

A Logrunner *Orthonyx* (Passeriformes: Orthonychidae) from the Miocene of Riversleigh, North-western Queensland

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Summary: The logrunners *Orthonyx* are a distinctive endemic Australo-Papuan group represented by two living species from eastern Australia and highland New Guinea, and two fossil species known from Quaternary deposits of southern Australia. The peculiar feeding method of logrunners gives their femora a distinctive appearance that is diagnostic for the genus. New material from Riversleigh, north-

western Queensland, extends the chronological range into the Miocene and increases the known geographical distribution of the genus. Living species inhabit rainforest and contiguous dense vegetation; structurally similar habitats have been interpreted for the fossil species. The presence of *Orthonyx* at Riversleigh supports vegetation reconstructions for this area during the Tertiary.

The logrunners *Orthonyx* are among Australo-Papua's most unusual birds. They are distinctive and endemic, and their affinities among the passerines are uncertain. As a matter of convenience, more than as a valid indication of its affinities, *Orthonyx* usually has been placed in a heterogeneous assemblage with other problematic terrestrial forms, the Orthonychidae (e.g. Deignan 1964; Schodde 1975). Recent studies by Sibley & Ahlquist (1985, 1990) and Sibley *et al.* (1988) placed *Orthonyx* within the corvine assemblage (Corvoidea) as a distinct monogeneric family, and showed that the closest relatives of the Orthonychidae (*sensu stricto*) are the Irenidae (fairy bluebirds and leafbirds) and Potamostomidae (Australian pseudo-babblers).

The genus *Orthonyx* is represented by two living species. The larger, the Chowchilla or Northern Logrunner *O. spaldingii* Ramsay 1868, is restricted to the Atherton Tableland area, primarily between 450 and 1500 m asl, but occasionally to lowlands of the wettest districts (Storr 1984). The (Southern) Logrunner *O. temminckii* Ranzani 1822 occurs in rainforest and contiguous wet sclerophyll forest in south-eastern Australia from the Illawarra district, New South Wales, to around the Bunya Mountains, Queensland. It then reappears irregularly in the highlands of New Guinea, primarily between 1980 and 2840 m, probably up to 3450 m and rarely as low as 1200 m asl (Coates 1990).

Two recently described fossil species extend the known geographical distribution of this genus, as well as the size range of the member species. Baird (1985) described *O. hypsilophus* from an incomplete pelvis from the Green Waterhole Cave, south-eastern South Australia, of probable Quaternary age. The pelvis is

larger than that of living *O. spaldingii*. A tarsometatarsus has since been recovered but not yet published on; it is much larger than that of *O. spaldingii* (R.F. Baird pers. comm.).

A second palaeospecies of *Orthonyx*, represented by several incomplete femora and humeri, complete ulnae and a complete tarsometatarsus, has been recovered from Pyramids Cave, eastern Victoria, of probable Late Quaternary age (Baird in press). This form (*O.* PC sp. nov.) is slightly smaller than living *O. temminckii*. The two fossil species are not known from common elements, and therefore cannot be directly compared.

New material from Tertiary deposits at Riversleigh, north-western Queensland, described herein, extends the geographic and chronological range of *Orthonyx*.

Geographic and geological setting

The Riversleigh deposits are located on Riversleigh Station, approximately 200 km north of Mount Isa, north-western Queensland. Only one of the sedimentary units has been given a formal name, the Carl Creek Limestone (Tedford 1967), which is currently interpreted to be Late Oligocene to Middle Miocene in age (Archer *et al.* 1989). More than 100 local faunas have been identified, and the names of several of these have now been established in the literature. Stratigraphic relationships among these faunas are starting to become clear (Archer *et al.* 1989) but these, as well as the interpreted ages, are regarded as tentative and are based largely on faunal comparisons for age criteria.

The specimen described herein was recovered from Last Minute Site (Last Minute local fauna), which forms part of the System C of Archer *et al.* (1989), con-

sidered to be ?Middle Miocene to early Late Miocene. This site is interpreted as representing shallow pools or even emergent accreting surfaces, and is dominated by terrestrial vertebrate fossils. It is the type locality of the possible petaurid possum *Djilgaringa gillespieae* Archer *et al.* (1987) and the phalangerid *Strigocuscus reidi* Flannery & Archer (1987).

