

A New Species of Flightless Auk from the Miocene of California (Alcidae: Mancallinae)

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ABSTRACT

Praemancalla wetmorei is described from the late Miocene of Orange County, California, with humerus and ulna as holotype and paratype, and radius, carpometacarpus, and coracoid referred. The species, although less specialized as a flightless diver than the geologically younger genus *Mancalla*, appears to be more advanced than *Praemancalla lagunensis*, which is believed to be derived from slightly older deposits.

Introduction

Since Lucas (1901) described the first humerus of *Mancalla*, knowledge of the flightless mancilline alcids (Mancillinae) has increased to include nearly all skeletal elements and to involve five species and two genera.

The type-genus, *Mancalla*, is known from four species—*M. californiensis* Lucas (1901), *M. diegensis* (Miller, 1937), *M. milleri* Howard (1970) and *M. cedrosensis* Howard (1971)—and is recorded from Humboldt County in northern California to Cedros Island, Mexico. The Humboldt County site, with a single humerus assigned to *M. diegensis* (Howard, 1970), is believed by Kohl (1974:217) to be Pleistocene in age. The other records are middle to late Pliocene. *Praemancalla* is known from the single species, *P. lagunensis* Howard (1966), de-

scribed from a late Miocene deposit in Leisure World, Laguna Hills, Orange County, California.

Recently, three other Miocene sites in Orange County have yielded mancilline bones. These sites are in Laguna Niguel, approximately 5 km south of the Laguna Hills locality. The specimens from these sites are in the collections of the Natural History Museum of Los Angeles County. The catalog and locality numbers are listed under Los Angeles County Museum (LACM).

The associated avifauna from these sites includes the same families recorded at the type-locality of *Praemancalla lagunensis* (LACM Loc. 1945), but the species represented are not identical. None of the species described as new from locality 1945 has appeared in the Laguna Niguel localities. On the basis of associated marine mammals, it is suggested that these sites may represent a later subdivision of the late Miocene than locality 1945 (Barnes, et al., in prep.).

The mancilline skeletal elements from Laguna Niguel include humerus, ulna, radius, carpometacarpus, and coracoid, all of which have been previously described for *Mancalla*. Only for the carpometacarpus, coracoid, and distal end of the humerus is there comparable material of *Praemancalla*. The newly found specimens suggest a generally larger form than any previously described mancilline species. Qualitative characters show distinction from comparable elements of all species of *Mancalla*. Distinctions are also apparent with respect to *Praemancalla lagunensis*, but the degree of adaptation towards restriction of the wings for swimming is closer to *Praemancalla* than to *Mancalla*. Possibly a third genus is indicated. At the

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present state of knowledge, however, it seems wiser to assign the specimens to the genus *Praemancalla* under a new species name.

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Praemancalla Howard

In describing *Praemancalla lagunensis*, the specific diagnosis of the holotype humerus and paratype carpometacarpus served also as the generic diagnosis. In the specimens from Laguna Niguel now at hand, the following characters are in agreement with that diagnosis:

Humerus with groove separating base of ectepicondyle from external condyle, brachial impression faint and running diagonally from ectepicondylar prominence to a point slightly proximal to attachment of articular ligament, with no papilla present above condyles. The tricipital grooves and ridges are broken in the humerus from Laguna Niguel, so the characters of this area set forth in the original diagnosis cannot be assessed.

Carpometacarpus with distinct, blunt pisiform process, trochlear area having narrow, deep groove between internal and external crests posteriorly, metacarpal II relatively broad with more rounded anterior contour and more angular internal contour than in *Mancalla*, and process of metacarpal I relatively shorter.

The following additional characters observed in the specimens now at hand are considered to be of generic value when compared with *Mancalla*: humerus with head only slightly extended over capital groove, deltoid crest weakly developed, area of anterior articular ligament slightly swollen; ulna with prominent olecranon process; radius lacking prominent crest on convex contour; coracoid with scapular facet facing dorsally, coracohumeral attachment flat and angular in outline.

Praemancalla wetmorei, new species

FIGURE 1a, b, e-g, i-k

HOLOTYPE.—Humerus, LACM 42653, complete except for tricipital area of distal end (Figure 1i,j).

