



## Dusky Twinspot *Euschistospiza cinereovinacea*, a new host species for indigobirds *Vidua*

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**Pintadinho-cinza *Euschistospiza cinereovinacea*, uma nova espécie hospedeiro de viúvas *Vidua* em Angola.** Nas terras altas de Angola, foi encontrada uma população de viúvas (*Vidua* sp.) a imitar as vocalizações do pintadinho-cinza *Euschistospiza cinereovinacea*. As características morfológicas da viúva—brilho azul pouco marcado, asas castanhas, bico esbranquiçado e patas rosadas—sugerem tratar-se da viúva-negra *Vidua funerea*. Os sonogramas das vocalizações da viúva mostram que, na maior parte das vezes, estas copiam a vocalização de contacto do pintadinho-cinza. No entanto, outras vocalizações gravadas incluem o que parecem ser cópias do canto, gritos de alarme e chamadas de solicitação de alimentos do pintadinho-cinza—tudo vocalizações mal conhecidas ou por documentar nesta espécie. Este é o primeiro registo de parasitismo no ninho de pintadinhos-cinza, e esta é apenas a segunda espécie de hospedeiro registada para a viúva-negra.

**Summary.** A population of indigobirds mimicking Dusky Twinspot *Euschistospiza cinereovinacea* was found in the Angolan highlands. Morphological characters—dullish, blue body gloss, brown wings, whitish bill and pinkish legs—most closely match Dusky Indigobird *Vidua funerea*. Sound-recordings of mimicry depicted by sonograms include, most commonly, the contact call of Dusky Twinspot. However, a range of other vocalisations was also recorded, including the presumed song, begging calls and alarm calls, vocalisations which are poorly known or undocumented for Dusky Twinspot. This is the first evidence of brood parasitism of Dusky Twinspot and only the second recorded host for Dusky Indigobird.

The indigobirds are members of the brood-parasitic family Viduidae and specialise on hosts in the family Estrildidae (Payne 2004). Most indigobirds parasitise finches (*Lagonosticta* spp.), although Orange-breasted Waxbill *Amandava subflava*, Black-faced Quailfinch *Oryzospiza atricollis* and twinspots of the genera *Hypargos* and *Euschistospiza* are also known hosts. Indigobirds typically specialise on a single host species, with exceptions including Cameroon Indigobird *V. camerunensis* and Village Indigobird *V. chalybeata*, both of which possess multiple hosts (Payne 2004, Payne *et al.* 2005).

Evidence suggests that indigobird species have evolved rapidly. Assortative mating / mate recognition—based on females identifying conspecific males by the mimicry of host species vocalisations in their songs, a result of host-specific imprinting—reinforces reproductive boundaries (Klein & Payne 1998, Payne *et al.* 2000, Payne & Sorenson 2004). Mimetic song of male indigobirds may incorporate a wide range of host vocalisations, including songs and calls (alarm, contact, flight and begging) (Payne 1973, 1982, Payne *et al.* 2005). Because indigobirds learn calls and songs from the species that rears them and adult males incorporate



**Figure 1.** Male indigobird *Vidua* on its song perch at Mount Moco, Angola. It included mimicry of Dusky Twinspot *Euschistospiza cinereovinacea* vocalisations in its song (see sonograms) and had a whitish bill, pinkish legs and dull blue gloss, the latter feature not visible in this image (M. S. L. Mills)

**Figura 1.** Macho de viúva (*Vidua* sp.) a cantar no Monto Moco, Angola. O seu canto incluía imitações de vocalizações do pintadinho-cinza *Euschistospiza cinereovinacea* (ver sonogramas); apresentava um bico esbranquiçado, patas rosadas e um brilho azul sombrio que não é visível nesta imagem (M. S. L. Mills)