Methods

Measurements were made with vernier calipers accurate to 0.05 mm and rounded to the nearest 0.1 mm. Measurements follow the methods illustrated by Steadman (1980). The specimen described herein and all comparative material used are considered to represent adult birds because of the lack of a 'pitted appearance of the surface of the bone and incomplete ossification of the articular facets', criteria for recognising bones of juvenile birds (Campbell 1979).

The fossil material described in this paper is currently held in the collections of the Vertebrate Palaeontology Laboratory, University of New South Wales, but will be transferred to the Queensland Museum at the completion of this study; prefixes to registration numbers for these institutions are AR and QM respectively. Acronymns for specimens from the Australian Museum and Museum of Victoria are AM and MV respectively.

Systematics

I follow Sibley & Ahlquist (1985, 1990) in considering *Orthonyx* to be the sole genus in the family Orthonychidae.

Family ORTHONYCHIDAE G.R. Gray 1840
Genus *Orthonyx* Temminck 1820

Diagnosis: Femur, head large; proximal-most extension of trochanter flat and laterally broad; trochanter extends away from shaft at 90° angle; lateral face and proximal end of trochanter mainly smooth, except for large tubercle for insertion of *M. iliotrochantericus caudalis*; shaft, short and stocky; rotular groove very broad; internal condyle with extreme proximal extension.

Remarks: Generic characters are from Baird (in press).

Orthonyx kaldowinyeri sp. nov.

Holotype: QM F16867 (AR 9446), a complete left femur (Fig. 1).

Diagnosis: (Femur) *Orthonyx kaldowinyeri* differs from all other species of the genus by its smaller size (Table 1, Fig. 1) and proportionally shorter shaft (0.57

Table 1 Measurements of the femora of living and extinct species of *Orthonyx* (mm).

	<i>spaldingii</i>	<i>temminckii</i>	PC sp. nov.	<i>kaldowinyeri</i>
LENGTH				
\bar{X}	31.7	24.0	23.1	19.7
<i>s.d.</i>	1.5	0.5	—	—
range	30.2-33.2	23.3-24.7	—	—
<i>n</i>	3	8	1	1
PROXIMAL WIDTH				
\bar{X}	9.5	6.9	—	6.1
<i>s.d.</i>	1.1	0.2	—	—
range	8.4-10.6	6.6-7.3	—	—
<i>n</i>	3	8	—	1
DISTAL WIDTH				
\bar{X}	8.9	6.5	6.1	5.7
<i>s.d.</i>	0.7	0.2	—	—
range	8.3-9.6	6.3-6.7	—	—
<i>n</i>	3	8	1	1

of total length compared to 0.65-0.70, measured on the medial side between head and internal condyle). In addition, *O. kaldowinyeri* differs from *temminckii* and *spaldingii* by having the lateral projection of the trochanter less developed, particularly at its distal-most point, and from *O. PC sp. nov.* by being more robust.

Type Locality, Local Fauna and Age: Last Minute local fauna (Last Minute Site), Riversleigh, north-western Queensland, Australia. ?Middle to early Late Miocene (Archer *et al.* 1989).

Etymology: '*kaldowinyeri*' is an Aboriginal term meaning 'old' (Reed 1977) in reference to the age of this species relative to other known members of the genus.

Description: (Femur) Measurements, Table 1. Distal and proximal ends wide, with lateral and medial projections. Little constriction of neck on posterior face; head and iliac facet angled proximolaterad smoothly at 30° to proximal-most point of trochanter; groove between head and trochanteric ridge on anterior side wide and deep, extending distad and mediad, slightly undercutting head. Trochanter high, peaked, extending proximad beyond level of head, proximoanterior corner of trochanter chipped, full proximal extent cannot be assessed; extends away from shaft laterally on anterior side of lateral face of shaft; extends distad about 25% of length of shaft. Pronounced tubercle at anterioposterior end of trochanter. Obturator ridge broad, rounded,