TYPE-LOCALITY.—LACM Loc. 6906, site of excavation for North American Rockwell building (now U.S. General Services Administration building) on El Lazo Road, Laguna Niguel, Orange County, California; 914 m north of junction of Aliso Creek and Sulfur Creek, in yellow sands and laminated gray shale. Latitude 33°33'43" N, longitude 117°42'44" W. In the NE 1/4 NE 1/4 SE 1/4 of unsurveyed Sec 16, T7S, R8W, San Juan Capistrano quadrangle, USGS 1948, 1:24000.

FORMATION AND AGE.—Monterey Formation, late Miocene.

PARATYPE.—Proximal end of ulna LACM 32429 from type-locality (Figure 1e).

DIAGNOSIS.—Humerus broad proximally; medial profile of capital groove a wide open curve; depth through deltoid crest only 5 percent greater than depth of shaft above distal end; ectepicondylar prominence notably protuberant at its proximal tip and slightly lateral in position with respect to palmar surface of shaft; groove between external condyle and base of ectepicondyle more constricted and less distal in extent than in *P. lagunensis*; shaft breadth above ectepicondylar prominence 53 percent of shaft depth at same point; shaft depth 113 percent of breadth of distal end.

Ulna laterally compressed, with short brachial impression partially palmar in position and bordered palmar by heavy ridge; olecranon blunt but protruding proximally beyond cotylae and distinctly set off from cotylae by lateral depression both externally and internally.

MEASUREMENTS.—Humerus: length to external condyle 82.7 mm, greatest proximal breadth from pectoral to bicipital crests 22.2 mm, breadth across head 19.6 mm, breadth through distal condyles 8.5 mm, breadth and depth of shaft above ectepicondylar prominence 5.1 mm and 9.6 mm, respectively, height of ectepicondylar prominence above distal end 16.9 mm, greatest depth through deltoid crest 10.1 mm, breadth of shaft at same point 5.5 mm. Ulna: proximal breadth across cotylae 7.5 mm, proximal depth through olecranon 11.3 mm,



FIGURE 1.—Skeletal elements of *Praemancalla* and *Mancalla*: *a*, *b*, coracoid (LACM 37637) of *P. wetmorei*, new species, medial and dorsal views; *c*, coracoid (LACM 15289) of *P. lagunensis*, dorsal view; *d*, coracoid (LACM 2310) of *M. diegense*, dorsal view; *e*, paratype ulna (LACM 32429) of *P. wetmorei*, internal view; *f*, referred carpometacarpus (LACM 52216) of *P. wetmorei*, internal view; *g*, radius (LACM 53907) of *P. wetmorei*, palmar view, *h*, humerus (LACM 15367) of *M. cedrosensis*, palmar view; *i*, *j*, holotype humerus (LACM 42653) of *P. wetmorei*, palmar and anconal views; *k*, referred humerus (LACM 32432) of *P. wetmorei*, anconal view; *l*, humerus (LACM 2331) of *M. diegense*, anconal view. (Approximately natural size.)

breadth and depth at middle of shaft 4.2 mm and 6.2 mm respectively.

REFERRED MATERIAL.—From Laguna Niguel, Orange County, California, late Miocene, Monterey Formation. Proximal end of humerus LACM 32432 (Figure 1*k*) from type-locality (LACM Loc. 6906). Complete radius LACM 53907 (Figure 1*g*) and scapular end of coracoid LACM 37637 (Figure 1*a,b*) from LACM locality 6902 at northwest end of El Lazo Road, 365 m northwest of type-locality and 244 m east of Aliso Creek, in basal 0.5–1.5 m of coarse yellow sand directly overlying laminated gray shale. Proximal $\frac{3}{4}$ of carpometacarpus LACM 52216 (Figure 1*f*) from LACM locality 3185, in tributary gully west of Aliso Creek in coarse yellow sand.

ETYMOLOGY.—I take pleasure in naming this new species in honor of Dr. Alexander Wetmore, who has done so much to further the science of paleornithology and who has generously given advice and counsel to me throughout my years of study in this field.

