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Short Note

## The sociality of nesting in Rüppell's Weaver *Ploceus galbula* and the Lesser Masked Weaver *Ploceus intermedius* in an Ethiopian acacia woodland

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**Rüppell's Weaver *Ploceus galbula* and the Lesser Masked Weaver *Ploceus intermedius* nest prominently in the Awash National Park, Ethiopia. In both species the sociality or degree of aggregation of their nesting is varied. Rüppell's Weaver can nest singly or in small clusters, or in association with the Lesser Masked Weaver, which itself can nest in loose aggregations or bustling colonies. This variation suggests a continuum of nesting sociality in weavers, from solitary nesting through associative and gregarious nesting to full coloniality.**

**Keywords:** coloniality, nesting associations, breeding, weaverbirds, *Ploceus*

The central Awash River Valley in Ethiopia is a hotspot of *Ploceus* weaverbird diversity: nine species' ranges overlap in the triangular area of lowlands formed by the narrowing of the Great Rift Valley where the Ethiopian and Somalian plateaus approach each other in the vicinity of Awash National Park (Redman et al. 2009). Here I describe the nesting in southern Awash National Park of two weaver species about which very little has been published: Rüppell's Weaver *Ploceus galbula* and Lesser Masked Weaver *P. intermedius*. I focus especially on the sociality of their nesting, by which I mean their tendency to nest in groups within and between species, because this feature was notably variable in the study site and because these observations might shed light on aggregated nesting more broadly.

The vegetation of Awash National Park (ANP) is considered acacia–*Commiphora* woodland, and this designation is accurate for much of the of the Park's semi-arid interior. Rüppell's and Lesser Masked Weavers nested, often in association with each other, in these open acacia woodlands (Figure 1). The nesting events described below took place in such habitat, south-west of the Ilala Sala Plains, just north and east of ANP Headquarters (8°53.150' N, 40°02.147' E). In moister areas of ANP the plant community can be radically different, such as along the river where the vegetation is denser and the canopy higher, dominated by large broadleaf trees such as *Ficus* and *Terminalia*. Although the Village Weaver *P. cucullatus abyssinicus* nested in dense colonies alongside the Awash River (R Habig and DCL unpublished data), neither Rüppell's nor Lesser Masked Weavers nested along the river or in the associated gallery forest during the study. However, all three of these species regularly congregated in and around the gallery forest in mixed-species flocks in the early evening prior to roosting, together with large numbers

of the Chestnut Weaver *P. rubiginosus* and the occasional Little Weaver *P. luteola*. This interspecific gregariousness has been documented for both the Lesser Masked and Rüppell's Weavers in this region (Bruggers et al. 1985, Clarke 1986), as indeed is generally the case for most African *Ploceus* species (Craig 2010).

Following are seven specific observations, but each example represents a commonly seen nesting situation in the study site. Each is also diagrammed in Figure 2.

- (1) A single Rüppell's Weaver nest with eggs, at least 10 m from the closest nest of another weaver, with no dense nesting aggregations within at least 100 m
- (2) Two Rüppell's Weaver nests, 0.5 m apart, both defended by a single male and containing eggs of two different females, in a situation otherwise identical to (1). (This and other similar observations demonstrate that Rüppell's Weaver was frequently polygynous in this study site, unlike in a Yemeni site where only one nest was occupied per male [Al-Safadi 1996]).
- (3) Three active Rüppell's Weaver nests, each 1.5 m from the other. These nests were 6 m from the closest other nests, a loose aggregation of the Lesser Masked Weaver, containing 27 complete nests (nine active of nine checked) and 14 incomplete nests.
- (4) Ten Rüppell's Weaver nests (seven active) and four Lesser Masked Weaver nests (all active) distributed evenly along a 10 m stretch of road, most about 3 m from each other regardless of species. All active nests had nestlings.
- (5) Thirty Rüppell's Weaver nests (12 active of 16 checked) distributed sparsely in an area of 25 m × 25 m, interspersed with 10 Lesser Masked Weaver nests (none checked).
- (6) About 110 complete nests and 60 incomplete nests of Rüppell's (c. 25 in total) and Lesser Masked Weavers

(c. 145 in total) (and a single nest of a Little Weaver), distributed broadly over several trees in an area of 30 m × 15 m. Of 40 nests checked, one had a new egg, and 25 had nestlings of varying ages or well developed eggs (so 65% were active). Several of the empty nests were old and lined.

- (7) More than 200 nests of Lesser Masked Weavers, roughly half of which were aggregated tightly into a colony where the nearest nest is generally 1 m away or less, the colony then petering out into a loose aggregation stretching over a 3 m × 40 m area along a roadside, where nests tend to be 2–5 m apart. Among the latter loose aggregation were interspersed 11 Rüppell's Weaver nests. It was a ghost town, with no active nests found and no birds present of either species; c. 20% of the nests were lined, the remainder unlined but completed, a few torn apart. (Bruggers et al. [1985] describe a case of Lesser Masked Weavers abandoning a colony between nesting attempts, the same [marked] individuals subsequently setting up a new one nearby).