**Figures 2–3.** The male indigobird trapped in May 2013 near Mount Moco, Angola. It included mimicry of Dusky Twinspot *Euschistospiza cinereovinacea* in its song, had brown wings, a dull blue body gloss, whitish bill and pinkish legs (M. S. L. Mills)

**Figuras 2–3.** Macho de viúva (*Vidua* sp.) capturado em maio de 2013 perto do Monto Moco, Angola. O seu canto incluía imitações de vocalizações do pintadinho-cinza *Euschistospiza cinereovinacea*; as suas asas eram castanhas, o corpo tinha um brilho azul sombrio, o bico esbranquiçado e as patas rosadas (M. S. L. Mills)

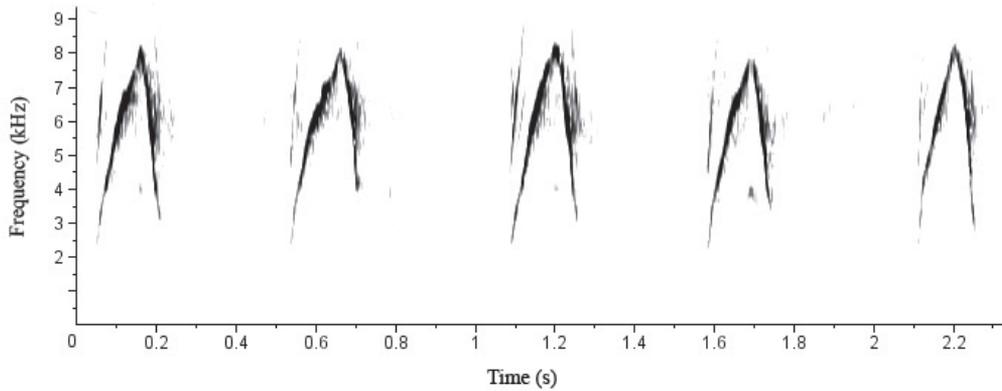
these vocalisations into their own songs (Payne *et al.* 1998), such mimicry is important in field identification and provides solid indirect evidence of parasitism of host species, although accurate identification of male indigobirds relies on an agreement between host species mimicry and morphology (Sorenson *et al.* 2003, Payne *et al.* 2005). Important morphological characters for field identification are the colour and intensity of plumage gloss, and the colour of the primary feathers and bare parts (Payne *et al.* 1992a, Payne 1996). It is important to note that differences between species are subtle and can be difficult to judge under field conditions, unless particularly good views are obtained under favourable light (pers. obs.).

On 13 May 2011 I was travelling from Lobito towards Mount Moco in Huambo Province, Angola, when I observed a male indigobird mimicking Dusky Twinspot *Euschistospiza cinereovinacea* in open woodland at 12°36.86'S 14°55.50'E (1,290 m altitude). Careful observation indicated a blue gloss, white bill and pinkish legs. Unfortunately, I had failed to bring mist-nets with me, so could not trap the bird for closer examination. On the same trip, I found two more male indigobirds mimicking

Dusky Twinspot at Kanjonde village, Mount Moco (12°42.83'S 15°15.26'E; 1,930 m). They possessed the same morphological features as the first bird (Fig. 1). On 15 May I recorded the song of one of these birds, including extensive mimicry, using an Olympus LS-11 digital sound-recorder (recording in 16-bit WAVE format at 96 kHz). On departing Mount Moco a few days later, I observed another similar male indigobird also mimicking Dusky Twinspot. At least four males all mimicking Dusky Twinspot suggested that the local population of indigobirds were brood parasites of this species, perhaps unsurprisingly given that firefinches *Lagonosticta* are rare in the Angolan highlands and absent at Mount Moco, whereas Dusky Twinspot is common there (Mills *et al.* 2011).

