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SONG AND COURTSHIP OF THE WATTLED STARLING *CREATOPHORA CINEREA*

by Walter A. Sontag Jr.

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INTRODUCTION

Among the African sturnids the Wattled Starling *Creatophora cinerea* is considered to be the nearest relative of the genus *Sturnus* (Amadon 1943; see also Durrer & Villiger 1970, Harrison 1963). It inhabits dry areas and is distributed from southwestern Africa, through South Africa, East Africa and Ethiopia, occasionally to the Arabian peninsula (Hall & Moreau 1970).

Wattled Starlings are extremely sociable (Liversidge 1961), and outside the breeding season flocks wander distantly. When breeding, they usually live in colonies comprising up to 400 nests. However, rarely, in close relation with mass reproduction of locusts, they suddenly form enormous colonies composing thousands of nests in a small area. A breeding colony consists, to a large extent, of nesting communities (Liversidge 1961), within which pairs breed and rear their own young only. Because of its extraordinary sociology and ecology, the Wattled Starling might be expected to possess particular behavioural adaptations.

The remarkable song, its function, and the visual expressive behaviour during singing were studied in captive birds. Furthermore, I paid attention to the great variation in the appearance of individuals which becomes evident when they display.

METHODS

The investigation was started 12 years ago at Frankfurt Zoo, West Germany, where Wattled Starlings were bred and reared in large numbers. From 1974 to 1976, in Nieder-Olm near Mainz, starlings were kept in an aviary that comprised a covered enclosure (1.8 x 2 x 2.2 m) connected to an outside cage (6 x 3 x 2.9 m). From 1979 to 1981, groups of birds were housed for study in equally sized aviaries of c. 5 x 3 x 2 m on Mainz University campus. A control group was (and is still being) kept in a large aviary in Mainz Municipal Park.

'UNDIRECTED' SONG

Song is uttered during courtship but does not serve territorial functions, consistent with the fact that Wattled Starlings do not defend real territories beyond their own nests. Males often sing without directing the song to a female; when uttering this 'undirected' song they wave their wings.

Songs (Fig. 1) very often have a three-partite pattern with (1) a faint, often hardly audible introductory part, (2) a louder middle section, and

(3) a 'peeling' end (which can be succeeded by further parts). Songs typically exceed 15 s in duration, and stepwise differences in volume between the different sections are characteristic.

'Undirected' song does not elicit aggression in conspecifics. In the moulting period, at times a male approaches a singing male and ruffles its head plumage, but I have not yet found an explanation of this behaviour.

I noted one instance of apparent selective attraction to an individual's songs. 'Undirected' song of Male P attracted Male R, housed in an adjacent aviary. Whenever P sang R tried to approach it, although it did not respond similarly to other singing males. P was wild-caught and R zoo-born, and they had never lived together in one group; no sexual or agonistic motivation was evident in either bird.

