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Songs of Mali Firefinch *Lagonosticta virata* and their mimicry by Barka Indigobird *Vidua larvaticola* in West Africa

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Summary

Vocalizations of Mali Firefinch *Lagonosticta virata* are distinct from other firefinches in having a long whistle "feee", a downslurred harsh "kyah", several slow and fast trills, and a distinctive "churrrr" excitement call. These support their distinctiveness as a species. All vocalizations of Mali Firefinch are mimicked in the songs of certain Barka Indigobirds *Vidua larvaticola*, a brood parasite with populations that mimic songs of several host species. We describe the song and calls of *L. virata* and their song mimicry by the indigobird, and suggest that populations of the indigobird have switched from Black-faced Firefinch *L. larvata* to parasitize Mali Firefinch.

Résumé

Les chants de l'Amarante de Koulikoro *Lagonostica virata* et leur imitation par le Combassou de Barka *Vidua larvaticola* en Afrique de l'Ouest. Les vocalisations de l'Amarante de Koulikoro *Lagonostica virata* sont distinctes de celles des autres amarantes en ayant un long sifflement "feee", un "kyah" descendant rauque et indistinct, plusieurs trilles lents et rapides, et un cri d'excitation particulier "churrr". Ces particularités sont caractéristiques d'une espèce. Toutes les vocalisations de l'Amarante de Koulikoro sont imitées dans les chants de certains Combassous de Barka *Vidua larvaticola*, parasite des nids avec des populations qui imitent les chants de plusieurs espèces-hôtes. Nous décrivons les chants et cris de *L. virata* et l'imitation du chant par le combassou, et suggérons que les populations du combassou sont passées de l'Amarante masqué *L. larvata* au parasitisme sur l'Amarante de Koulikoro.

Introduction

Although Mali Firefinch *Lagonosticta virata* is morphologically and genetically distinct from other firefinch *Lagonosticta* species (Sorenson et al. 2003, Payne 2004) their songs have been incompletely documented (Nicolai 1982). Most indigobird species are host specific, mimicking songs and parasitizing a single estrildid species, mainly firefinches, with most parasite-host associations known only through song mimicry (Nicolai 1964, Payne 1982, 1998). We carried out field and aviary studies to determine the songs of *L. virata* and song mimicry by indigobirds that occur in the same geographic region.

The common name "Barka Indigobird" is here used for *Vidua larvaticola*, as in Payne (2004). In the original species description (Payne 1982), "Baka" Indigobird was used, with the etymological rationale of using a greeting term of the local Hausa people (much as "Jambandu", a Fulani greeting, was used for another indigobird species there described). Later in 1982, R. Wilkinson (*in litt*.) drew my attention to the fact that, according to standard Hausa-English dictionaries, "Barka" is correct.

Study areas and methods

Field observations were carried out in September 1999 and October 2000 in Mali, between Bamako and Koulikoro at Tienfala forest reserve (12°55´N, 7°42´W) where Mali Firefinch *L. virata* were previously observed (Nicolai 1982, Wheatley 1985). *L. virata* is known in aviculture as Kulikoro Firefinch. The habitat at Tienfala was rocky hillside and surrounding grassy woodland, as illustrated in Hinze (2001). *L. virata* were common; Red-billed Firefinches *L. senegala* were the only other firefinches seen there. A bird dealer in Bamako had many *L. virata* in his aviaries and was told by his collectors they were caught east of Tienfala. *L. virata* occur westward to E Senegal and eastward as far as Fiko near Bandiagara escarpment in central Mali. Previous records of "*L. rubricata*" in Mali refer to *L. virata* (Lamarche 1981, Payne 1997, 2004). Song mimics of *L. virata* at Tienfala were identified in the field as Barka Indigobird *Vidua larvaticola*, by observaing it at close range and in a mist-net. We tape recorded songs of two male indigobirds mimicking the calls and songs of this firefinch. One was an adult with bluish-green plumage gloss, brown wings and pale feet; the other was in sparrowy plumage.