DESCRIPTION.—Compared with *Mancalla*, the humerus of *P. wetmorei* is relatively, as well as actually, broader both proximally and distally (ratio of greatest proximal breadth to length 26.8 percent in *P. wetmorei*, 23–25 percent in *Mancalla*; ratio of distal breadth to length 10.2 percent in *P. wetmorei*, 8.2–9.6 percent in *Mancalla*) and exceeds in length all but one specimen of *Mancalla* (the maximum of *M. diegense*). It is, however, 8 percent longer than the average for *M. diegense* and 12 percent longer than the average for *M. cedrosensis* (Table 1), and 32 percent longer than the much smaller *M. milleri*.

The lesser protrusion of the head over the capital groove is reflected in the wide, open curve between the head and internal tuberosity as seen in palmar and anconal views; this condition contrasts with the narrow, U-shaped curve found in *Mancalla* (Figure 1*h-l*). Further distinction from *Mancalla* is seen in the deltoid crest which, in *P. wetmorei*, describes a low, even arc and is not expanded towards its distal termination. Distally, the greater breadth of the humerus is observed not only in the width through the condyles but also in a slight expansion in the region of the attachment of the anterior ligament. In this character, as well as in the lateral slant of the brachial impression and absence of a prominent papilla above the condyles, *P. wetmorei*

resembles *Praemancalla lagunensis*. It is distinguished from that species in the greater projection of the ectepicondylar prominence from the shaft, narrower groove between the base of the ectepicondyle and external condyle, and relatively narrower and deeper shaft (relative breadth to depth of shaft 53 percent in *P. wetmorei*, 66 percent in *P. lagunensis*). In depth of shaft relative to breadth of distal end, *P. wetmorei* is intermediate between *Praemancalla lagunensis* and the several species of *Mancalla* (99 percent in *P. lagunensis*, 113 percent in *P. wetmorei*, 126–140 percent in *Mancalla*).

The prominence of the olecranon immediately distinguishes the ulna of *P. wetmorei* from all species of *Mancalla*, but the palmar position of the brachial impression and the shortened lip of the external cotyla assign the element to the subfamily Mancallinae rather than the typical alcids.

The radius (LACM 53907), although short and laterally compressed as in *Mancalla*, is less blade-like and lacks the prominent crest on its convex contour. The ulnar depression is broader and deeper than in *Mancalla*. Neither the ulna nor the radius is known for *Praemancalla lagunensis*. Those assigned to *P. wetmorei* both show less modification towards a flipper-like wing than in *Mancalla*, and in this regard are in keeping with the character of the other elements known for *Praemancalla*.

The radius is 12 percent longer than the maximum known for any species of *Mancalla* (Table 1). Using the radius as a guide, and comparing the relative size of ulna to radius in the type of *Mancalla cedrosensis* (associated skeletal elements of one individual), it is suggested that the ulna of *P. wetmorei* attained a length of 36.5 mm.

Carpometacarpus LACM 52216 differs from that of *Mancalla* and resembles *Praemancalla* in the presence of a distinct, blunt pisiform process, rounded anterior contour of shaft of metacarpal II and deep narrow groove between the internal and external crests of the trochlea posteriorly. It is distinguished from *P. lagunensis* by the narrower shaft and the relatively longer process of metacarpal I, with more than half its length distal to the level of the metacarpal symphysis; also, the trochlea extends higher above that process and the lateral surface of the internal crest of the trochlea is more broadly and less deeply depressed.

In coracoid LACM 37637 the furcular facet is

TABLE 1.—Skeletal measurements (mm) of *Praemancalla wetmorei* compared with *P. lagunensis*, *Mancalla diegense*, *M. cedrosensis*, *M. californiensis*

