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THE IDENTITY OF THE FOSSIL DUCKS DESCRIBED FROM AUSTRALIA BY C. W. DE VIS

STORRS L. OLSON

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SUMMARY

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The type material of the nine species of fossil ducks described from Australia by C. W. De Vis was restudied and lectotypes designated for all species based on series. No valid extinct species were represented. *Nyroca robusta* is a synonym of *Anas superciliosa*. *Nyroca reclusa* and *Anas elapsa* are synonyms of *Aythya australis*. *Nyroca effodiata* is a synonym of *'Leucosarcia proevisa'* De Vis and is not a duck at all. *Anas strenua*, *Anas gracilipes* and *Nettapus eyrensis* are synonyms of *Anas castanea*, which species evidently had a wider range in the late Pleistocene than at present. *Dendrocygna validipinnis* and *Biziura exhumata* are synonyms of *Biziura lobata*, although the Plio-Pleistocene form may have been slightly smaller, in which case it would be known as *Biziura lobata validipinnis*.

INTRODUCTION

About the turn of the century, C. W. De Vis involved himself at the Queensland Museum with the description of many new living and fossil vertebrates of all kinds. Although prolific and dedicated, his taxonomic acumen with modern forms left much to be desired and his work with fossils was decidedly worse. This was recognized even in De Vis's day; Lydekker (1892: 533) wrote that 'although Mr De Vis has undoubtedly done some good work in regard to the Pleistocene birds of Queensland, yet I am afraid that, until he produces much more conclusive evidence as to the affinities of the owners of some of the bones which he describes, many of his genera and species are not likely to find their way into palaeontological works when authors have any regard for their own reputation.' Nevertheless, more for the sake of completeness than in disregard of their reputations, the authors of lists and catalogues have continued to carry De Vis's species of fossil birds (e.g. Lambrecht 1933; Brodkorb 1964; Condon 1975).

Recently, several of De Vis's fossil avian taxa have come under scrutiny (Miller 1966a, 1966b; van Tets 1974; Olson 1975) and in many instances have been found to be inseparable from modern taxa. In the present paper the nine fossil species of ducks described by De Vis are reviewed. I have designated lectotypes for all those species that are based on series of specimens, because often these series consist of more than one species or contain undiagnostic specimens. This action was deemed necessary in order that a final disposition of all of De Vis's fossil ducks could be made.

The fossil birds that De Vis described came from two distinct areas. The first was Darling Downs in south-eastern Queensland, where the most productive fossil locality was at Chinchilla. Fossils here come from what has been termed the Chinchilla Sand (Woods 1960), which is either late Pliocene or early Pleistocene in age (Woods 1960; Olson 1975). Other localities in Darling Downs from which De Vis obtained fossils are believed to be late Pleistocene in age (Woods 1960) but De Vis did not identify any ducks from these sites. Almost all the rest of the fossil birds described by De Vis were obtained by J. W. Gregory (1906) from a number of late Pleistocene or even Recent localities in north-eastern South Australia, mainly to the east of Lake Eyre. The difference in age between these sites and that at Chinchilla must be kept in mind in analysing their respective faunas, because specimens from the older deposits might possibly represent temporal forms with slight morphological differences from their modern descendants.

SYSTEMATICS

Nyroca robusta

De Vis (1888: 1278) described this species as a ' predecessor of the white-eyed duck *Nyroca* [= *Aythya*] *australis*.' The type material listed by De Vis consists of the distal half of a right humerus (QM F1122), a complete left coracoid (QM F5550) and the proximal end of an ulna (not seen), all from the Plio-Pleistocene deposits at Chinchilla. The ulna was neither figured nor described by De Vis and so cannot be used to determine the status of the species. Because the coracoid is complete and more diagnostic than the partial humerus, I designate it as lectotype of *Nyroca robusta*. Its measurements (mm) are: greatest length 53.5, width of sternal end 19.5, least width of shaft 5.4. The humerus measures 14.4 in distal width and 6.5 in least width of shaft.

The two specimens in question differ from *Aythya* and agree with *Anas* as follows: coracoid (Plate 5A) in ventral view with head produced as a distinct knob jutting well beyond the internal margin of the shaft, triossial canal more excavated, brachial tuberosity wider; humerus with much more robust shaft, olecranal fossa shallower, condyles heavier,

brachial depression larger, proximal portion of attachment of anterior articular ligament projecting farther palmad. The specimens agree in all respects with the modern Australian species *Anas superciliosa*. I therefore consider *Nyroca robusta* De Vis, 1888, to be a synonym of *Anas superciliosa* Gmelin, 1789.

