 6 August, when two beaks appeared above the rim of the nest. We assumed from the parents' behavior that the eggs hatched several days earlier.

At 15:35, 8 August, a Smooth-billed Ani (*Crotophaga ani*) settled on a branch slightly below the nest and another in the top of a leafy avocado tree 5 m away. The ani perched near the nest called, and the other flew down from the top of the avocado tree and landed about 1 m from the nest. While the male flycatcher made a number of passes, never coming within half a meter of the bigger bird, the ani, head extended, crept along the branch, snatched a nestling in its bill by the neck, flew up a meter or two, and glided to the ground.

The other ani then flew up into the top of the avocado tree, from which it watched the nest until Munves shooed it away. Five minutes later he chased the other ani away and recovered the dead nestling, which it left on the ground. As both nestlings were seen alive 2 hours earlier and the parents were feeding the young a few minutes before the anis' arrival, we assume the ani killed it, but nothing showed the bird tried to eat it.

Continued feeding activity after the raid showed the other nestling was still alive. Observations ended that afternoon at 17:00, 90 minutes before sundown. When they were resumed at 07:55 the following morning, 2 hours after dawn, the nest was abandoned. The fate of the second nestling remains unknown.

Both species are fairly common in the valley of the Bogota River where this occurred. Wetmore (1968, *The birds of the Republic of Panama*, vol. 2, Washington, D. C., Smithsonian Inst. Press, pp. 128–129) gives food of this ani as insects, spiders, small lizards, and berries. We recorded only insects and seeds in the stomachs of 60 specimens in the collection at the Instituto de Ciencias Naturales. We are not aware that this behavior has been reported previously in the ani.—ANTONIO OLIVARES, OFM, and J. A. MUNVES, *Instituto de Ciencias Naturales, Universidad Nacional, A. Aereo 7495, Bogota, DE, Colombia, South America*. Accepted 4 Oct. 72.

Song mimesis by a captive Gouldian Finch.—A survey of the imitative abilities of birds reveals a spectrum ranging from species such as the White-crowned Sparrow (*Zonotrichia leucophrys*) and Song Sparrow (*Melospiza melodia*), which may copy only the songs of conspecifics, to versatile mimics in the families Sturnidae, Mimidae, and Psittacidae, which may reproduce a variety of alien vocalizations and sounds (reviews in Nottebohm 1972, Baptista 1972). There are few records of song mimesis by estrildid finches (review by Immelmann 1969a). Some forms appear to be better mimics than others. Two estrildid species, namely the African Silverbill (*Lonchura cantans*) and the Zebra Finch (*Taeniopygia guttata*), cross-fostered under Bengalese Finches (*Lonchura striata*), learned the songs of their foster-father (Immelmann 1967, 1969a). On the other hand Nicolai (1965) and Güttinger (1970; see also Güttinger and Achermann 1972) list a number of estrildid species that produced only species-specific vocalizations when reared by Bengalese Finch foster-parents. I know of no record of a Gouldian Finch (*Chloebia gouldiae*) mimicking the song of another species as described here.

A single Gouldian Finch was hatched and raised to maturity by a pair of Bengalese Finches along with three of their own young. In neighboring cages were an assortment of estrildids and fringillids, including a pair of Red Avadavats (*Amandava amandava*) that the Gouldian Finch could hear and see. I separated the Gouldian Finch from the foster-parents when it could fend for itself at a little over 1 month in age. Thereafter it was kept in a large cage containing other estrildid species including adult Bengalese, a pair of Gouldian Finches, and a pair of Red Avadavats. The young Gouldian Finch eventually sang a song containing no elements of the songs of its foster-parents, nor of its own species, but only of the Red Avadavat.

Hall (1962) described the songs of the three estrildid species under discussion. The song of the Gouldian Finch is typical of most estrildids in that it is soft and hardly discernible by the human ear beyond a few yards (Hall 1962, Immelmann 1965). Song spectrograms in Hall (1962) and Thorpe (1961: 113) reveal the complex structure of the Gouldian Finch song. This involves "the simultaneous production of two or more notes each harmonically distinct" in which "a series of low-pitched clicks provides a more or less unbroken accompaniment to at least two other independent sets of higher notes, with a high-pitched descending whine cutting right across a second series of slightly lower notes" (Hall, 1962: 49). Thorpe (1961: 112) suggested that three vocal mechanisms may be operating simultaneously to produce this complex song.

The song of the Red Avadavat is easily distinguished from the above by "the loudness and unusually simple harmonic structure of the individual notes and by their organisation into a well-defined, . . . musical song-phrase" (Hall 1962: 44). The notes are delivered on a descending scale (Goodwin 1960, Harrison 1962a, Figure 1A). My captive wild-caught male usually gave a series of very soft "tit" calls (Figure 1C) before singing. Its song usually ended with a toy-trumpet-like "geh" (Figure 1A) that sounded very similar to the contact call of the Zebra Finch. A pair of Zebra Finches in a neighboring cage would call excitedly in response to the "geh" of the Red Avadavat each time it completed its song.