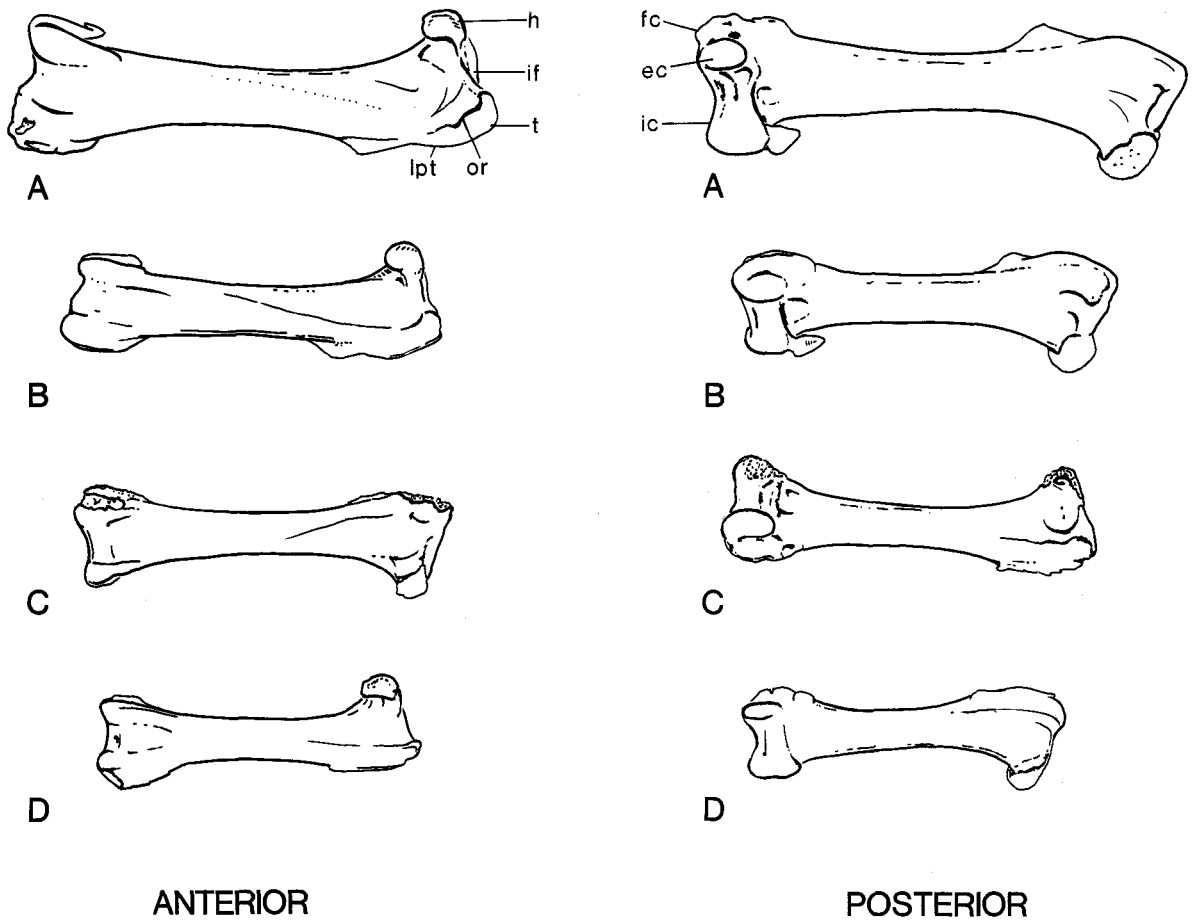


Figure 1 Femora of four species of *Orthonyx*, anterior (left) and posterior (right) views. From top to bottom *spaldingii* (QM O.27876), *temminckii* (AM O.59361), PC sp. nov. (MV P.183118) and *kaldowinyeri* sp. nov. (QM F.16867). Abbreviations: h, head; if, iliac facet; t, trochanter; or, obturator ridge; lpt, lateral projection of trochanter; ic, internal condyle; ec, external condyle; fc, fibular condyle.

angling smoothly into lateral projection of trochanter on lateral face of shaft. Shaft short and stocky; medial and lateral faces slightly concave. Rotular groove very broad, more or less parallel with proximodistal axis of shaft. External condyle extends more anteriad and posteriad and slightly more distad than internal condyle; proximal extension more or less equal. Internal condyle strongly directed posteriomediad with tubercle on posteriolateral corner, which, in medial view, projects more or less abruptly at 90° from shaft. Fibular condyle strongly developed, lateral edge more or less parallel with proximodistal axis of shaft; in lateral view angled proximoanteriorad–distoproximad; slight abrasion on distolateral corner, epicondyle damaged.