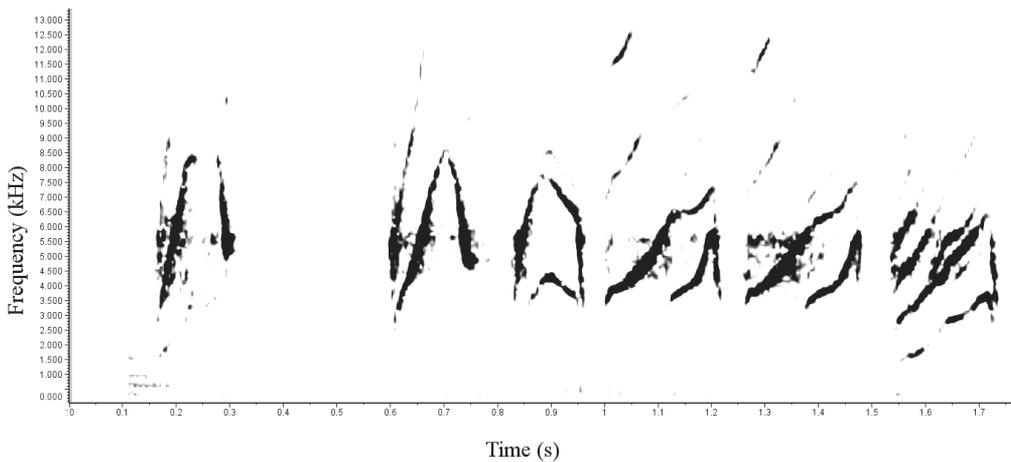
The timing of all subsequent visits to Mount Moco lay outside the indigobird breeding season, so no further observations were made until May 2013, when at least four males were found along the entrance road to Kanjonde village and around the village itself, all of them mimicking Dusky Twinspot. One male was sound-recorded at 12°39.46'S 15°11.14'E (1,790 m), then trapped in a mist-net and photographed, and blood samples taken (available upon request to researchers





**Figure 4.** Sonogram of the *tsyip-tsyip* contact call of Dusky Twinspot *Euschistospiza cinereovinacea*, as presented in Mills (2009), based on recordings in Mills (2007).

**Figura 4.** Sonograma da vocalização de contacto (*tsyip-tsyip*) do pintadinho-cinza *Euschistospiza cinereovinacea* publicado em Mills (2009) a partir de gravações de Mills (2007).



**Figure 5.** Sonogram of mimicry of Dusky Twinspot *Euschistospiza cinereovinacea* by an indigobird at Mount Moco, Angola. The first two notes are mimicked contact calls of Dusky Twinspot; note the similarity in structure with the calls in Fig. 4. The notes that follow are probably mimicry of the begging call of Dusky Twinspot.

**Figura 5.** Sonograma da mímica de pintadinho-cinza *Euschistospiza cinereovinacea* feita por uma vidua do Monte Moco, Angola. As primeiras duas notas são cópias das vocalizações de contacto do pintadinho-cinza; note a similaridade de estrutura com as vocalizações apresentadas na Fig. 4. As notas seguintes são provavelmente imitações das vocalizações das crias de pintadinho-cinza quando solicitam comida.

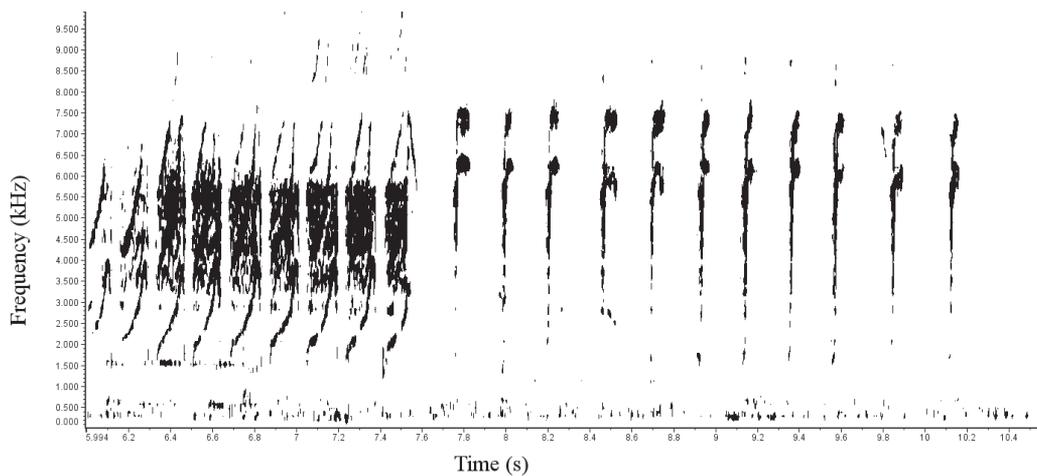
studying genetic variation of indigobirds). In common with previously observed birds, it had a dullish blue gloss, brown wings, whitish bill and pinkish legs (Figs. 2–3).