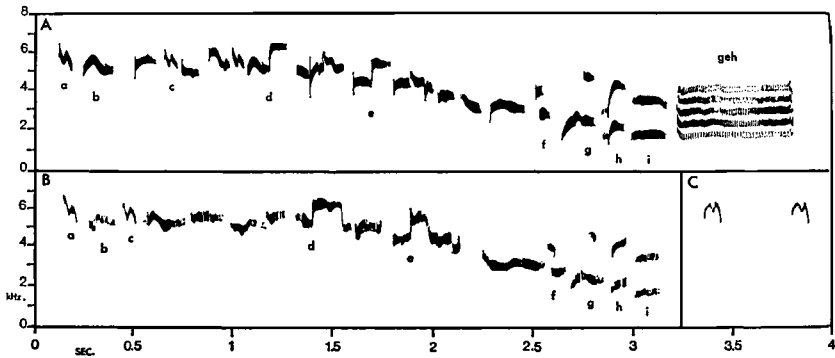


Figure 1. A. Song of wild-trapped Red Avadavat. Note the terminal "geh" element absent in B. B. Imitation by the Gouldian Finch of the song of the Red Avadavat. Note the similarities, in notes a, b, to i in B, compared with notes a, b, to i in A. C. Two "tit" calls with which the Red Avadavat introduced its song. These calls were not imitated by the Gouldian Finch.

I recorded imitation songs of the Red Avadavat by the cross-fostered Gouldian Finch when it was 149 days old (Figure 1B). These songs were always whispered, as in the songs of conspecifics. Except for element b being absent in 13 spectrograms, the imitated songs were quite stereotyped in that the same elements appeared in the same sequence within a total of 15 song spectrograms examined. The Gouldian Finch was never heard giving the soft "tit" (Figure 1C) calls with which the Red Avadavat tutor introduced its songs. The "geh" (Figure 1A) element is also absent in the mimicked songs (Figure 1B). In other respects the mimicked songs bear many of the features present in the songs of its Red Avadavat tutor, namely in: (1) "the simple harmonic structure of the individual notes" (Hall 1962), (2) the notes delivered in descending pitch, and (3) the morphology of notes a to i (Figure 1B). Whereas the notes in the song of its tutor (Figure 1A) are discrete, some of the whistles in the songs mimicked by the Gouldian Finch seem to fade away (Figure 1B). They are frequency and amplitude modulated, and appear to be poor copies of the tutor's notes (see unlabelled notes in Figure 1B). Notes d and e in the mimicked songs (Figure 1B) also differ slightly in morphology from notes d and e in the tutor songs (Figure 1A). Some improvisation appears to have been involved in the construction of these two notes. The male Red Avadavat tutor was mated and therefore sang only occasionally (see Harrison 1962b). Possibly a Gouldian Finch exposed to more Red Avadavat songs than was this one might copy the tutor songs more accurately.

The duration of five of the tutor's songs without the terminal "geh" (Figure 1A) ranged from 2.83 to 2.89 sec. (\bar{x} = 2.86 sec.; SD = 0.026 sec.). The duration of 12 of the mimicked songs ranged from 2.84 to 3.05 sec. (\bar{x} = 3.00 sec.; SD = 0.089 sec.). These figures indicate that the latter's songs were also stereotyped in duration and were a good approximation of the length of the tutor songs. In normal Gouldian songs, which measure much longer, the beginning and end of each motif is never clearly marked (Hall 1962).

Immelmann (1967, 1969a) postulated an "emotional bond" between tutor and tutored as a prerequisite to song learning in the three estrildid species he studied. Additionally the cross-fostered individuals were irrevocably imprinted on the foster species (Immelmann 1969b, 1970). The cross-fostered Gouldian Finch was observed in a cage with other estrildid species from November 1971 to late March 1972. It did not appear to be imprinted on its foster species, namely the Bengalese Finch, nor on the Red Avadavat whose song it had learned. The cross-fostered Gouldian Finch always roosted near the two adult Gouldian Finches at night and followed them during the day. No social bond was apparent between this Gouldian Finch and its alien tutor, but that Gouldian Finches raised by Bengalese may be sexually imprinted on them is well-known (Immelmann 1965). Probably the fact that this cross-fostered Gouldian Finch was separated from its foster-parents immediately when weaned prevented its being imprinted (see Immelmann 1965). Estrildid finches also may differ individually in disposition to being imprinted (see e.g. Goodwin 1971).

No Gouldian or Bengalese Finch song elements appeared in this Gouldian Finch's mimicked themes (Figure 1B) possibly because my adult male Gouldian and Bengalese Finches did not sing enough to effect any learning of their songs. Nicolai (1965) reports having seen many Gouldian Finches raised under Bengalese Finches singing only Gouldian Finch songs.

Nicolai's (1965) observations raise a number of questions regarding song development in Gouldian Finches. Firstly could it be that imitation is not important in normal song development of young Gouldians? If so the song mimicry, as I have reported for this species, is "facultative," as appears to be the case with the Oregon

Junco (*Junco oreganus*) and the Song Sparrow (*Melospiza melodia*) (see review by Nottebohm 1972). In view of the complexity of normal Gouldian song, exposure to songs of adult conspecifics may possibly be prerequisite to normal song development. A spectrographic study of songs of Gouldian Finches raised under Bengalese Finches may reveal certain aberrancies in syllabic or temporal structure. Secondly, could it be that Gouldian Finches may imitate certain sounds (e.g. in conspecific song or in Red Avadavat song) and not others (e.g. in Bengalese song)? Interestingly, the notes in the songs of Bengalese (see spectrograms in Immelmann 1969a) and the "geh" element in the tutor song (Figure 1A) neither of which did my Gouldian Finch learn (Figure 1B) are structurally very similar. Only a detailed laboratory study of song development by sound spectrography may answer these questions more adequately.

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