Discussion

The femur of *O. kaldowinyeri* is markedly smaller than that of any other member of the genus. The femora show a step-wise increase in size, from *O. kaldowinyeri*, through *O. PC* sp. nov. and *O. temminckii*, to large *O. spaldingii* (Fig. 1). The known elements of *O. hypsilophus* are larger than those of *O. spaldingii*, the largest extant species, so presumably the femur of *O. hypsilophus* was also larger than the femur of *O. spaldingii* and therefore that of *O. kaldowinyeri*. Size variation within each species is small and, other than *O. PC* sp. nov./*temminckii*, they are separated in size from their congeners by large discontinuities. The difference

between *O. PC* sp. nov. and *O. temminckii* is smaller but consistent (Table 1; Baird in press). The former species also is more gracile (pers. obs.). All the specimens examined appeared to represent adult birds, so the size differences are not age-related.

Different authors have for years allied *Orthonyx* with a range of other genera, the major criterion for the association being shared terrestriality. Deignan (1964) maintained the Orthonychinae (within the Muscicapidae [s.l.]) comprising nine genera: *Orthonyx*, *Andropobus*, *Psophodes*, *Sphenostoma* (= *Psophodes*), *Cinclosoma*, *Ptilorrhoa*, *Eupetes*, *Melampitta* and *Ifrita*. All but *Ifrita* are terrestrial; all but *Eupetes* [s.s.] are Australo-Papuan. Many of these species differ markedly and have little in common other than their ground-frequenting habits. *Orthonyx* has a number of peculiar morphological and behavioural characters that argue for its placement in its own family. This segregation agrees with the conclusions from DNA-DNA hybridisation studies by Sibley & Ahlquist (1985, 1990) and Sibley *et al.* (1988).

Morphology and foraging

Foremost among the peculiar aspects of logrunners are the structure of the tail and the unusual foraging methods. The rectrices have strong shafts that extend beyond the end of the webs and terminate in spiny points (see plate in Boles 1988, p. 400).

The feet are used to clear away litter from the soil with an unusual sideways sweeping motion. A sweep begins with the foot extended forward beneath the bird's throat. The foot is then swept to the side in an arc of 90° or more (Hindwood [1934] and Boles & Shields [1980] for *O. temminckii*; Zusi [1978] for *O. spaldingii*). The main support during this action comes from the other leg, involving a considerable flexion of the ankle. Once the top layer of debris has been removed and the soil exposed, the bird leans back on the tail, using the pointed rectrical shafts as a brace, and scratches with alternate legs in a front-to-back fashion.

It is the structural modifications of the logrunner's femur for the extraordinary sweeping action of the legs that make it so distinctive. Most ground-feeding birds that use their feet when prey-searching employ a front-to-back scratching motion. The foot remains under the body for most of the movement and the path of the leg is more or less parallel with the cranio-caudal midline of the body. The sweeping extension of the leg at 90° to the body seen in *Orthonyx* requires special muscle attachments. The broad proximal end and extensive later-

al projection of the trochanter provide such an attachment. Other terrestrially foraging species have well developed lateral muscle attachments but not to the degree exhibited by *Orthonyx*. In the lyrebirds *Menura* these lateral attachments are distal to and not part of the trochanter (illustrated in Rich *et al.* 1985, plate VIII). The hypertrophied development of the lateral muscle attachment in *Orthonyx* appears to be unique within the Passeriformes. The distal end of the femur also has strongly developed projections (presumably related to the flexion of the ankle). Together these features give the *Orthonyx* femur a diagnostic 'dumbbell' shape.

On the pelvis, the anterior iliac fossae are deeply excavated and extend caudally proportionally further than in other passerines. 'The expanded surface area of the iliac crest accommodates a greatly expanded *M. iliotrochantericus caudalis*, which originates over the whole of the cranial surface of the iliac fossa' (Baird 1985, p. 365). The dorsal iliac crests are compressed laterally into a single crest. The caudal section of the pelvis abruptly expands laterally. (See Baird 1985 for a more detailed description of the pelvic morphology of *Orthonyx*.) These features contribute to the distinctive shape of the pelvis of *Orthonyx*, that is diagnostic for this genus among Australo-Papuan passerines (Baird 1985).

Diversity and habitat

Although now geographically restricted, *Orthonyx* was more widely distributed in the Quaternary (Baird 1985, in press). It was at least as speciose as it is currently. Baird (in press) suggested that *O. PC* sp. nov. was a chronospecies from which *O. temminckii* arose. *O. spaldingii*, or its closely related antecedent, was undoubtedly also present in the Quaternary.