Subsequently, sound-recordings made of these indigobirds were manipulated using Goldwave Software ([www.goldwave.com](http://www.goldwave.com)) and sonograms of one individual recorded in 2011 produced with Raven Lite software (Cornell Lab of Ornithology 2003–2005), as evidence of mimicry. These

sonograms are presented alongside a sonogram of Dusky Twinspot contact calls from Mills (2009) (Fig. 4). An edited, 140-seconds recording of the song of this indigobird, exhibiting both extensive mimicry and non-mimetic song, can be downloaded at <http://www.birdsangola.org/downloads.htm>.

Current knowledge of Dusky Twinspot vocalisations is limited, with no recordings in the British Library Sound Archive ([\*Dusky Twinspot, a new host species for indigobirds: Mills\*](http://www.</a></p></div><div data-bbox=)





**Figure 6.** Sonogram of two different vocalisations of Dusky Twinspot *Euschistospiza cinereovinacea* mimicked by an indigobird at Mount Moco, Angola. The first series of identical notes, a rapid, nasal complaining, appears to represent begging calls. The second series of identical notes are a sharp, metallic *tink tink tink* that may be alarm calls.

**Figura 6.** Sonograma de duas vocalizações diferentes de pintadinho-cinza *Euschistospiza cinereovinacea* que são imitadas por uma viúva (*Vidua* sp.) do Monte Moco, Angola. A primeira série de notas idênticas, lembrando uma lamúria rápida e nasalada, parece representar a vocalização de solicitação de alimentos pelas crias. A segunda série de notas idênticas correspondem a um *tink tink tink* forte que possivelmente é um grito de alarme.

