COMPARISON OF VOCAL SIGNALS OF THREE SPECIES OF AFRICAN FINCHES

by

NICHOLAS E. COLLIAS1) and ELSIE C. COLLIAS2)

(Department of Ecology and Evolutionary Biology, University of California, Los Angeles, CA 90095-1606, USA)

(Acc. 7-IX-2004)

Summary

African finches of a monophyletic group in the Passeridae nest in colonies with roofed nests thatched of dry grass-stems. Vocal signals are described, with the aid of sonograms, 13 for the white-browed sparrow-weaver (Plocepasser mahali) (Pm), 13 for the grey-capped social weaver (Pseudonigrita arnaudi) (Pa), and 20 for the sociable weaver (Philetairus socius) (Ps). These vocal signals fall into general categories, as is true for most birds, of alarm calls, agonistic behavior, and courtship and mating signals, parent-young relations, and flock contact calls.

These three species illustrate the principle of adaptive specialization of vocal signals. Pm differs from the others in having a loud dawn song, a whispered version of this song, and also a loud vocalization frequently given in defense of a group territory within which the birds forage. Pa and Ps differ from Pm in defending only the immediate vicinity of the nest or nest chamber, in foraging in large flocks on neutral ground often well away from the colony nest trees, and have special flock calls. In Pa, the territorial call is used mainly to announce arrival

1) Corresponding author: University of California, Department of Ecology and Evolutionary Biology, 621 Charles E. Young Drive South, Box 951606, Los Angeles, California 90095-1606, USA; e-mail address: margaret@lifesci.ucla.edu

2) Our observations of vocal communication were made possible by support from our university, by the Los Angeles County Museum of Natural History, and the National Science Foundation. In Africa, many organizations and individuals kindly helped us in our research and are named in our general reports on the behavior of the birds in the Ibis (1978) and in the Auk (1978, 1980). We thank our daughter Karen Whilden for making the sonograms of Plocepasser mahali vocalizations and Dan Blumstein for making the sonogram of the song of Plocepasser donaldsoni. Robert Stilbravy, reference librarian at UCLA helped locate references for us. Preparation of the manuscript was aided by a grant from the Council on Research at UCLA.

© Koninklijke Brill NV, Leiden, 2004

Behaviour 141, 1151-1171

Also available online -
at its nest, and song is rare or absent in this species. *Ps*, which lives in a large, apartment-style communal nest, has the most diversified repertoire, especially of social contact calls. Convergent evolution of vocal signals and social organization with unrelated families gives some idea of the selection pressures in the evolution of these signals.

**Introduction**

The invention of the sound spectrograph by the Bell Telephone Company (Potter, 1945) revolutionized the study of vocal communication in birds and other animals during the last half-century. The first spectrographic study of the general repertoire of vocal signals of a bird was published 50 years ago in *Behaviour* (Collias & Joos, 1953).

In the present study we attempt to apply to the evolution of vocal communication the Darwinian principle of gradation in adaptive specialization of traits and also to some degree Darwin’s principle of antithesis (Darwin, 1872) for social behavior.

Some experimental evidence that antithesis reduces signal ambiguity was presented in our first paper (Collias & Joos, 1953). The initial antithesis is between distress cries (chirps) of an isolated chick of the domestic fowl and relief of this distress whereupon the chick promptly switches to pleasure notes (twitters) which are structurally opposite to the distress cries. Brief, low-pitched notes as in the clucking of a mother hen calms a distressed chick which then promptly utters twitters. Playback of artificial long or high sounds does not inhibit chirping by an isolated chick, whereas artificial brief or low pitched sounds do and induce twitters.

There has been extensive study of bird song generally the most complex vocalization of birds but much less comparative study of bird calls in any comprehensive way. Vocal signals help regulate the social life of a species. We here compare the repertoire of vocal signals of three species of African finches, a monophyletic group within the Passeridae (Bock & Morony, 1978; Sibley & Ahlquist, 1990; Sibley & Monroe, 1990). Our object was to inventory the different calls for each species and then to try and understand what selection pressures might have led to the evolution of differences in vocal signals of these species.

These species are the white-browed sparrow weaver (*Plocepasser mahali*) (*Pm*), the grey-capped social weaver (*Pseudonigrita arnaudi*) (*Pa*), and the sociable weaver (*Philetairus socius*) (*Ps*).