Of c. 400 nests found of both species combined, all nests were 2.5–5.5 m high in acacias over the ground in open woodland, the upper limit being imposed by the stature of the acacias.

Lesser Masked Weaver nests were retort-shaped with a descending entrance tube, whereas Rüppell's Weaver nests were kidney shaped with a larger entrance and no tube. Lesser Masked Weaver nests were also narrower, constructed of finer materials, woven much more densely, and with a higher proportion of dead rather than green vegetation, compared to Rüppell's Weaver nests. Moreover, a Lesser Masked Weaver nest was generally anchored more strongly, often to two different twigs, whereas a Rüppell's Weaver nest was usually attached only at one point, usually to the end of a twig.

The above observations illustrate a broad continuum of nesting situations, especially for Rüppell's Weaver. This bird is gregarious in its behaviour, and does tend to nest in the proximity of other weavers of its own or a different species. However, given the broad variation in the distance between nests, what should count as 'proximity' is unclear: an individual building a nest 10 m from another in an acacia woodland is practically a solitary nester, although where one finds a single nesting Rüppell's Weaver there are almost always others nearby. Moreover, two or three weaver nests within 1–2 m of each other are usually built by the same male: Rüppell's Weaver males attempt to be polygynous, so each male will often build and maintain usually two, and occasionally three nests at a time. In this study site, these were generally 1–1.5 m from each other, and further (at least 2 m) from those of a neighboring male. When nesting near Lesser Masked Weavers, however, the distance can be shorter – one Rüppell's nest was built just 0.3 m from a Lesser Masked nest. In a more typical association ([3] above), three Rüppell's nests of a single male were 1.5 m from each other and 6 m from the closest of an aggregation of Lesser Masked nests.

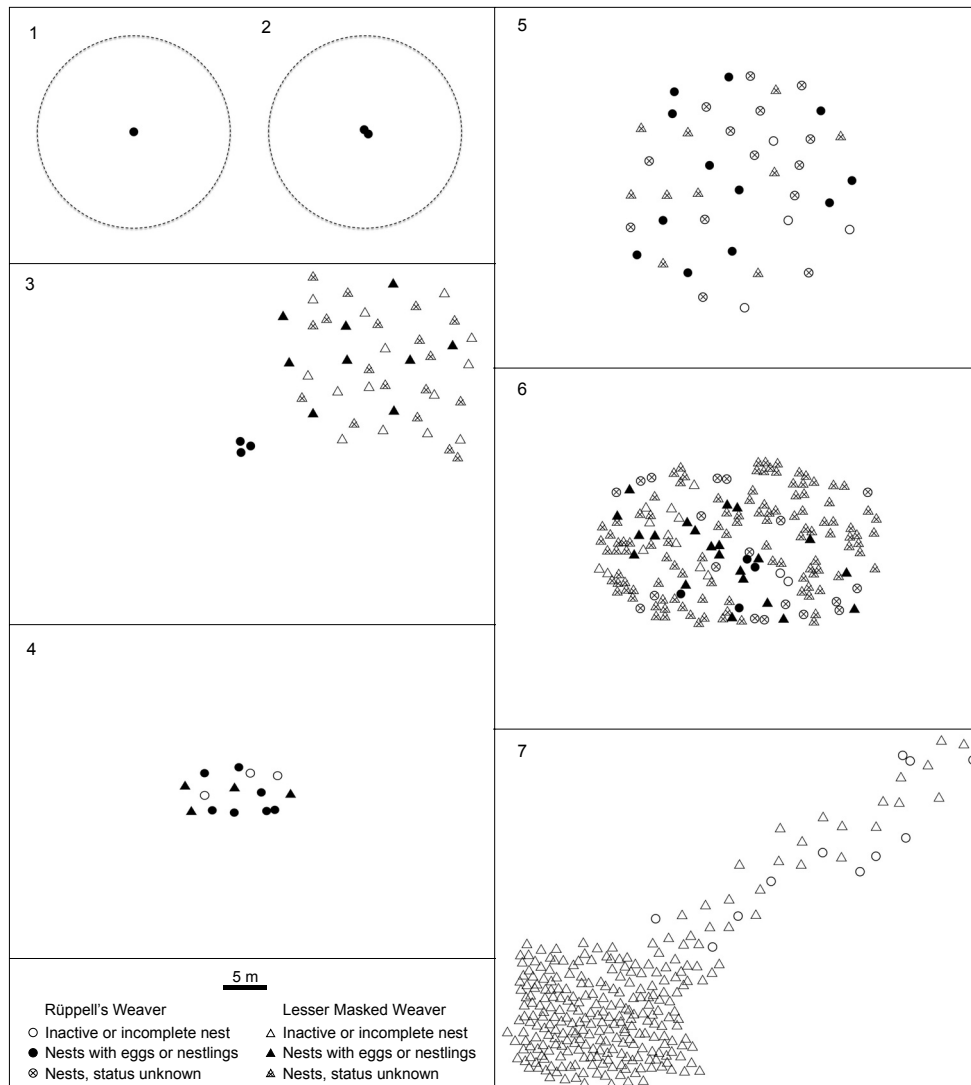
Thus the Rüppell's Weaver is not adequately described as a solitary nor a colonial nester. Two further terms might be employed to fill the continuum between these two extreme nesting situations in weavers, perhaps as well as



