# THE FOSSIL AVIAN ASSEMBLAGE FROM WEEKES CAVE (N-15), NULLARBOR PLAIN, SOUTH AUSTRALIA: CORRECTIONS, ADDITIONS AND REINTERPRETATION

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## INTRODUCTION

G. F. van Tets (1974) described a subfossil avian assemblage from Weekes Cave (N-15) on the Nullarbor Plain *(sensu stricto)*, South Australia, which was collected at random from the floor surface by members of the Cave Exploration Group of South Australia. In his report he referred 15 specimens to eight species of bird (see Table 1). For this species list he suggested a taphonomy (history of fossilisation) of the deposit, which included both predator accumulated (allochthonous) species and species accumulated by being trapped in the cave (autochthonous: Baird in press a). His palaeoenvironmental reconstruction suggested that wetter conditions previously 'prevailed' on the Nullarbor as compared with those of recent times, and that:

> "as a group, the bird remains found in the cave are those that one would expect to see in savannah woodlands with areas of open grassland and shallow pools of water. They may have come on to the Nullarbor Plain during brief spells of exceptionally wet weather and sought shelter in the cave when the country dried up again."

During the course of PhD studies (Baird 1986), I had reason to review all of the previous studies completed on fossil avian remains in southern Australia and noted a significant number of misidentifications in the determinations of van Tets (1974). The misidentifications (and therefore their use in palaeoenvironmental reconstruction) combined with a misinterpretation of the use of material of this type in palaeoenvironmental analysis requires correcting both the species listing and the interpretation.

## MATERIALS AND METHODS

The material reported on herein is housed in the South Australian Museum, Department of Palaeontology. To the best of my knowledge all of the avian material available has been studied. That which was not reported by van Tets (1974) includes Masked Owl *Tyto novaehollandiae* (26202), Button-quail *Turnix* sm. sp. (31421), a charadriiforme (31422), a honeyeater (31423), and a passeriforme (31424). Modern comparative material used in the identifications was provided by the Department of Ornithology, Museum of Victoria, and Department of Ornithology, South Australian Museum. Registration numbers can be found in the materials section of each species-account. A prefix 'P' should accompany each number but has been omitted for conservation of space.

Taxa previously unknown from sub-fossil and fossil deposits are noted (unpublished records in the faunal lists of Rich & van Tets (1982) are not considered formally confirmed records as full diagnoses are not available).

Geographical ranges for each species are here assumed to be the same as the current range and unless otherwise noted include the area surrounding Weekes Cave.

Anatomical terminology follows Baumel *et al.* (1979).

All measurements in the text are in millimetres. Standard measurements are indicated in brackets and follow the guidelines in von den Driesch (1976) unless stated otherwise. All measurements were taken with vernier callipers accurate to 0.05 mm and were rounded to the nearest 0.1 mm.

Botanical nomenclature follows the guidelines of Specht (1981).

For the basis on which species identification and palaeoenvironmental reconstruction using avian remains in Australia are accomplished, see Baird (1989) and Baird (in press a), respectively.

List of abbreviations used in text.

| | |
|---|---|
| art. | articularis |
| ATSF | *Acacia* tall scrub formation |
| cta | crista |
| ccd. | coracoid |
| cmc. | carpometacarpus |
| com. | complete |
| cran. | cranium |
| dist. | distal |
| EOFF | *Eucalyptus* open forest formation |
| EWF | *Eucalyptus* woodland formation |
| fac. | facies |
| fem. | femur |
| *for.* | *foramen/foramina* |
| frag. | fragment |
| hum. | humerus |
| huml. | humeral |
| incom. | incomplete |
| mand. | mandible |
| M.N.I. | minimum number of individuals |
| MOSF | Mallee open scrub formation |
| N | number of elements in the statistical population |
| osc. | os coxae |
| pel. | pelvis |
| proc. | processus |
| prox. | proximal |
| *ram.* | *ramus* |
| rost. | rostrum |
| scap. | scapula |
| $\sigma$-1 | standard deviation |
| stm. | sternum |
| syn. | synsacrum |
| tbt. | tibiotarsus |
| tmt. | tarsometatarsus |
| *troc.* | *trochlea* |
| *tub.* | *tuberculum* |
| $\mu$ | mean |
| y.B.P. | years Before Present |

## SYSTEMATIC PALAEONTOLOGY

Class AVES
Order Ciconiiformes
Family Threskiornithidae
SPOONBILL SP.
*Platalea* sp.