Wild-caught indigobirds and estrildid finches were obtained from bird dealers in Dakar, Senegal. Specimens of captive birds from Dakar (origin unknown) were compared with museum series taken in the field. CRB interviewed two dealers in Dakar; both reported their birds originated in Senegal, Guinea and Mali. An earlier dealer's lot of birds from SE Senegal (Goudiry) had *L. virata* and Vinaceous Black-faced Firefinch *L. larvata vinacea* (Centre National pour la Recherche Scientifique et Technique (CNRST, formerly ORSTOM) collection at Mbour, Senegal; Morel &

Morel 1990, Payne 1997). Finches are legally caught in SE Senegal with Kédougou as the gathering centre. Field counts around Kédougou and elsewhere in Senegal by CNRST and the Direction des Eaux, Forêts, Chasses et de la Conservation des Sol, estimate population numbers to calculate a sustainable harvest (P. Reynaud pers. comm.). We suspect SE Senegal was the site of origin of our captive birds.

Firefinches and their indigobird song mimics were tape recorded both in the field in Mali and in captivity in The Gambia, using a Sony TC-D5M cassette recorder and 33 cm parabolic reflector. Songs were displayed using a Kay Elemetrics Digital Sound Processor from 0–16 kHz using a 256 points per s (234 Hz) filter and printed with a Mitsubishi P61U printer. We determined song mimicry by visually comparing audiospectrograms of each song of each indigobird with audiospectrograms of recordings of the estrildids. Such comparisons by different observers give consistent and repeatable results (Payne *et al*. 2000a). Field and aviary recordings, and bird specimens, are in the University of Michigan Museum of Zoology (UMMZ). Recordings (Barlow *et al*. 2001) are also in the Wildlife Sounds Archive, British Library, London

Mali Firefinch *Lagonosticta virata* and its indigobird song mimic

Calls and songs of *L. virata* are readily identified in the field (Fig. 1). (1) A short-distance contact call ("tschek" or "kyah") rises rapidly in pitch from 1.0 to 2.8 kHz then falls slowly to 1 kHz and lasts 0.2 s; it is similar in form to the contact call "peeeh" of *L. rara* in temporal pattern, nasal tone and harmonic overtones. (2) A long-distance contact call "feeee" is a single whistle, usually held at one pitch *c*. 3 kHz and 0.8 to 1.0 s in duration, sometimes rising or falling in pitch ("doooey") or displaying a harmonic overtone with the fundamental lower than in simple "feeee". (3) Alarm call or contact note is a distinctive rattling trill, "churrrr", with each note falling from 1.9 to 1.2 kHz or rising from 1.9 to 2.0 kHz then falling to 1.2 kHz, the notes with a harmonic peak at 3.8 kHz and overtone at 5 kHz, repeated 20–22 notes per s, somewhat as in Jameson's Firefinch *L. rhodopareia* but louder, deeper-pitched and more mellow. (4) A slower variant "choorrrr" (Fig. 1). (5) A series of whistled trills, the notes either rising or falling in pitch.

Calls of *L. virata* were described briefly but not recorded by Burkhard (1961) and Goodwin (1982). Nicolai (1982) had audiospectrograms of "feeee", "kyah" and "churrrr", corresponding with calls recorded in the present study, but he reported an absence of trills. Later (J. Nicolai pers. comm.) he recorded trills as well. The distinctive calls of *L. virata* are "churrrr", wheeze "kyah" and whistle "feeee", while their whistled trills are similar to trills of some other firefinches (Payne 1973, 1982, 1998).

Calls of *L. virata* in the field and captivity are similar. Indigobirds at Tienfala mimicked most calls and songs of *L. virata* (Fig. 2). Compare Figs. 1 and 2, particularly Fig. 1 a–c, e with Fig. 2 a, b (feeee"); Fig. 1 d–g with Fig. 2 c, d ("kyah"); Fig. 1 g–h with Fig. 2 e–g ("churrrr"); Fig. 1 i –l with Fig. 2 h–m (trills).