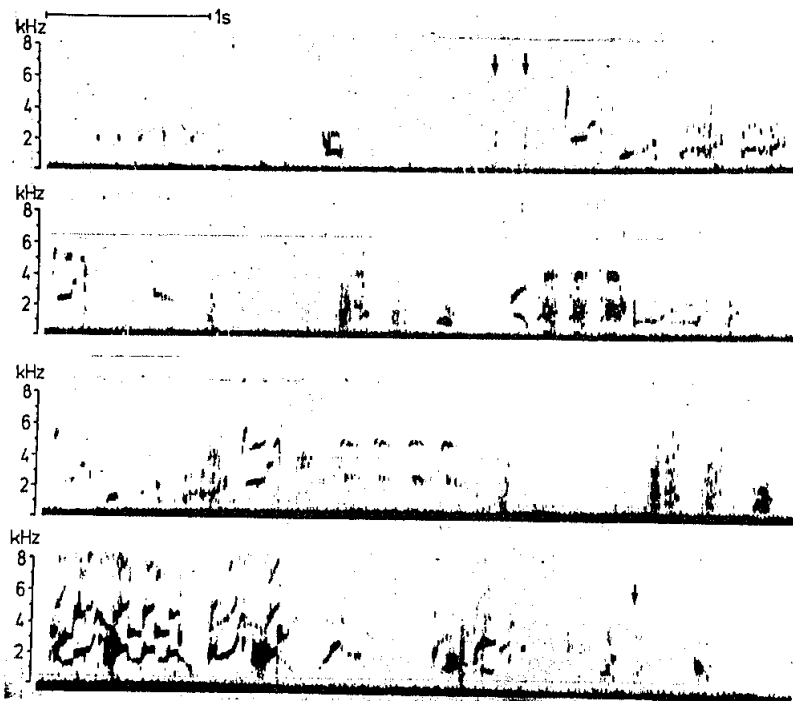


Figure 1 Sonagram of initial 18 sec of a male's single song lasting for 31 sec. Arrows mark faint elements. In the upper line there is the 'gentle' introductory part. The very loud structures in the first half of the last line were repeated twice in this song. 1 s = 1 second. Sonagraph used: Kay 6061 - R.

In the moulting period song alters and it sounds not fully developed (in one bird as if the voice was 'breaking'). At that time some components differ from those sung at other times, and there is also a dramatic change in the contact call (Male P). Normal voices are resumed after moulting.

Females over one year old utter 'undirected' song outside the breeding period, but their song is not as perfect as male song.

In Wattled Starlings 'undirected' song suggests a low level of sexual motivation, as assumed for Zebra Finches *Taeniopygia guttata* by Morris (1954) and substantiated for it by castration experiments by Pröve (1974). Both inhabit dry areas (cf. Liversidge 1961 and Immelmann 1969) and are opportunistic breeders (Wattled Starlings only partially so: Dean 1978), in which reproductive behaviour can probably always be induced very rapidly. The gonads of *C. cinerea* may be kept in an 'activated' condition by means of song. The influence of vocalizations on gonadal condition has been demonstrated in female Budgerigars *Melopsittacus undulatus* (Brockway 1965), Ring Doves *Streptopelia risoria* (Lott et al. 1967), and Canaries *Serinus canarius* (Kroodsma 1976).

Because of their strikingly similar qualities it is worth comparing the 'undirected' song of Wattled Starlings with the 'solitary' song of estrildids (Harrison 1962, Immelmann 1962, 1968, Morris 1958). In both cases song lacks any epigamic function (although Wattled Starlings and estrildids do have advertisement songs). Harrison (1962) described the song of estrildids as "complex utterances, frequently elaborate and prolonged", which is 'like' Wattled Starling song. In African estrildids, a male that is unpaired or separated from his mate utters 'solitary' song, which is inhibited by the presence of a conspecific (Harrison 1962). However, in Australian estrildids 'solitary' song is uttered within groups and in *Lonchura* by different males together (Immelmann 1962). Similarly, Wattled Starlings often sing together, and an attraction effect was mentioned above. Some estrildids sing with an audience (Morris 1958).

The lack of territorial function in Wattled Starling song is due to colonial breeding (Hoesch 1936, Liversidge 1961) and absence of territorial defence. However, in two breeding pairs I noticed singing during nest-reliefs. Among estrildids, too, song does not provoke aggression (cf. Immelmann 1968).

COURTSHIP

Morphologically significant characters

The individual appearance of Wattled Starlings differs extraordinarily. The head can be fully feathered (except for the naked black skin stripes on the chin and the naked yellow skin stripe on the temples), or it can be variably bald, when patches of yellow and black skin become obvious. The upper greater wing coverts show great variation in colour, being brown, grey or white. Heads and wings vary individually and with sex and age, and the head varies seasonally. Heads and wings are both displayed during courtship.

