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ART OF CONSTRUCTION: NEST MATERIALS USED BY A GREATER DOUBLE-COLLARED SUNBIRD *CINNYRIS AFER*

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On 25 May 2013 a sunbird nest was discovered on the grounds of Barberton Mountain Lodge (S25°48'27.3"; E31°02'50"; 1 130 m a.s.l.), approximately 2.3 km SW of Barberton, Mpumalanga, South Africa. The nest was secured to the base of one of the uppermost fronds of a 3 m high, exotic Queen palm *Syagrus romanzoffiana,* adjacent to a small swimming pool, *c.* 2.2 m above the ground.

Despite appearing freshly built and in excellent condition, no sunbird was seen to approach the nest during a four-day observation period. The nest did not contain any eggs or chicks, and was not used as a nocturnal roost by adults. Therefore the identity of the species that constructed the nest remains unconfirmed. Amethyst Sunbirds *Chalcomitra amethystina* were numerically and socially dominant throughout the lodge gardens, and large numbers were feeding in trees in the immediate vicinity of the nesting palm.

However, the nest appeared very different from a true Amethyst Sunbird nest collected elsewhere in the lodge gardens (Ditsong National Museum of Natural History accession number TM80741). The latter was much darker in colour, was constructed of rather coarse materials, was externally decorated with multiple large dead leaves, much lichen and other assorted large debris items, and did not include a single feather in its lining. Additionally, the Amethyst Sunbird nest was placed conspicuously at the tip of an exposed 1.5 m drooping twig, hanging below the canopy of a *Celtis africana* tree, *c.* 3.5 m above the ground.

Conversely, the original nest was pale in colour, constructed almost exclusively of light, fluffy materials, lacked large leaves or large pieces of lichen on the outside, and was lavishly lined with feathers internally. In addition, its placement near the top, but close to the centre, of the palm tree suggests that it was not built by an Amethyst.

In addition to the boisterous Amethyst Sunbirds, smaller numbers of Greater Double-collared Sunbirds *Cinnyris afer,* and White-bellied Sunbirds *C. talatala* were observed in the garden. Distributional data from the South African Bird Atlas Project (SABAP) suggest that other remote possibilities are Malachite Sunbird *Nectarinia famosa*, Scarlet-chested Sunbird *Chalcomitra senegalensis*, Olive Sunbird *Cyanomitra olivacea*, Collared Sunbird *Hedydipna collaris,* and perhaps Southern Double-collared Sunbird *Cinnyris chalybeus*. Of all these species, Greater Double-collared Sunbird appears to be the only likely candidate, given the surrounding habitat, nest placement, and nest materials, and in particular the zealous use of feathers as lining in the nest interior: Skead (1967) remarked of this species that "some nests have almost more feathers than bulk!".

Shortly after the nest was collected (DNMNH accession number TM80742), it was snatched by a passing dog, which promptly demolished the delicate structure. Fortunately I was able to collect all the nest materials, which then resembled little more than a heap of shredded cotton. However, the nest dimensions could thus not be measured, nor the nest structure adequately examined and described. When weighed after a further three days had elapsed, the nest materials collectively weighed 12.5 g. As the nest was already partly disassembled, I took the opportunity to count and measure the nest construction materials.

The nesting material was separable into eight main classes (Fig. 1, A1-C3), excluding decorative adornments (Fig. 3). Two of these classes were excluded from numerical anaylsis: a mass of inseparable and uncountable fibrous material tangled in down and cobweb, weighing *c.* 1.5 g (A1), and a large amount of fluffy, greyish

Figure 1 *- Nesting material separated into eight classes based on material type, colour, size and texture. See text for descriptions. Each white box measures 115 mm x 185 mm.*

plant down (*c.* 1.5 g; A2). The latter category may include some hare fur. The remaining six material-types (A3-C3) together constituted 1 185 discrete items. The exterior walls of the nest were constructed primarily of dry, straw-coloured grass inflorescences with stalks *c.* 1 mm in diameter, without seeds or soft down (A3). A total of 205 such inflorescences were used, with lengths 14-150 mm (mean 63.8 mm; S.D. ±24.6 mm).If laid end-to-end, these would collectively measure just over 13 m.

In addition, 80 soft, white grass inflorescences (B1) were also incorporated (26-164 mm; mean 62.1 mm; S.D. ±27.1 mm). Another principal component of the nest walls was dark-coloured, almost hair-thin twiglets (B2), with multiple angular divisions and small, single, black apical seeds (n = 130; 20-121 mm; mean 55.0 mm; S.D. ±21.1 mm). All other dark twig-like materials 1 mm or less thick, were counted together (n = 100; 9-191 mm; mean 42.3 mm; S.D. ±27.6 mm); this category included many pliable conifer needles. More than 8 m of plant fibres (B3) was also incorporated into the nest; fibres were whitish, straw-yellow or grey-brown in colour, and 1-4 mm in width and 18-230 mm in length.

Finally, 165 small, compact, fibrous balls of plant material (C1) resembling "dust bunnies", were included in the nest walls; these balls were of six colours, namely brown (148), grey (11), blue (3), black (1), green (1) and purple (1). Skead (1967) mentioned a fondness for "coloured cottons" for exterior decoration. He also described one female hovering in front of stems of wild grapes (*Rhoicissus* sp.) in order to pluck, bit by bit, the hairy down off the stems; possibly the "dust bunnies" are such beakfuls of fuzz. Yellowish cobweb was used to hold the nest together.