**Material.** Associated partial skeleton [17927: including incom. cran., left mand. art., prox. end right hum., dist. end right hum., com. left hum., com. left ulna, com. right & left radius, com. left cmc., incom. right & left scap., com. left ccd., stm. frags, incom. pel., prox. end right fem., dist. end right fem., com. left fem., com. right & left tbt., com. right & left tmt., 13 costal frags, 4 phal., com. right & left fib., com. os dorsale, 8 vert.].

**Characters.** Species determination is not considered possible due to the degree of mensural overlap between the two species currently inhabiting continental Australia (Royal Spoonbill *P. regia* and Yellow-billed Spoonbill *P. flavipes).*

**Remarks.** This material can probably be considered autochthonous, as hypothesised by van Tets (1974) and the probable cause for the occurrence of the Australian Pelican *Pelecanus conspicillatus* in N-224 Cave seen by Kevin Mott (pers. comm.). A scenario provided as explanation of these otherwise unlikely occurrences is that after the sporadic downpours that occur every couple of years, these animals come to feed in the water-filled claypans. After these have dried out, the animals are drawn to the dongas and occasionally find their way into the caves which frequently have surface water available. Alternatively those individuals which died on the plain may have been brought to the caves by scavengers. Currently there are occasional downpours which are sufficient to fill the claypans on the Nullarbor Plain with water (Beard 1975), especially in 1930 and 1955 (Johnson & Baird 1970).

Order Accipitriformes
Family Accipitridae
HARRIER SP.
*Circus* sp.

**Material.** 2 incom. skull (18060, 31420), incom. syn. (18061).

**Characters.** Regarded as an accipitrid due to the large oblate external nares, lacrymals not fused

to the skull and the rostrum which is narrow and elongate.

Characters considered diagnostic for the genus *Circus* include: **Skull** (viewed laterally), 1. *cta lateralis et cta ventralis* of *os palatinum* ventrally expressed and distinct, 2. distal border of *os palatinum* rounded, 3. external nares large, 4. width across *os nasale* narrow, 5. cranium dorsoventrally flattened, 6. temporal fossa narrow, 7. interorbital bridge narrow, 8. *zona elastica palatina* narrow, 9. rostrum tapers gradually anteriorly (viewed ventrally), 10. rostrum dorsoventrally shallow, 11. very pronounced crista shielding the area where the quadrate articulation occurs: **Pelvis** (viewed posteriorly), the *ala postacetabulari ilii* cuts in medially very abruptly and not tapered as in *Accipiter*.

Species-determinations are not considered possible, for I could find no morphological differences between the bones of the two *Circus* species currently inhabiting Australia and their mensural characters overlap extensively.

**Remarks.** Both species of *Circus* inhabiting Australia occur in structurally similar habitats, where Spotted Harrier *C. assimilis* ". . . ranges over plains and open wooded grassland" and Marsh Harrier *C. aeruginosus* ". . . inhabits open swampy country . . ." and in the inland near bores (Blakers *et al.* 1984). *C. assimilis* has been recorded as nesting on the Nullarbor Plain after greater than average rainfall (Klau 1985) and occurs on the spinifex plain to the north of the Bunda Plateau (Storr 1985).

Family Falconidae
AUSTRALIAN KESTREL
*Falco cenchroides*

**Material.** Incom. skull and mandible (18062).

**Characters.** Considered to belong to the Falconidae by the external nares being rounded and small and the lacrymal fused to the skull. The rostrum is broad and short.