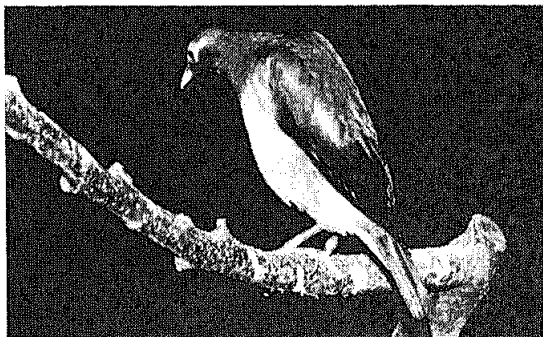


Figure 2 'Vulture posture' of sexually motivated female.

Courtship behaviour

Sexual activity can be initiated by either sex.

Females do not have courtship songs but use 'vulture postures' (Fig. 2), when the naked temple stripes are conspicuously displayed.

Male courtship utilizes acoustic and optical signals. It commences with the male lowering and slightly spreading the wing next to the female. With the wing hanging close to the body, the upper primary coverts become partly visible. As the male approaches the female its lateral display is succeeded by a more frontal one, with the plumage puffed out. From in front, the underparts appear enlarged and smooth; from behind they look ruffled and unkempt. The white rump is extremely ruffled, contrasting markedly with the spread dark rectrices (Fig. 3). Both wings are then lifted, held in a roughly horizontal position, and quivered. The differences in colouring between the dark remiges, highly variable coverts, and grey scapulars and back become conspicuous. Individual differences in the coverts are more evident in frontal than in lateral display. During the frontal display the male's legs are bent and head lowered, and the front part of his body performs thrusting movements, accentuating the head marks.

During lateral and frontal display the male sings, the song being identical with the 'undirected' song.

Absent behaviours

It should be stressed that Wattle Starling courtship does not incorporate several behaviour patterns that occur in other starlings, namely courtship feeding, billing, allopreening, 'nodding', and duetting (cf. Rowan 1955, Harrison 1963, Sontag 1983).



Figure 3 Male (on right) courting a sexually non-motivated female.

OTHER POSSIBLE FUNCTIONS OF SONG

A spontaneous reaction to a distant singing bird, or probable aural recognition of song of a hidden social partner, was observed in at least three dyads (two being male-male and one female-male). Individual song recognition is most likely to occur. Another function of song may be sex recognition. In a long-term study of three males and five females in Nieder-Olm, only the males sang, but both sexes 'twittered' producing a 'degenerate' song.

Singing during nest-relief might serve to strengthen the pair-bond or as a greeting or merely for mate recognition; or it might result from motivational conflict.

COMPARISON WITH EUROPEAN STARLING

Because of the close relationship between the European Starling *Sturnus vulgaris* and the Wattled Starling the following behavioural differences should be pointed out. Liversidge (1961) mentioned acoustic mimicry in Wattled Starlings. Although I studied a great number I did not find evidence for interspecific sound imitation, with perhaps one exception: one female frequently uttered a clicking sound that I have never heard uttered by any other individual. In European Starlings acoustic mimicry is common (Feare 1984).

Feare (1984) noted that in European Starlings singing is accompanied by wing-flicking and wing-flailing; although he suggested that Wattled Starlings wing-flail it seems to differ from the wing-waving described above.

SUMMARY

Wattled Starlings *Creatophora cinerea* were studied in captivity in Germany. Both sexes sing (slightly dissimilarly), songs often lasting for over 15 sec. Individual song recognition is very likely. Male song may be uttered 'undirected' (not addressed to a female). In two pairs singing occurred during nest relief. 'Undirected' song is accompanied by wing-waving. A male sings while performing lateral and frontal display. Head pattern and individual differences in wing colouring are conspicuous during display. Female song plays no role in sexual behaviour; females indicate sexual motivation with a 'vulture posture'.

This paper is in honour of the sixtieth anniversary of Prof Dr Jürgen Nicolai.

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