Characteristically for *C. afer*, the interior and cup of the nest were densely lined with feathers (Tarboton 2011). The nest included a total of 383 feathers, 7-114 mm in length (measured from base of rachis to tip of flattened feather). In comparison, Skead (1954, 1967) reported one nest with 539 feathers, another with 445 feathers, and

Figure 2 *- Selected examples of passerine feathers incorporated into nest lining. Top right: Red-winged Starling contour feathers; middle left: Forest Canary contour feathers; bottom left: Yellow-fronted Canary contour feathers, remiges, rectrices and wing coverts. Specimens from the Ditsong National Museum of Natural History.*

one with 91 feathers. The majority of feathers (78%) were of domestic chickens, as also found by Skead (1954). The builder appeared to show a slight preference for white feathers (C2; 58% of chicken feathers), although this might just reflect feather availability. The remaining 86 feathers (22%) were from passerines; through comparisons with museum material, these were found to belong to three species (Fig. 2):

- Red-winged Starling *Onychognathus morio* (23 contour feathers).
- Yellow-fronted Canary *Crithagra mozambica* (35 contour feathers and 17 remiges/wing coverts/rectrices).
- Forest Canary *Crithagra scotops* (11 contour feathers).

It is not clear where or how these passerine feathers were gathered, but the large number of feathers from only three species suggests abundant but localised sources, such as roosts, nests or feeding sites, or perhaps even remains of dead birds. Skead (1967) reported that chicken feathers are collected from the environs of "native huts", while wild bird feathers were "taken at a roosting place in a kloof shared by all three these species" *viz.* Hadeda Ibis *Bostrychia hagedash*, Helmeted Guineafowl *Numida meleagris*, and Cape Glossy Starling *Lamprotornis nitens*. In the case of the Barberton nest, Yellow-eyed and Forest Canaries and Red-winged Starlings were all observed within 25 m of the sunbird nest, while the chicken coop was located 80 m away.

A tiny whitish tick or feather mite was found in amongst the nest material. Miscellaneous items incorporated into the nest walls, or used as decorations (Fig. 3), included:

- A 450 mm sloughed snake skin which was attached to the outside of the nest.
- Four large 5x11 mm seed cases.
- One small piece of lichen.

- Nine 1-2 mm stick, 9-39 mm in length.
- Two eucalyptus bark chips (13x 5 mm and 24 x 3 mm).
- A 154 mm string-like piece of cotton.
- Several meters of human hair, including single strands from blondes and brunettes and multiple matted tangles, possibly collected from e.g. drain outlets.
- Two blackjacks fruits (*Bidens pilosa*).
- Two rolled-up dead leaves, five live leaves > 20 mm, and 41 live leaves < 10 mm in length.
- Three small balls of tangled yellow cobweb.
- Two small pieces of yellow-brown dishwashing sponge.
- Small section of mottled bluish material, apparently "undercarpet felt".
- One clump of pink, and one clump of orange flower stamens.

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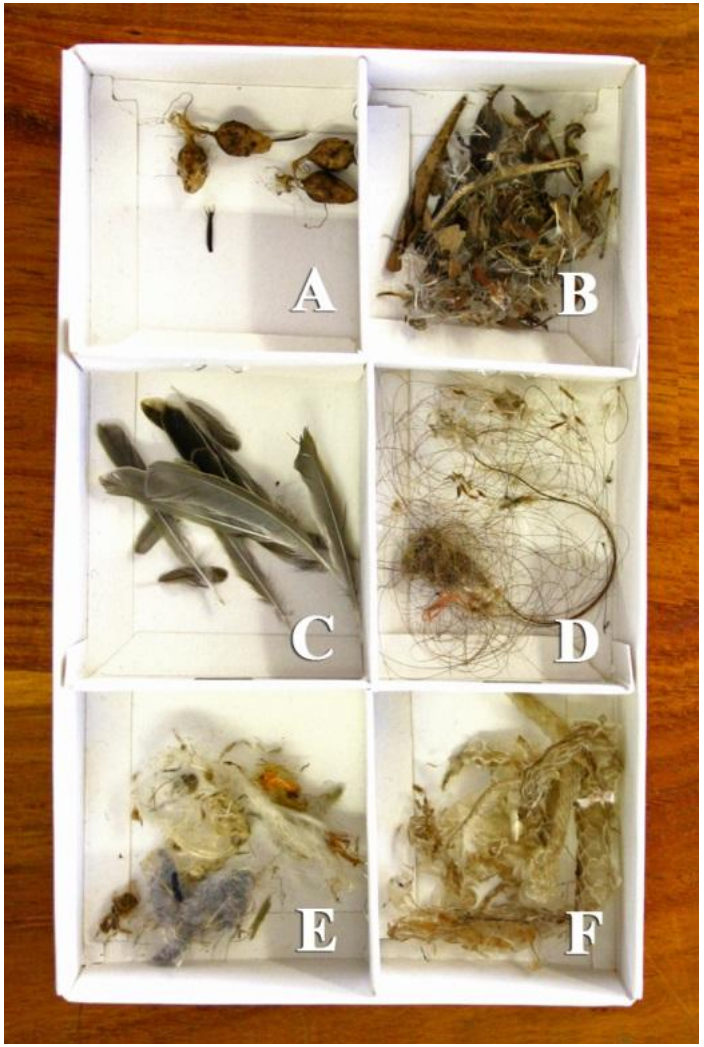

Figure 3 *- Decorative and minor structural elements. A: seed cases and blackjack fruits; B: assorted small dried leaves and short sticks; C: passerine feathers used in inner lining (see text and Fig. 3 for details); D: human hair; E: miscellaneous objects, including sponge, cotton, flower stamens, cobweb and felt; F: sloughed snake skin.*