The only genus of the family to occur in Australia is *Falco*. The species determination is based upon mensural characters: *F. cenchroides* is smaller than all other species of *Falco* in Australia and the subfossil material agrees in mensural criteria with this species (*e.g.* GL *F. cenchroides* $\mu$ = 33.7, $\sigma$-1 = 0.9, OR = 32.0–35.0 and N = 12; subfossil GL = 34.9).

**Remarks.** *Falco cenchroides* occurs throughout Australia and is capable of surviving in all terrestrial habitats.

This species is known to nest in the caves of the Bunda Plateau (Richards 1971), and part of the subfossil material may represent normal attrition of individuals nesting in the entrance to Weekes Cave. *F. cenchroides* may increase in abundance through dispersal onto the Nullarbor Plain after greater than average rainfall (Klau 1985), which is correlated with an increase in the abundance of prey items (Dell 1979).

Order Gruiformes
Family Turnicidae
LITTLE BUTTON-QUAIL
*Turnix* sp. *cf. T. velox*

**Material.** Incom. cran. (18065), com. left hum. (31421), incom. right tbt. (18067).

**Characters.** See Baird (in press a) for the characters involved in the identification of the genus *Turnix*.

Mensural characters are considered to be of little use in separating *T. velox* and Red-chested Button-quail *T. pyrrhothorax*, therefore the species-determination relies upon biogeographic probability (see Table 1, in Baird in press a).

**Remarks.** Of the four skulls previously referred to this genus only one is considered correctly identified, the others are referable to Thick-billed Grasswren *Amytornis textilis* (18063, 18064) and an indeterminate passeriforme (18066).

*Turnix velox* is abundant on the Bunda Plateau, and areas to the north, in years of greater than average precipitation, but largely confined to the CLSF (Brooker *et al.* 1979, Storr 1985).

Order Charadriiformes
Family Indeterminate

**Material.** Incom. left tbt. (31422).

**Characters.** The characters used in the identification of this element as a charadriiforme include: **Tibiotarsus** (proximal end), 1. anteroproximally flattened shaft, 2. broad *facies gastrocnemialis*, 3. very narrow *sul. intercristalis*; (distal end), 1. *cond. medialis* extends laterally, 2. *inc. intercondylaris* relatively small and rounded, 3. *cond. medialis* proximodistally flattened.

Order Strigiformes
Family Tytonidae
MASKED OWL
*Tyto novaehollandiae*

**Material.** Incom. skull (26202).
**Characters.** The skull is referred to the genus *Tyto* based on the following suite of characters: **Rostrum,** 1. proximodistally elongate and dorsoventrally flattened, 2. *os palatinum* proximodistally elongate and laterally flattened: **Cranium,** 1. surface swollen and undulating, 2. deep furrow along the whole of the cranial midline, 3. cranium not greatly expanded distally.
**Remarks.** Although *Tyto novaehollandiae* has been recorded from the Nullarbor Plain several times, only two of these records are strictly acceptable (Parker 1977). This species has been suggested to be the accumulator of vertebrate material in caves across Australia (Archer & Baynes 1972, Mees 1964, Wakefield 1972) but recent evidence indicates that Barn Owl *Tyto alba* is a more frequent accumulator of vertebrate material (Baird in press a).

Order Passeriformes
Family Orthonychidae
NULLARBOR QUAIL-THRUSH
*Cinclosoma alisteri*

**Material.** 2 incom. skulls (18072-18073), incom. left tbt. (18077).
**Characters.** Referred to the genus *Cinclosoma* by virtue of the holorhinal condition of the external nares, expanded auditory bullae, proportionately large crania and small delicate rostra (see Parker 1982 for illustration).

Species determination is based upon the small size of the crania which in *C. alisteri* should be smaller than that of all other species of *Cinclosoma,* based upon postcranial elements, although no cranial comparative material exists (Baird in prep. a). The most striking feature in the specimens (18072 & 18073) is the holorhinal condition of the external nares, therefore precluding their placement within the Artamidae.
**Remarks.** These specimens were formerly referred to White-breasted Woodswallow *Artamus leucorhynchus* (van Tets 1974), but the renewed study of this material leads me to believe that only one of the specimens actually belongs to the genus *Artamus* (18071: due to its amphirhinal condition; see species account for the White-browed Woodswallow *Artamus superciliosus).*

The species is restricted to the CLSF of the Bunda Plateau (see Baird in prep b for a full discussion).

