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An Exceptionally Elaborate Bower Structure of the Great Bowerbird *Chlamydera nuchalis* (Ptilonorhynchidae)

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The Great Bowerbird *Chlamydera nuchalis* is the largest of the 19 presently acknowledged bowerbird species, and belongs to the only bowerbird genus adapted to life in dry, sparsely vegetated habitats. It is endemic to tropical Australia where it frequents riverine woodlands and vine thickets, eucalypt and melaleuca woodlands, open savannah woodlands and well-foliaged suburbia. It is common within the city and suburbs of Townsville on the tropical eastern coast of Queensland (Wieneke 1992), where the authors have been studying some aspects of nesting biology (Frith & Frith 1990a) and bower dispersion (Frith, Frith & Wieneke unpubl. data).

Eleven bowerbird species are known to mate polygynously (Diamond 1986b; Coates 1990; Frith & Frith 1990a,c, 1993, 1994) and five (Flame Bowerbird *Sericulus aureus*, Fire-maned Bowerbird *S. bakeri* and three gardener bowerbirds *Amblyornis* spp.) are assumed to do so, the males attempting to mate with many females each breeding season and taking no part whatever in nest duties. The three species of bowerbirds known as catbirds *Ailuroedus* spp. are monogamous (pair-bonding birds in which both sexes share in nesting duties). Of the sixteen polygynous species, males clear a court, accumulate fern fronds on the forest floor or construct structures of sticks, known as bowers, which they decorate with objects such as stones, bleached bones, fruits, snail shells etc. These bowers and decorations are cleared, built, accumulated and maintained, as externalised secondary sexual characters, in order that males might impress females (Borgia 1986).

Bowers are of four distinct basic types. The only cleared 'court' type is that of the Tooth-billed Bowerbird *Scenopoeetes dentirostris* which clears an area of forest floor and places fresh leaves upon it (Frith & Frith 1993 and unpubl. data). The only 'mat' type is that of Archbold's Bowerbird *Archboldia papuensis* which accumulates fern fronds on the forest floor beneath decorated perches and then places decorations upon the 'mat' (Frith & Frith 1990b, 1991, 1994). The far more complex 'maypole' bowers of sticks are constructed by the New Guinea gardener bowerbirds *Amblyornis* spp. (Cooper & Forshaw 1977) and by the Golden Bowerbird *Prionodura newtoniana* of tropical north-eastern Australia (Frith 1989 and unpubl. data). The 'avenue' bower builders consist of the three 'regent' bowerbirds *Sericulus* spp. of New Guinea and eastern Australia, the Satin Bowerbird *Ptilonorhynchus violaceus* of eastern Australia and the 'grey' bowerbirds *Chlamydera* spp. of tropical Australasia (Gilliard 1969, Cooper & Forshaw 1977). Avenue bowers consist of two parallel walls of sticks placed upright into a foundation or 'platform' of sticks placed upon the ground.

Although gross variation in stick-bower architecture and construction may be apparent between individual structures of gardener and Golden Bowerbirds (Diamond 1986a, Frith 1989), the bowers of avenue bower builders usually appear remarkably uniform, although there are subtle differences in the quality of sticks and their placement (Borgia 1985, N. Lenz unpubl. data). Thus the vast majority of the avenue bowers of any given species appear generally remarkably similar, consisting of two

An exceptionally elaborate bower of the Great Bowerbird built at Townsville, north Queensland. A normal avenue bower of the species (centre) is more than half encircled by two extensive curved walls separated by a gap (upper picture) apparently left for access. Photograph taken 27 November 1992.

Plate 55 Photo: Allan Carr

parallel walls of upright sticks. Some architectural additions to avenue bowers are, however, known in several species. These usually take the form of a small- to regular-sized third (rarely a fourth [Chaffer 1959, 1984]) wall that may be parallel to the original normal two walls or may be at an irregular angle to them. In some abnormal Satin Bowerbird bowers a third wall may be at right angles to, and at one end of, the parallel avenue walls, just as are the two normal end walls in bowers of Lauterbach's Bowerbird *C. lauterbachi* of New Guinea which builds the most elaborate of avenue bowers. Such irregular bowers are known for the Satin Bowerbird (Hyem 1968; Chaffer 1959, 1984) and the Great Bowerbird and Spotted Bowerbird *C. maculata* (Chaffer 1984, C. & D. Frith pers. obs.).