| Character | <i>P. wetmorei</i> | <i>P. lagunensis</i> | <i>M. diegense</i> | | | <i>M. cedrosensis</i> | | | <i>M. californiensis</i> * |
|--|--------------------|----------------------|--------------------|------|------|-----------------------|------|------|----------------------------|
| | | | min. | mean | max. | min. | mean | max. | |
| HUMERUS | | | | | | | | | |
| Length | 82.7 | — | 71 | 76.5 | 85.2 | 69.5 | 73.5 | 80 | — |
| Greatest proximal breadth | 22.2 | — | 17.3 | 18.7 | 20.3 | 17 | 17.9 | 20.1 | 19.4 |
| Distal breadth | 8.5 | 7.8 | 6.4 | 6.7 | 8 | 6.9 | 7 | 7.2 | — |
| ULNA | | | | | | | | | |
| Proximal depth | 11.3 | — | 9† | | 9.3 | 8.8 | 9.7 | 10.2 | 9.9 |
| Proximal breadth | 7.5 | — | 5.9 | 6.4 | 6.6 | 6.2 | 6.6 | 7.2 | 6.5 |
| RADIUS | | | | | | | | | |
| Greatest length | 35.8 | — | 29.6 | 30.9 | 31.8 | 27.3 | 29.3 | 31.1 | 29.7 |
| Greatest shaft depth | 5.8 | — | 6.3 | 6.35 | 6.4 | 5.4 | 5.6 | 6.1 | 6.8 |
| Shaft breadth | 3 | — | 2.3 | 2.5 | 2.7 | 2.5 | 2.6 | 2.8 | 2.3 |
| CARPOMETACARPUS | | | | | | | | | |
| Length process Metacarpal I | 15.7 | 14 | 15.2 | 15.3 | 15.5 | 15.4 | 15.6 | 16 | 17.1 |
| Proximal depth | 12.1 | 11.9 | 9.7 | 10.3 | 11 | 10.2 | 10.5 | 11.1 | 11.2 |
| Shaft breadth | 4.3 | 4.5 | 3.1 | 3.4 | 3.7 | 3.4 | 3.5 | 3.8 | 3.4 |
| CORACOID | | | | | | | | | |
| Length from below scapular facet to head | 20.9 | 18.8 | 15.4 | 17.3 | 19.5 | 15.2† | | 16.7 | 18.8 |
| Breadth below furcular facet | 5.8 | 6 | 5.4 | 5.8 | 6.3 | 5.2 | 5.5 | 6 | 5.9 |
| Breadth furcular facet | 10.3 | — | 7.3 | 7.8 | 8.6 | 7.1† | | 7.3 | 8.7 |

* Only one specimen of each element of *M. californiensis*, except carpometacarpus (average of four).

† Only two specimens measurable for this dimension.

broad and deep; it extends ventrally well beyond the triosseal canal, is strongly thrust mediad above the canal, and is markedly undercut. Below the facet the bone narrows and the ventral border of the triosseal canal is sharply angular. The species of *Mancalla* vary in development of the furcular facet and the bordering of the triosseal canal. The greatest overhang of the facet and the least angular border of the triosseal canal are found in *M. cedrosensis*; the least overhang and most angular border of the canal occur in *M. californiensis*. In no specimen of *Mancalla* is the furcular facet as ventrally extended as in *P. wetmorei*. This facet is broken ventrally in the single known coracoid of *P. lagunensis*, but the portion that remains is deep

and has a strong overhang; below the facet, however, the area is broader and more rounded than in *P. wetmorei*. In direct dorsal view (with dorsal surface of shaft held horizontally) the scapular facet in *P. wetmorei* is more dorsally and less laterally directed than in *Mancalla*, and the triosseal canal faces more mediad. Resemblance is closer to *Praemancalla lagunensis*, although the canal is even more medially directed in the latter species. The attachment of the coracohumeral muscle in *P. wetmorei* is broad, flat, and angular in outline at its anterior end, as in *P. lagunensis*, but is relatively longer, and narrows near the glenoid facet. In *Mancalla* the attachment is narrow and rounded.

Conclusions

Four wing elements and a coracoid from three correlative localities of late Miocene age in Laguna Niguel, Orange County, California, represent a new species, *Praemancalla wetmorei*, in the alcid subfamily Mancallinae. The degree of specialization towards a flipper-like wing is less than in the Pliocene genus *Mancalla*, and reflects a stage of development closer to the Miocene genus *Praemancalla*. Differences noted with respect to *Prae-*

mancalla lagunensis, however, suggest a slight advance towards the more specialized wing of *Mancalla*. The humerus is more compressed, the triosseal canal of the coracoid more dorsally rotated and narrower, and the process of metacarpal I of the carpometacarpus longer.

This suggested evolutionary trend is in keeping with the evidence presented by the associated faunas of the localities involved, which indicates a slightly greater age for the type-locality of *P. lagunensis* than for the Laguna Niguel sites.

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