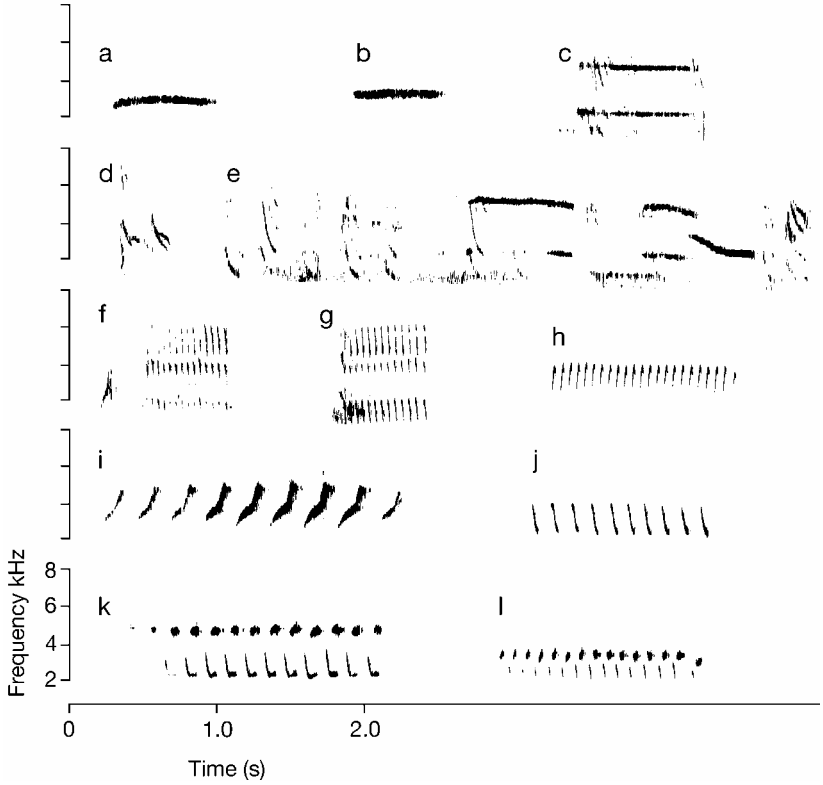

Fig. 1. Songs and calls of Mali Firefinch *Lagonosticta virata*: a–c, "feeee"; d, "kyah"; e, "kyah" of one bird with "feeee" of its mate; f, g, h, "churrrr"i, j, simple trills k, l, complex trills. Source of recorded birds: e, g, h, i, k, l, Tienfala, Mali; a-d, f, j, captives.

Indigobird song mimicry of *L. virata* was first recognized in a male *Vidua* obtained from a bird dealer in Dakar. CRB recorded its songs from Dec 1999 through March 2000, when it was saved as a specimen (UMMZ 236300), in blue-green breeding plumage with brown wings and pale feet. Songs of Tienfala indigobirds were similar to those of the captive, with the mimetic songs "feeee", "kyah", "churrrr" and various trills (Fig. 2). The song mimicry strongly indicates a host–brood parasite association between these birds. The wing of UMMZ 236300 is 64 mm, compared with 64–68 mm (mean 66.4, n = 18) for male *V. larvaticola* (UMMZ) that mimicked songs of *L. larvata*. Comparison of specimen UMMZ 236300 with other

UMMZ specimens of known song mimicry of *L. larvata* confirmed its identification as *V. larvaticola*.

