

First record of subsong and vocal duetting in the Purple Sunbird *Cinnyris asiaticus*, United Arab Emirates

ANDRÉ-ALEXANDER WELLER

Bird song varies with a number of innate and external factors such as age, hormonal regulation, social behaviour, season, altitude or climate *eg* Thorpe 1961, Lofts & Murton 1973, Nottebohm 1975, Kroodsma & Byers 1991, Brenowitz *et al* 1997, Nowicki & Searcy 2004. Apart from the well-studied main functions of full song in males *ie* female attraction and territorial defense, so-called subsong is independent of maturity, sex and phase of reproduction and occurs usually within a different functional context (Thorpe & Pilcher 1958, Marler 1991). In comparison to main song, it has been traditionally defined as 1) generally quieter, 2) having a different pattern, 3) tending to contain longer phrases, 4) having a broader frequency range with lower-frequency high-pitched notes, and 5) representing non-inter-individual communication (Thorpe 1958, Thorpe & Pilcher 1958). However, there may be exceptions to the latter point as *eg* found in *Sylvia* warblers such as Blackcaps *S. atricapilla* (Fisher 2009, pers obs). Subsong is not sex-restricted and is also practiced by females (Powlesland 1983, MacKay 2001). Finally, during ontogeny, subadults of three avian orders, Apodiformes (*ie* hummingbirds, Trochilidae), Psittaciformes and Passeriformes practice song learning by repeating subsong phrases (*eg* Nice 1943, Nottebohm 1975, Baptista & Schuchmann 1990, Marler & Peters 1982). However, understanding of the entire social context, in which subsong is emitted, still remains incomplete (Marler 1991).

Sunbirds (Nectariniidae) are small nectar- and insect-feeders inhabiting the tropical zones of the Old World (Cheke *et al* 2001). Courtship behaviour is often connected with males' posing in front of females, making unusual movements with bowing positions or raised heads, fanned tails or wings, and the displaying of pectoral tufts, as well as pecking the cloaca of females (*eg* Skead 1967, Howells 1971). While sunbird males usually utter loud territorial songs, some species also exhibit subsong, and others do group singing (Cheke *et al* 2001, Riebert *et al* 2014).

The most species-rich genus of nectariniids is *Cinnyris*, currently comprising 50 members with a focal distribution in Africa (Cheke *et al* 2001, Cheke & Mann 2008). Some taxa belong to the most highly advanced singers of the whole family (Cheke & Mann 2008). Among them, the Purple Sunbird *C. asiaticus* has a broad distributional range across southern Asia from the Indian subcontinent westward to the eastern-most parts of the Arabian peninsula (United Arab Emirates, northern Oman) where it breeds January–July (Cheke *et al* 2001, Cheke & Mann 2018). Adult males are characterized by an iridescent blue-black to dark-green plumage with some purple reflections. Apart from a number of usually sharp, high-pitched calls uttered by both sexes, male vocalizations include a melodious warbling (widely audible song strophe) as in other sunbirds. Males usually sing individually from a perch such as exposed branches or tree crowns (Cheke *et al* 2001). Here I describe the unusual observation of vocal duetting using subsong in males of the Purple Sunbird, a behaviour previously unknown for the species, with a discussion of social context.



Plate I. Vocal duetting in two Purple Sunbird (*Cinnyris asiaticus*) males at Hatta Fort hotel, Hajar mountains, Dubai, United Arab Emirates on 11 February 2018. A) Birds in the top of a small *Acacia* bush, watching each other somewhat distantly. B) Right male approaching the other. © André-Alexander Weller

SITE AND OBSERVATIONS

In the course of an ornithological study excursion to the United Arab Emirates, I visited Hatta Fort hotel at Hatta, Hajar mountains, Dubai (24° 49' 12" N, 56° 08' 09" E), 10–12 February 2018. The private area comprises c33 ha including a broad mix of habitats, parks and gardens, greens, small ravines and hills with ornamental and relic natural vegetation (mainly elements of mountain *Acacia* thorn woodlands). Due to the rich amount of flowering ornamental plants around the year, the surroundings of the hotel host a good number of Purple Sunbirds, the only species in the UAE, which I could observe in different behavioural situations and social interactions (*ie* feeding, displaying, singing and chasing) during my stay. On 11 February at 08.00 h, while walking at the foot of a steep, inaccessible rocky hill adjacent to a row of guest apartment houses, I became aware of two male sunbirds in breeding plumage uttering unusual vocalizations. At the beginning of the observation, both individuals were sitting, c6 m away from me, in the top of a small *Acacia* sp (Fabaceae) bush (height c1.5 m) and c1.2 m away from each other. Their posture was upright with no spreading of tail or wings (Plate 1A), and the bill was not visibly open. Both emitted a monotonous, continuous warbling sound “*wddwddwddwddwddwddwdd...*,” fairly inconspicuous, but still quite different from full song. There was no audible modulation of frequency, range and speed. After 30 s one male (right in Plate 1) started approaching at c0.7 m (Plate 1B), with the head facing towards the other at first but then turning around and sitting laterally in front of the opponent (for 1.00 min). After half a minute a female, which was possibly present during the entire time in a nearby tree (I followed the display of the males), flew into the bush but did not vocalize. Finally, the ‘stationary’ male left its position after 10 s followed by the other shortly after, and both disappeared out of my sight. During the entire observation time (altogether c1.40 min) I observed no specific posing or even aggressive behaviour between the males or towards the female.