One peculiar Satin Bowerbird bower, built with its avenue along the north-south axis, was described as having a narrow wall built at right angles to the southern entrance of the avenue which 'continued in a semicircle around to the proximity of the northern end' of the western wall for a brief time. This additional curving wall was then reduced to merely a short wall at right angles to the southern avenue entrance as an additional, fourth, wall was simultaneously built parallel to the eastern wall of the normal avenue bower to, thus, form a second avenue (Chaffer 1984, Figure 1.1).

Males of most, if not all, avenue-bower-building species 'paint' the inside of their bower walls with a mixture of masticated fruit pulp, charcoal, leaves or grass stems and saliva (Gilliard 1969, Cooper & Forshaw 1977, Frith & Frith 1989).

On 15 October 1992 a bower of the Great Bowerbird was examined by J. Wieneke, built on the ground of a wide, poorly grassed street-edge footpath, directly beneath an overhanging acacia tree. Local informants told us that a Great Bowerbird bower had been at this particular site for at least the previous eight years. This bower was

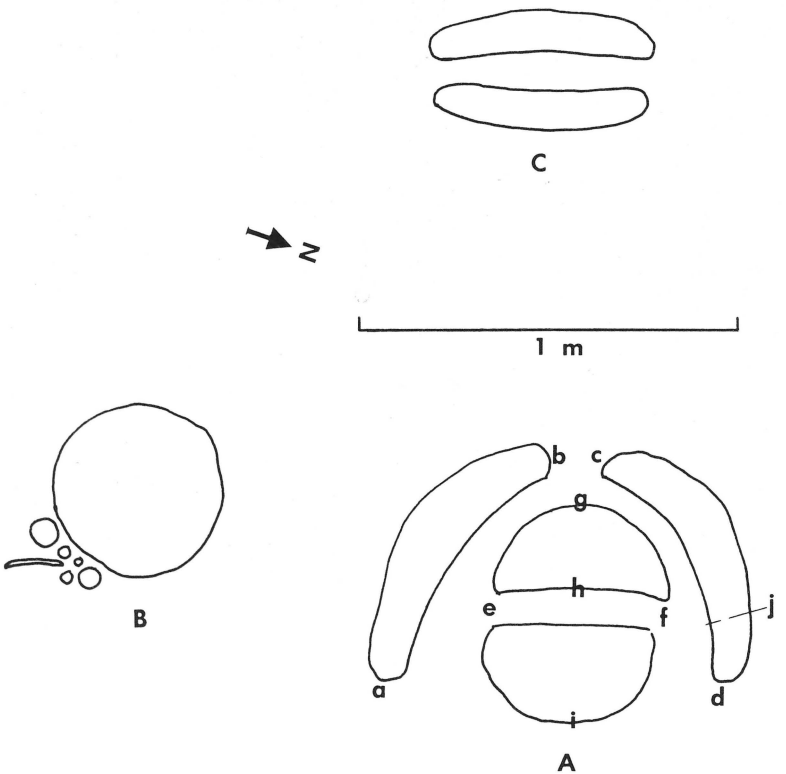

Figure 1. Schematic ground plan, to scale, of (A) an exceptionally elaborate Great Bowerbird bower with immediately adjacent tree trunk mostly cleared of surrounding leaf litter and decorated with 'bower' decorations (B) and a subsequently built normal avenue bower (C). Plan (A) is drawn from Plate 55 and is therefore distorted by camera perspective. Measurements, in cm, are: a-d = 100, b-c = 22, e-f = 48, g-h = 24, i to furthest point on a-b outer curve = 94, i to furthest point on c-d outer curve = 89, d-j indicates the limited extent of the only wall additional to the normal avenue found in January 1991 by P. Kesteven. Average distance between the inside of the two walls of the avenue and between the outside of the avenue walls and the inside of the outer, curved, walls was 16.5 cm (range 13-20).

most exceptional in having two extensive and well-constructed curved walls half encircling the normal avenue bower (see Plate 55 and Figure 1A). The two additional walls in fact formed a near-perfect semicircle, broken by a narrow gap that appeared to be deliberately left by the bowerbird for access. These additional walls were as tall (30-40 cm) as those of the normal avenue walls, were equally well constructed and were clearly painted on their inner (bower) sides (as was indicated by a tan-brown 'paint' residue on the inner sticks) as in those of the avenue itself.