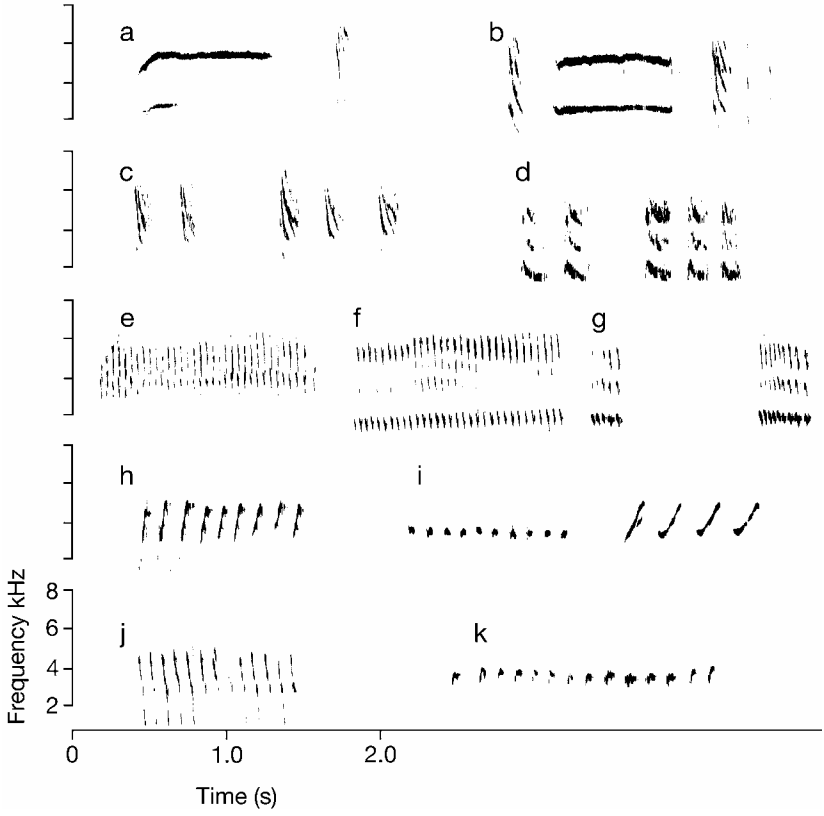

Fig. 2. Mimicry songs and calls of Mali Firefinch *L. virata* by *V. larvaticola.* a, b, "feeee" with introductory and terminal "kyah"; c, d, "kyah"; e–g, rattling trill (e, f, "churrrr", g, "choorrrr")h–k, trills. Source of recorded birds: a, b, c, e, i, Tienfala, Mali; d, f, g, h, j, k, captive.

Discussion

Songs and calls of *L. virata* are distinct from the songs and calls of other firefinches including the most closely related Rock Firefinch *L. sanguinodorsalis*, Chad Firefinch *L. umbrinodorsalis* and *L. rhodopareia* (Payne 1973, 1998, Brunel *et al*. 1980). *V.*

larvaticola normally parasitizes *L. larvata*, and *L. virata* occurs in more arid regions than *L. larvata*, although they overlap in Senegal. At Goudiry, E Senegal, the only known site of *L. virata* in Senegal, *L. larvata vinacea* also occurs (Payne 1997). The males of the morphologically similar *V. larvaticola* and Cameroon Indigobird *V. camerunensis* have greenish or bluish breeding plumage, brown wings and pale feet (Payne 1982) but *V. larvaticola* is more greenish and the wing primaries are darker in fresh plumage. *V. larvaticola* usually occur in drier habitats than *V. camerunensis*, although the two overlap in N Nigeria. Nestling mouth colours of *V. larvaticola* in Nigeria match those of the host young of *L. larvata* (Payne 1982, Payne & Payne 1994) and it would be instructive to determine the mouth colours of young indigobirds reared by *L. virata*.

There are no records of nests or brood parasitism of *L. virata*. The song mimicry of *L. virata* by *V. larvaticola* suggests a recent host switch by this indigobird. Certain host–parasite associations have been substantiated by observations of mixed broods of host and indigobird, and by song mimicry of the host by the indigobird (Payne 1973, 1982). Behaviour experiments confirm that male indigobirds learn the songs of their foster species, and females imprint to the songs of their foster species and lay eggs in the nest of the same foster species (Payne *et al*. 1998, 2000b, 2001). The molecular genetic variants that are shared across indigobird species and the occurrence of male indigobirds with the appearance of one species and song mimicry of a host not the normal host of that species indicate the success of occasional host switches by indigobirds from one to another host species (Klein & Payne 1998, Payne *et al*. 2002, Sorenson *et al*. 2003). The mitochondrial genes that have been characterized and compared to date are not diagnostic for species identification of the indigobirds. Finally, in *V. camerunensis*, song mimic populations are sympatric across a wide geographic area, and the genetic similarity between these populations suggest that other indigobirds have switched from one host species to another within W Africa (Klein & Payne 1998, Sorenson & Payne 2002, Sorenson *et al*. 2003, Payne 2004).

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