Biochemical studies have shown that this is an archaic lineage. *Orthonyx kaldowinyeri* shows that the logrunners were present in the Miocene. This falls within the divergence time of the Orthonychidae (s.s) lineage from other extant lineages (45 myBP) as calculated by Sibley & Ahlquist (1985, 1990).

The presence of *Orthonyx* at Riversleigh offers useful clues to the vegetation that existed there during the mid Miocene, given the assumption that its habitat requirements then and now are similar. The extant species of *Orthonyx* inhabit vegetation types that provide a thick canopy, low light level and an accumulation of litter on the ground. The most characteristic of these is rainforest but thickets of non-rainforest plants, such as introduced *Lantana* *Lantana* and Blackberry *Rubus*, ad-

adjacent to rainforest are frequently used. The presence of *O. PC* sp. nov. and other rainforest-associated taxa at Pyramids Cave led Baird (in press) to consider that a closed forest formation was then present in the river valleys and alluvial soils during the Quaternary.

Rainforest was replaced in western Victoria and south-eastern South Australia by xerophytic-dominated vegetation by the Late Pliocene. Baird (1985) suggested that *O. hypsilophus* found its required habitat conditions in *Melaleuca* thickets along waterways. *Melaleuca* is recorded from this area throughout the last 50 000 yBP (Dodson 1975). Such thickets, which are still common through parts of south-eastern Australia, have a very dense canopy. Baird (1985, p. 365) concluded that *Orthonyx* could 'no longer be considered strictly adapted to rainforest', with 'the radiation within this genus ... ecologically greater than is currently demonstrated'.

If *O. kaldowinyeri* is assumed to have had habitat requirements similar to those known or postulated for other species, this indicates that some type of closed vegetation formation (i.e. with dense canopy) was present at Riversleigh during the Miocene. Although the opening of the Australian vegetation and emergence of sclerophyllous vegetation types (e.g. *Eucalyptus*, *Melaleuca*, *Leptospermum*, etc.) were starting around this time, it seems doubtful that this would have been sufficiently prevalent at this time to form a significant part of the habitat of *Orthonyx*. In contrast, there is evidence from other animal groups in the Riversleigh deposits that rainforest-inhabiting taxa were predominant at about the same time (Archer *et al.* 1989). This suggests that rainforests were present and that *O. kaldowinyeri* was a bird of the forest floor, much as logrunners are today.

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Applications and Opinions published in the *Bulletin of Zoological Nomenclature*

Part 2 of Vol. 49 of the *Bulletin of Zoological Nomenclature* was published on 25 June 1992 and contained the following items of ornithological significance:

Application Case 2784 *Procellaria gigantea* Gmelin, [1789] (currently *Macronectes giganteus*; Aves, Procellariiformes): proposed conservation of usage of the specific name by designation of a neotype

J.-F. Voisin, R.K. Brooke, W.J. Bock, W.R.P. Bourne, J. Cooper, J.P. Croxall, R. Escalante, S. Halforn, O. Hogstad, P.S. Humphrey, S. Hunter, Chr. Jouanin, K. Lambert, P. Leraut, P.D. Shaughnessy, F. Vuilleumier and J. Warham

Abstract. The purpose of this application is to conserve the current universal understanding and usage of the specific names of *Macronectes giganteus* (Gmelin, [1789]) and *M. halli* Mathews, 1912, for the southern, antarctic and the more northern, subantarctic

species of giant petrel respectively (family PROCELLARIIDAE). The name *giganteus* (type species of the genus *Macronectes* Richmond, 1905) was based on a description of the second species. It is proposed that a neotype for *giganteus* be designated.

Comment or advice on this Application is invited for publication in the *Bulletin* and should be sent to the Executive Secretary, I.C.Z.N., c/o The Natural History Museum, Cromwell Road, London SW7 5BD, U.K.

Opinion 1687. *Phorusrhacos* Ameghino, 1887 (Aves, Gruiformes): not suppressed.

Opinion 1688. *Coccyzus eulerei* Cabanis, 1873 (Aves, Cuculiformes): specific name conserved.

The following Opinion was published on 30 September 1992 in Vol. 49 Part 3 of the *Bulletin of Zoological Nomenclature*:

Opinion 1696. HYDROBATIDAE Mathews, 1912 (1865) (Aves, Procellariiformes): conserved.