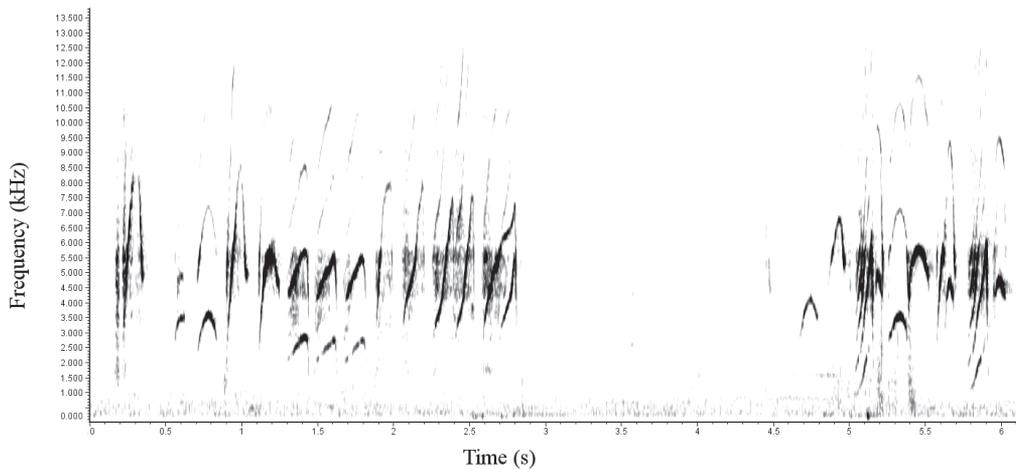
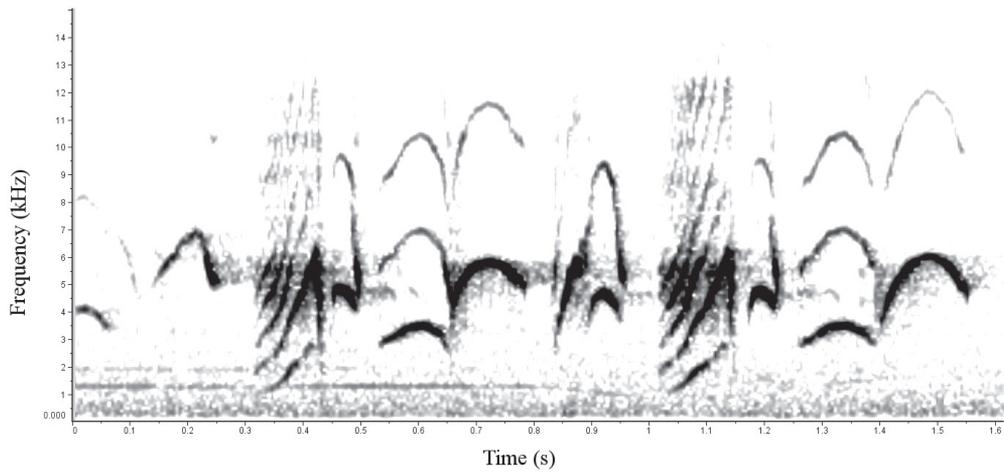
bl.uk/reshelp/findhelpstetype/sound/wildsounds/wildlife.html), the Macaulay Library of Natural Sounds (Cornell University), xeno-canto archive (www.xeno-canto.org) or on Chappuis (2000), other than those made by the author (Mills 2007). The only recorded vocalisation is the contact call, a short, dry *tsyip-tsyip* (Goodwin 1982, Mills 2009) which is often heard in the field (pers. obs). Other vocalisations, which I have never heard, are described as follows: the song is a 'varying series of not very loud or striking notes', the begging call is a loud 'visvisvisvis...' and the distance / alarm call is a 'tsvilip', similar to but louder than the contact call (Goodwin 1982, Fry & Keith 2004).

The contact call was the most frequently mimicked vocalisation in Angola (Fig. 5), although several other vocalisations were mimicked too. These were a rapid, nasal 'complaining' judged to be begging calls (Fig. 6), a sharp, metallic *tink tink tink* presumed to be an alarm call and seemingly undescribed previously (Fig. 6), and a rapid, musical series of high-pitched whistles that rose and fell in pitch (Figs. 7–8), presumed to be the song based on its similarity to that of some other estrildid finches (Fry & Keith 2004). This is not the first time new finch vocalisations have been documented first in indigobird mimicry;

vocalisations mimicked by Jos Plateau Indigobird *V. maryae* led to the discovery of a new species, Rock Firefinch *L. sanguinodorsalis* (Payne 1998).

Three species of indigobird occur in Angola: Dusky Indigobird *V. funerea*, Village Indigobird and Purple Indigobird *V. purpurascens* (Dean 2000). While the latter two are known only from the more arid south, Dusky Indigobird has been recorded over much of the central plateau, including the highlands of Cuanza Sul and Huambo, and occurs throughout the mesic savannahs of southern and eastern Africa (Payne *et al.* 1992b, Payne 2004), making it the most likely candidate. Dusky Indigobird is characterised by a dullish blue to blue-green plumage gloss, brownish primaries and whitish bill, sometimes with a pinkish tinge (Payne 1996). Two subspecies are recognised: nominate *funerea* with orange-red legs and feet, occurring from southern Mozambique to eastern South Africa, and *nigerrima* with pale purplish legs and feet, in Angola, Zambia and central Mozambique in the south to western Kenya in the north (Hockey *et al.* 2005). Village Indigobird has a stronger blue gloss and orange-red legs, and Purple Indigobird a more purple gloss, although differences from the latter species are very minor.