**Figure 1:** A Rüppell's Weaver *Ploceus galbula* female tending to her young, with an unfinished Lesser Masked Weaver (*Ploceus intermedius*) nest nearby. These two species regularly nest in association with each other at the study site in Awash National Park, Ethiopia (photograph by April Lahti)

other species. At a step above solitary nesting we might use the term 'associative nesting', drawing from the literature on nesting associations between species (Lahti et al. 2002, Quinn and Ueta 2008). A species can be called an associative nester if the presence of nests of its own or another species increases the likelihood that it too will nest nearby. At some high level of such association, the species could be considered to engage in 'gregarious nesting' (e.g. Collias et al. 1971), a term that refers to species that nest closely enough to others that the individuals will tend to interact on a regular basis during nesting. A resulting group of nests can be called an 'aggregation', avoiding the more specific connotations of coloniality. The word 'colony' might then be reserved for a high or tight level of aggregation, perhaps when nesting territories (where they exist, as in weavers) are adjacent and individuals constantly monitor and defend them from neighbours, or when the distance between different males' nests are not appreciably greater than the distance between the same male's nests. The concept of coloniality also suggests concerted or shared behaviour, such as in fleeing from or defense against predators, or (in weavers) synchronised mating display. Whether inter-nest distance, nest number, or concerted behaviour is used as the defining feature of coloniality, the sense of the term is likely to be similar because of the interactions among these features (Danchin and Wagner 1997). All of these situations can be considered as aspects of nesting sociality, analogous to the way researchers consider the sociality of other behaviours such as foraging or predator avoidance.

In this context, the Rüppell's Weaver in the Awash Valley is an associative nester, breeding generally among others of its own or other weaver species. It can be somewhat gregarious in its nesting, but the aggregations are very loose, with different males' nests generally at least twice the distance (and usually much more) from each other as a single male's nests are. The Lesser Masked Weaver, on the other hand, overlaps Rüppell's in nesting sociality but is on the whole a more gregarious species (see also Craig



**Figure 2:** Variation in the aggregation or sociality of nesting in Rüppell's Weaver (circles) and Lesser Masked Weaver (triangles) in Awash National Park, Ethiopia, illustrated by seven schematic spatial diagrams of representative nesting events. Closed symbols represent nests with eggs or nestlings at the time of the study. Open symbols represent empty or incomplete nests. Hatched symbols represent nests whose status was unknown because they were not checked. No nesting aggregations were present in an area of at least 100 m radius from each of these events. The dashed-line circle in panels 1 and 2 represents the minimal area (10 m radius) over which no other single weaver nests of any species were present. In panels 3–7, no other single weaver nests were present within the area denoted by the panel, with one exception: an active nest of a Little Weaver is not shown in the densely colonial region of panel 7. These diagrams are for the purpose of illustrating relative variation in nesting density only: absolute nesting density cannot be inferred from these because the third dimension (height) is not represented. Locations of individual nests, or even nest types (species, reproductive status), are not based on specific observations except to the extent noted in the text

1997). It nests sometimes in loose aggregations, but other times in bona fide colonies where individual male territories can only be distinguished by observing male behaviour, and where males defend their territories in a cacophony, display in apparent synchrony, and leave the colony together with a warning call when approached. Occasionally, a Rüppell's Weaver or two will nest on the outskirts of such a colony, though usually they will nest further away where the aggregation is looser.

This report is broadly consistent with the only other detailed published description of Rüppell's Weaver nesting (Al-Safadi 1996), which described similar nesting materials,

nest heights, and nest plants in Yemen as I observed in this Ethiopian study site. Nesting sociality ranged perhaps even more broadly in Yemen than in this study, from singletons to 'colonies' of up to 50, sometimes in association with other species such as the House Sparrow *Passer domesticus* and the Arabian Golden Sparrow *Passer euchlorus*.

In general, the variation in nesting associations and coloniality in *Ploceus* appears to be high, and yet scarcely studied except in the Village Weaver (Collias and Collias 1969, Da Camara-Smeets 1981) and some non-*Ploceus* weavers (Brown and Lawes 2007, Spottiswoode 2009), although there are exceptions (Hall 1970, Din 1992).

Additional studies of the diversity of nesting sociality within and between species are necessary in order to understand these strikingly gregarious weavers, and might also lead to insights into the functions and evolution of coloniality and nesting aggregations in general.

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