Family Maluridae
THICK-BILLED GRASSWREN
*Amytornis textilis*
**Material.** 2 incom. skull (18063 & 18064), com. mand. (18074), com. left tbt. (18076).
**Characters.** See Baird (in prep. b) for the suite of characters used in the identification of this material as *Amytornis textilis.*
**Remarks.** The skulls were formerly referred to *Turnix* sp. and the other material to an unidentified passeriforme. Throughout most of its range *Amytornis textilis* is restricted to chenopod low scrub formation. The presence of this species on the Nullarbor Plain provides additional evidence for a model of speciation for birds on the Bunda Plateau (Baird in prep. b) which suggests that the formation of the Barton Sandhills sometime in the late Pleistocene was the physical barrier to further genetic interchange.

Family Meliphagidae
SINGING HONEYEATER
*cf. Lichenostomus virescens*
**Material.** 2 incom. skull (18069, 31423)
**Characters.** Considered to belong in the family Meliphagidae based on its long, posteriorly attenuate palatines.

I here tentatively refer the specimen to *Lichenostomus virescens* on the grounds of size.
**Remarks.** The specimen (18069) was incorrectly referred to Rufous Songlark *Cinclorhamphus mathewsi* in van Tets (1974). The condition of the palatines precludes its placement in *Cinclorhamphus* where the palatines are posteriorly short and end abruptly.

Family Estrildidae
Indeterminate species
**Material.** Incom. cran. (18070).
**Characters.** The suite of characters used to identify the material as estrildid include: **Rostrum,** 1. Laterally broad, 2. anterodorsally flattened, 3. *apatura nasalis ossea* inset behind the broad face of the *os nasale.*

Family Artamidae
WHITE-BROWED WOODSWALLOW
*Artamus superciliosus*
**Material.** incom. skull (18071).
**Characters.** Referred to the genus *Artamus* for the following characters: **Rostrum,** 1. amphirhinal nostril condition, 2. narrow,

posteriorly projecting parallel *os palatinum lamella caudolateralis*: **Cranium,** 1. bifurcated zygomatic proc.

Species determination is based upon morphological characters. Due to the combination of having a stout head and long gracile rostrum, the specimen is referred to *Artamus superciliosus* (LI = 21.9, Gb = 18.2).

**Remarks.** van Tets (1974) referred three subfossil crania (18071–18073) to *A. leucorhynchus.* Of these, only one belongs to *Artamus* (18071) while the other two belong to the genus *Cinclosoma* (see the species account for *Cinclosoma alisteri).*

Identification of the species is based upon the lengths of the rostra and the breadth of the crania. The six Australian species in the genus *Artamus* can be split into two groups. One group includes species with long rostra and the other includes species with short rostra. The species composing the first group are *A. leucorhynchus, A. superciliosus,* and Masked Woodswallow *A. personatus.* The species in the second group are Little Woodswallow *A. minor,* Black-faced Woodswallow *A. cinereus,* and Dusky Woodswallow *A. cyanopterus.*

The species-determination of the only specimen referred to *Artamus* was incorrectly assigned by van Tets (1974) to *A. leucorhynchus* but instead should be referred to *A. superciliosus.* It is clearly not *A. leucorhynchus* because it lacks the broad interorbital region and stout, long rostrum characteristic of this species.

*Artamus superciliosus* is abundant on the Bunda Plateau and occurs in both MOSF and ATSF (Brooker *et al.* 1979).

Family Indeterminate

**Material.** 2 incom. skull (18066, 18075), incom. stm. (18068), incom. syn. (31424).

**Characters.** Due to the incomplete nature of the skulls and the sternum (lacking both lateral edges), I regard them as indeterminate to familial level.

**Remarks.** One of the skulls was referred to *Turnix* sp. (18066) and the sternum was referred to the Brown Songlark *Cinclorhamphus cruralis* in van Tets (1974).