**Figures 7–8.** Sonograms of mimicry of the poorly described song of Dusky Twinspot *Euschistospiza cinereovinacea* by an indigobird at Mount Moco, Angola. The notes are a rapid, musical series of high-pitched whistles that rise and fall in pitch, similar to that made by other species of Estrildidae (Fry & Keith 2004).

**Figuras 7–8.** Sonogramas da mímica do pouco conhecido canto de pintadinho-cinza *Euschistospiza cinereovinacea* por uma viúva (*Vidua* sp.) do Monte Moco, Angola. As notas são uma série musical rápida de assobios agudos, cuja frequência sobe e desce, tal como acontece noutras espécies da família Estrildidae (Fry & Keith 2004), a que o pintadinho pertence.

Birds described in this paper from the Angolan highlands most closely match the *nigerrima* subspecies of Dusky Indigobird, although they have pinkish rather than pale purplish legs. However, Dusky Indigobirds mimicking African Firefinch *Lagonosticta rubricata* (the only previously known host of this species: Payne 2004) captured at Lagoa Carumbo in north-east Angola possessed the same features, including leg colour (Figs. 9–10). While these Dusky Twinspot-mimicking indigobirds may represent a separate species, their

morphological features match Dusky Indigobird well, so I present these data tentatively in evidence of Dusky Twinspot being the second recorded host of Dusky Indigobird. My observations also represent the first evidence of brood parasitism of Dusky Twinspot. By indirect evidence, my data expand the known repertoire of Dusky Twinspot vocalisations. Interestingly, mimicry of Dusky Twinspot vocalisations is incorporated in the song of Thick-billed Seed-eater *Crithagra burtoni* (Mills 2009), along with the calls of many other species.





**Figures 9–10.** Male Dusky Indigobird *Vidua funerea* trapped at Lagoa Carumbo, Lunda Norte, north-east Angola, on 29 April 2011. It was mimicking African Firefinch *Lagonosticta rubricata* and possessed the same morphological features as the birds mimicking Dusky Twinspot *Euschistospiza cinereovinacea* in the Angolan highlands, namely a blue gloss, brownish wings, whitish bill (with a pink tinge) and pinkish legs (M. S. L. Mills)

**Figuras 9–10.** Macho de viúva-negra *Vidua funerea* capturado na Lagoa Carumbo, Lunda Norte, noroeste de Angola, 29 de abril de 2011. Este macho imitava o peito-de-fogo-de-bico-azul *Lagonosticta rubricata* e possuía as mesmas características morfológicas das aves que imitavam o pintadinho-cinza *Euschistospiza cinereovinacea* nas terras altas angolanas – nomeadamente: um brilho azul, asas acastanhadas, bico esbranquiçado (com um tom rosado) e patas rosadas (M. S. L. Mills)

More and closer attention is revealing a greater number of indigobird hosts and a more complex web of host-and-parasite relationships. New data may better unravel diversity within this interesting group, and may provide new insights into indigobird species limits and variability.

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### References

Chappuis, C. 2000. *African Bird Sounds: Birds of North, West and Central Africa*. 15 CDs. Paris: Société Études Ornithologiques de France & London, UK: British Library.

Cornell Laboratory of Ornithology. 2003–05. *Raven Lite 1.0*. Ithaca, NY: Bioacoustics Research Program, Cornell Lab of Ornithology.

Dean, W. R. J. 2000. *The Birds of Angola: An Annotated Checklist*. BOU Checklist No. 18. Tring: British Ornithologists' Union.