DISCUSSION

Group display, or lek behaviour, in birds may have different social functions and advantages, respectively. In hummingbirds (Trochilidae), leks of up to 20 males (*ie* hermits *Phaethornis* spp) serve as centres for mate choice (Schuchmann 1999). In some monogamous passerines, group displays may force extra-pair copulations *eg* European Serin *Serinus serinus* (Hoi-Leitner *et al* 1999), a behaviour also known from some sunbirds (*eg* *Cinnyris*, *Nectarinia*, Cheke *et al* 2001, Riegert *et al* 2014). However, sunbirds exhibit a variety of courtship patterns including group displays of more than two individuals of both sexes, in which males behave in a species-specific manner (*eg* Schoeman 1990, Lucking 1996, Riegert *et al* 2014). In Northern Double-collared Sunbirds *Cinnyris reichenowi*, group display is connected with territorial defence behaviour and mainly performed by pairs during the pre-breeding phase at territory boundaries, with males singing and both sexes uttering contact calls (Riegert *et al* 2014). Despite the fact that some sunbirds are polygynous or polyandrous (Lucking 1996, Cheke *et al* 2001), group displays seem rather to be directed to defending nectar sources (= territories) rather than being relevant for mate choice, although the social context is still understudied (Riegert *et al* 2014).

A number of sunbirds show geographic song variation or dialects (Payne 1978, Cheke *et al* 2001). Moreover, mimic vocalizations such as imitations of song elements of passerines are known from other members of *Cinnyris* (Cheke *et al* 2001). Compared to other, closely related congeners (*eg* Palestine Sunbird *C. oseus*, Irwin 1999, Cheke *et al* 2001), and despite its extended geographic range, the song repertoire of the Purple Sunbird is rather limited, consisting typically of a warbling strophe that distantly reminds one of a Willow Warbler *Phylloscopus trochilus* (Cheke *et al* 2001, pers obs). In contrast, the vocalization type

described in this paper can be best referred to as subsong and was previously unknown for *C. asiaticus* (Cheke *et al* 2001). Subsong is apparently rare in the genus and only known from two other representatives, Southern Double-collared Sunbird *C. chalybeus* and Variable Sunbird *C. venustus* (Cheke *et al* 2001, KL Schuchmann pers comm). Moreover, some other aspects are likewise unusual for group-displaying sunbirds: 1) Intrasexual duet singing is unrecorded for both this species and the genus at all, and the minimum number of participating individuals ($n = 2$ males) was atypical, even when considering the single female recorded as a potential auditor. 2) Males used an exposed but low bush instead of perching on a nearby, much higher tree. 3) Females were not present during the display from the beginning, and only a single female occurred near its end. Finally, vocal duetting in birds is usually intersexual and practiced by mates, which is supposed to strengthen the pair bond (Wickler 1980).

Taking into account that the observation date coincided with the early breeding phase in the species' western range (*cf* Cheke *et al* 2001), the case described may present a specific variation of group display in which males perhaps 'pre-compete' for a territory with/without the presence of females. Since subsong is not as conspicuous as full song, its function for mating purposes is highly questionable. A quieter display may also reduce aggressive encounters and chases, which are common in sunbirds including *C. asiaticus*, thus diminishing the risk for an individual being injured (by ritualized behaviour; see West-Eberhard 1979). Even with regard to its accidental nature, observations like this can shed light on the variation of display patterns in sunbirds and may help to understand their role in the complex but often poorly known social behaviour of many species.