## DISCUSSION

A revised species list is given in Table 1, with

TABLE: 1. Identifications of the material from Weekes Cave exemplifying the differences between those of van Tets (1974) and those proposed herein.

| **van Tets ID** | **Baird ID** |
|---|---|
| Threskiornithidae | Threskiornithidae |
| *Platibis flavipes* | *Platalea* sp. |
| Accipitridae | *Accipitridae* |
| *Accipiter fasciatus* | *Circus* sp. |
| Falconidae | Falconidae |
| *Falco cenchroides* | *Falco cenchroides* |
| Turnicidae | Turnicidae |
| *Turnix* sp. | *Turnix* sp. *cf. T. velox* |
| Sylviidae | Charadriiformes |
| *Cinclorhamphus cruralis* | Indeterminate |
| *C. mathewsi* | Tytonidae |
| Estrildidae | *Tyto novaehollandiae* |
| *Poephila guttata* | Orthonychidae |
| Artamidae | *Cinclosoma alisteri* |
| *Artamus leucorhynchus* | Maluridae |
| | *Amytornis textilis* |
| | Meliphagidae |
| | *cf. Lichenostomus virescens* |
| | Estrildidae |
| | Indeterminate |
| | Artamidae |
| | *Artamus superciliosus* |
| | Indeterminate |

comparisons with the original identifications. There was a minimum of 11 species identified from Weekes Cave and, of them, two (i.e. *Platalea* sp. and *Amytornis textilis)* have not been recorded from the Bunda Plateau. As previously discussed, the occurrence of *Platalea* sp. was probably a one-off event, not dependent upon an amelioration in climate. The presence of *Amytornis textilis* on the Bunda Plateau has wider biogeographic implications which are discussed in Baird (in prep. b).

The presence of the *Platalea flavipes* and *Artamus leucorhynchus* was used by van Tets (1974) to indicate ". . . wetter conditions than have prevailed on the Nullarbor in recent times" and that "as a group, the bird remains found in the cave are those one would expect to see in savannah woodlands with areas of open grassland and shallow pools of water." In order to make this palaeoenvironmental interpretation van Tets (1974) must have assumed contemporaneity for the subfossil assemblage collected from the cave.

Given a subfossil vertebrate assemblage which was collected solely from the floor of a cave one can no more logically argue for the contemporaneity of the material than one can that it is non-contemporaneous. Assuming that the floor surface is stable, and has been so for thousands of years, then the accumulation of material on that floor could have been ongoing for the length of time that the surface has been present. Unless one knows the history of the cave-floor surface then no argument of contemporaneity will be supported. In fact assemblages of vertebrate material collected from cave-floor surfaces are more likely to be non-contemporaneous.

If contemporaneity of the assemblage is assumed with no constraints on time, then a reconstruction of the palaeoenvironment may be provided. Radiocarbon dates on vertebrate and charcoal material collected from the floor of caves on the Bunda Plateau include: 180 ± 76 y.B.P. (Merrilees 1970), 390 ± 210 y.B.P. (W.A.I.T. 98: Baynes 1987), 2,200 ± 96 y.B.P. (NSW - 30: Lowry & Merrilees 1969), and 3,280 ± 90 y.B.P. (GaK-693: Partridge 1967) and 4,650 ± 153 y.B.P. (NSW-28c: Lowry & Merrilees 1969). Given a greater sample size the range of absolute dates on material collected from the surfaces of cave floors could easily be extended into the Late Pleistocene, unfortunately there can be no time contraints placed upon the material. Therefore, even if contemporaneity of the assemblage is assumed, one cannot place this assemblage into any useful time frame.

I suggest that the assumption of contemporaneity of the vertebrate assemblage cannot be justified. Therefore a paleoenvironmental interpretation is not warranted. With the re-identification of one of the species van Tets believed indicated an ameliorated climate (*i.e. Artamus leucorhynchus)*, and the explanation of the presence of the *Platalea* sp. likely to be the result of a brief downpour, there is no real reason to propose a climate any different from that of today.

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