Fry, C. H. & Keith, S. (eds.) 2004. *The Birds of Africa*. Vol. 7. London, UK: Christopher Helm.

Goodwin, D. 1982. *Estrildid Finches of the World*. London, UK: Brit. Mus. (Nat. Hist.).

Hockey, P. A. R., Dean, W. R. J. & Ryan, P. G. 2005. *Roberts—Birds of Southern Africa*. Seventh edn. Cape Town: Trustees of the John Voelcker Bird Book Fund.

Klein, N. K. & Payne, R. B. 1998. Evolutionary associations of brood parasitic finches (*Vidua*) and their host species: analyses and mitochondrial restriction sites. *Evolution* 52: 299–315.

Mills, M. S. L. 2007. *Vocalisations of Angolan Birds*. Vol. 1. CD. Cape Town: Birds Angola & Birding Africa.

Mills, M. S. L. 2009. Vocalisations of Angolan birds: new descriptions and other notes. *Bull. ABC* 16: 150–166.

Mills, M. S. L., Olmos, F., Melo, M. & Dean, W. R. J. 2011. Mount Moco: its importance to the conservation of Swierstra's Francolin *Pternistis swierstrai* and the Afromontane avifauna of Angola. *Bird Conserv. Intern.* 21: 119–133.

Payne, R. B. 1973. Behavior, mimetic songs and song dialects, and relationships of the parasitic indigobirds (*Vidua*) of Africa. *Ornithol. Monogr.* 11: 1–333.





- Payne, R. B. 1982. Species limits in the indigobirds (Ploceidae, *Vidua*) of West Africa: mouth mimicry, song mimicry, and description of new species. *Misc. Publ. Univ. Mich. Mus. Zool.* 162: 1–96.
- Payne, R. B. 1996. Field identification of the indigobirds. *Bull. ABC* 3: 14–25.
- Payne, R. 1998. A new species of firefinch *Lagonosticta* from northern Nigeria and its association with the Jos Plateau Indigobird *Vidua maryae*. *Ibis* 140: 368–381.
- Payne, R. B. 2004. *Vidua*. In Fry, C. H. & Keith, S. (eds.) *The Birds of Africa*. Vol. 7. London, UK: Christopher Helm.
- Payne, R. B. & Sorenson, M. D. 2004. Behavioral and genetic identification of a hybrid *Vidua*: maternal origin and mate choice in a brood-parasitic finch. *Auk* 121: 156–161.
- Payne, R. B., Payne, L. L. & Nhlane, M. E. D. 1992a. Song mimicry and species status of the Green Widowfinch *Vidua codringtoni*. *Ostrich* 63: 86–97.
- Payne, R. B., Payne, L. L., Nhlane, M. E. D. & Hustler, K. 1992b. Species status and distribution of the parasitic indigobirds *Vidua* in east and southern Africa. *Proc. Pan-Afr. Ornithol. Congr.* 8: 40–52.
- Payne, R. B., Payne, L. L. & Woods, J. L. 1998. Song learning in brood parasitic indigobirds *Vidua chalybeata*: song mimicry of the host species. *Anim. Behav.* 55: 1537–1553.
- Payne, R. B., Payne, L. L., Woods, J. L. & Sorenson, M. D. 2000. Imprinting and the origin of parasite-host associations in brood-parasitic indigobirds, *Vidua chalybeata*. *Anim. Behav.* 59: 69–81.
- Payne, R. B., Barlow, C. R., Balakrishnan, C. N. & Sorenson, M. D. 2005. Song mimicry of Black-bellied Firefinch *Lagonosticta rara* and other finches by the brood-parasitic Cameroon Indigobird *Vidua camerunensis* in West Africa. *Ibis* 147: 130–143.
- Sorenson, M. D., Sefc, K. M. & Payne, R. B. 2003. Speciation by host switch in brood parasitic indigobirds. *Nature* 424: 928–931.
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