LITERATURE CITED

- Baptista, LF & KL Schuchmann. 1990. Song learning in the Anna Hummingbird (*Calypte anna*). *Ethology* 84: 15–26.
- Brenowitz, EA, D Margoliash & KW Nordeen 1997. An introduction to bird song and the avian song system. *Developmental Neurobiology* 33: 495–500.
- Cheke, RA, CF Mann & R Allen. 2001. *A guide to the sunbirds, flowerpeckers, spiderhunters and sugarbirds of the world*. Yale University Press, New Haven, USA
- Cheke, R & C Mann. 2008. Family Nectariniidae (Sunbirds). In: del Hoyo, J, A Elliott & DA Christie (eds). *Handbook of the birds of the world*. Lynx Edicions, Barcelona, pp196–338.
- Cheke, R & C Mann. 2018. Purple Sunbird (*Cinnyris asiaticus*). In: del Hoyo, J, A Elliott & DA Christie (eds). *Handbook of the Birds of the World Alive*. Lynx Edicions, Barcelona, <https://www.hbw.com/node/60061>. [Retrieved 23 March 2018]
- Fisher, S. 2009. IBC1121858. Sound recording of Eurasian Blackcap *Sylvia atricapilla* at Wanstead Park, Great Britain. hbw.com/ibc/1121858. [Retrieved 25 March 2018]
- Hoi-Leitner, M, H Hoi, M Romero-Pujante & F Valera. 1999. Multi-male display sites in Serins (*Serinus serinus* L.). *Ecoscience* 6: 143–147.
- Howells, WW. 1971. Breeding of the Coppery Sunbird at Salisbury, Rhodesia. *Ostrich* 42: 99–109.
- Irwin, MPS. 1999. The genus *Nectarinia* and the evolution and diversification of sunbirds: an Afrotropical perspective. *Honeyguide* 45: 45–58.
- Kroodtsma, DE & BE Byers. 1991. The function(s) of bird song. *American Zoologist* 31: 318–328.
- Lofts, B & RK Murton. 1973. Reproduction in birds. In: Farner DS & JR King (eds) *Avian biology*, Vol. 5. Academic Press, New York, pp1–107.
- Lucking, RS. 1996. Polygyny in the Seychelles Sunbird *Nectarinia dussumieri*. *Bulletin of the British Ornithologists' Club* 116: 178–179.
- MacKay, BK (2001) *Bird song: how and why birds sing, call, chatter and screech*. Stackpole Books, Mechanicsburg.
- Marler, P. 1991. Differences in behavioural development in closely related species: birdsong. In: Bateson, P (ed) *The development and integration of behaviour. Essays in honour of Robert Hinde*. Cambridge University Press, UK, pp41–70.
- Marler, P & S Peters. 1982. Subsong and plastic song: their role in the vocal learning process. In: Kroodtsma, DE & EH Miller (eds). *Acoustic communication in birds. Vol. 2: Song learning and its consequences*. Academic Press, New York, pp25–50.
- Nice, M. 1943. Studies in the life history of the Song Sparrow. II. The behavior of the Song Sparrow and other passerines. *Transcriptions of the Linnean Society New York* 6: 1–328.

- Nottebohm, F. 1975. Vocal behavior in birds. *In: Farner, DS & JR King (eds) Avian biology, Vol. 5.* Academic Press, New York, pp287–332.
- Nowicki, S & WA Searcy. 2004. Song function and the evolution of female preferences: why birds sing, why brains matter. *Annals of the New York Academy of Sciences* 1016: 704–723.
- Payne, RB. 1978. Microgeographic variation in songs of Splendid Sunbirds *Nectarinia coccinigaster*: population phenetics, habitats, and song dialects. *Behaviour* 65: 282–308.
- Powlesland, RG. 1983. Seasonal and diurnal variation in vocal behaviour of the South Island Robin. *New Zealand Journal of Zoology* 10: 225–232.
- Rieght, J, M Antczak, D Fainová & P Blazková. 2014. Group display in the socially monogamous Northern Double-collared Sunbird (*Cinnyris reichenowi*). *Behavioural Processes* 103: 138–144.
- Schoeman, M. 1990. Behaviour observations of Greater Double-collared Sunbird. *Hornbill* 23: 22–23.
- Schuchmann, KL. 1999. Family Hummingbirds (Trochilidae). *In: del Hoyo, J, A Elliott & DA Christie (eds). Handbook of the birds of the world.* Lynx Edicions, Barcelona, pp468–680.
- Skead, CJ. 1967. *The sunbirds of southern Africa; also the sugarbirds, the white-eyes and the spotted creeper.* AA Balkema, Cape Town.
- Thorpe, WH. 1958. The learning of song patterns by birds, with especial reference to the song of the Chaffinch *Fringilla coelebs*. *Ibis* 100: 535–570.
- Thorpe, WH. 1961. *Birdsong: the biology of vocal communication and expression in birds.* Cambridge University Press, London.
- Thorpe, WH & PM Pilcher. 1958. The nature and characteristics of sub-song. *British Birds* 51: 509–520.
- West-Eberhard, MJ. 1979. Sexual selection, social competition, and evolution. *Proceedings of the American Philosophical Society* 123: 222–234.
- Wickler, W. 1980. Vocal duetting and the pair bond. I. Coyness and partner commitment. A hypothesis. *Zeitschrift für Tierpsychologie* 52: 201–209.

André-Alexander Weller, Zoological Research Museum A. Koenig, Section of Ornithology, Adenauerallee 160, 53113 Bonn, Germany. a.weller@leibniz-zfkn.de