In addition to the above, the owner of this remarkable bower or (an)other Great Bowerbird(s) had meticulously cleared the ground around most of a 45 cm diameter acacia tree-trunk base located 50 cm from the bower structure (Figure 1B), and had

The same Great Bowerbird bower as in Plate 55, photographed on 22 December 1992 when the outer curved walls had been reduced in length at their eastern ends (points a and d in Figure 1A) in order to build another, normal avenue bower immediately adjacent (Figure 1C).

Plate 56 Photo: Allan Carr

placed five fresh green globular fruits and one 10 cm long green-leaved conifer branch against the base of this tree as decorations.

By 27 November a second, smaller and shorter but normal, complete avenue bower had been built only one metre to the west of the extraordinary bower structure (Figure 1C). As a result of subsequently talking to Townsville residents we found that P. Kesteven, who lived in the street of the extraordinary bower, photographed the same bower and an attending bird in January 1991. Kesteven's photographs show the normal avenue bower, as in the centre of Plate 55, with a short, well-built, additional, third wall as indicated in Figure 1A by points d-j. It is not known if the bird Kesteven photographed was the same bird that attended the extraordinary structure we examined (which is quite possible) or if the same bird that built the latter structure also built the subsequent normal, smaller, avenue bower close by (Figure 1C) that was first seen on 27 November.

By 22 December 1992 the sticks from the eastern end of both outer curved walls (i.e. points a and d in Figure 1A) had been removed, apparently to use for a new avenue bower (Figure 1C), thus reducing the length of these walls to the extent that they no longer obstructed either end of the avenue of the normal bower (as in Plate 56).

The described and illustrated Great Bowerbird bower (Plate 55, Figure 1A) is of significance and interest because it shows a gross, if aberrant, modification or elaboration of the normal and conservative avenue bowers that is more extensive than has previously been found in any avenue-bower-building species. With respect to the structures of other avenue-bower-building bowerbird species, we make the observation

Lauterbach's Bowerbird bower, Baiyer River, Papua New Guinea. A female (tail only just visible, at left) is within the central 'avenue' bower whilst the displaying male is standing with his head between one end entrance of the avenue and one of the additional end walls (right) that obstruct the avenue entrances in bowers of this species — see text.

Plate 57 Photo: C. & D. Frith

that the commencement of the two additional (and subsequently long curving) walls near one entrance to the normal avenue bower, as found and photographed by Kesteven (see Figure 1A, d-j), is much as Lauterbach's Bowerbird builds at each end of its bower (see Plate 57). This bower form has once been observed in a Satin Bowerbird that built a small wall at each end of, and at right angles to, the avenue of its bower (Chaffer 1984, Figure 1.2).

With respect to the bower structures of other bowerbird genera, the fully developed aberrant form of this extraordinary Great Bowerbird bower could be viewed as a structure intermediate in general ground plan and structural form between an elaborated *Chlamydera* avenue bower of *C. lauterbachi* type, and a roofless *Amblyornis* maypole bower, of Macgregor's Bowerbird *A. subalaris* or Vogelkop Bowerbird *A. inornatus* type (see bower illustrations in Cooper & Forshaw 1977 and Borgia 1986).

The meticulous clearing of all ground litter immediately around much of a tree trunk, then decorating the cleared area with 'bower' decorations, is noteworthy as similar behaviour has previously been noted in presumed subadult male Great and Spotted Bowerbirds (Sharland 1964, Frith & Frith 1990c). Moreover, it has recently been pointed out that the male Tooth-billed Bowerbird similarly clears around the base of a tree within its forest floor court (Frith & Frith 1993). This it does specifically in order to be able to hide behind the tree trunk at the start of courtship display, in the same way that some male *Chlamydera* (Gilliard 1969; Frith & Frith 1989, 1993) and *Amblyornis* (Pruett-Jones & Pruett-Jones 1982) species hide behind or within their bower. Thus, the exceptional Great Bowerbird bower and associated clearing and

structures described here may exhibit aberrant bower forms that reflect both simplistic (or primitive?) and complex (or advanced?) bower architecture and behaviour, with possible significance to an understanding of the evolution of both bower design and male courtship behaviour within the family (Frith & Frith 1993).

Acknowledgements

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Correction: Great Bowerbird bower

In the paper by Frith, Frith & Wieneke on an elaborate bower of the Great Bowerbird (last issue, *ABW* **15**, 314-319, Sept. 1994), two plates were accidentally transposed. The photo on p. 315 belongs with the caption to Plate 57 on p. 318, and the photo on p. 318 belongs with the caption to Plate 55 on p. 315. Our apologies to the authors and photographers -- Ed.