Nyroca reclusa

This name was applied to a complete left coracoid (QM F1123) from Chinchilla. De Vis (1888: 1281) first identified the specimen as the modern species *Aythya australis* but then in a postscript (1888: 1292) rescinded one of his few correct decisions and applied the name *reclusa* to the fossil, without ever giving any distinguishing characters for the supposed species. In a footnote to the figure captions on the same page, De Vis referred to this species as '*N. reperta*', which Howard (1964: 308) has already noted was an obvious *lapsus*, the name *reperta* having been applied to a gallinule in the same work.

The holotype of *Aythya reclusa* (Plate 5B) is indeed referable to the genus *Aythya* and possesses those diagnostic characters of the genus that were not found in the lectotype of '*Aythya*' *robusta* (q.v.). Its length (measured with the sternal edge flat on the calipers) is 48.8 millimetres, which is within the size range of *A. australis* (1 male and 4 females ranged from 47.9 to 50.2 mm). There are no qualitative features by which the fossil can be distinguished from the modern species and thus *Nyroca reclusa* De Vis, 1888, becomes a synonym of *Aythya australis* (Eyton, 1838).

Anas elapsa

De Vis (1888: 1281) based this species on a complete left tibiotarsus (QM F1124) and the proximal half of a left femur (QM F5543), both from Chinchilla. The distal end of a left humerus (QM F7058), labelled by De Vis as *Anas elapsa* but not cited in any of his publications, has been identified as that of *Gallinula mortierii reperta* (Olson 1975).

The femur assigned to *Anas elapsa* is definitely not that of a duck, as evidenced by the high trochanter and the proportionately small head, among other characters. It appears to be from a charadriiform but I have not been successful in identifying it further. The remaining tibiotarsus is from a duck and the original description of *Anas elapsa* was based mainly on this specimen. I therefore designate it as lectotype of *Anas elapsa*. Its measurements (mm) are: length from proximal articular surface 70.5, width of proximal articulation 7.7, least width of shaft 3.6, distal width 7.6. This specimen (Plate 5D) is not referable to the genus *Anas* but belongs with *Aythya* for the following reasons: distal end bent farther medially, shaft above fibular crest more constricted, area between cnemial crests and on medial face of cnemial crest more deeply excavated, inner cnemial crest oriented more vertically, fibular crest relatively shorter than in *Anas*. The lectotype of *Anas elapsa* is smaller and somewhat more slender than in the five specimens of *Aythya australis* examined (length from proximal articular surface 73.7–76.7, average 74.9). This small series is almost certainly not representative of the true amount of variation in *A. australis*. In much larger series of *Aythya affinis* and *A. collaris* I find as much or more variation in size and proportions than between the lectotype of *A. elapsa* and the available specimens of *A. australis* (Plate 5F). It is, of course, possible that the Plio-Pleistocene representative of *Aythya australis* was smaller than its modern derivative and might therefore be recognizable as a temporal subspecies, although the other specimen of *Aythya* from the same deposit (the type of *A. reclusa*) does not support this. Should additional fossil specimens ever provide evidence that the Plio-Pleistocene *Aythya* is recognizable as a temporal subspecies, as first reviser I select the name *elapsa* rather than *reclusa*, on the basis of page priority. However, in the absence of such evidence, *Anas elapsa* De Vis, 1888, ought to be regarded simply as a synonym of *Aythya australis* (Eyton, 1838).

Nyroca effodiata

De Vis (1906: 15) founded this species on the distal end of a humerus from Wurdulumankula, north-eastern South Australia. This specimen fits perfectly onto the proximal end of a humerus that is the holotype of the pigeon *Leucosarcia proevisa* De Vis (1906: 6) and the united specimen is definitely that of a pigeon (see Rich 1976: 58, Fig. 4). Therefore, on the basis of page priority *Nyroca effodiata* can be regarded as a synonym of *Leucosarcia proevisa* and that species will be evaluated by Drs Rich and van Tets elsewhere.

Anas (Nettium) strenua

De Vis (1906: 15) founded this species upon the proximal three-fourths of a left humerus (QM F5541) and the distal end of another (QM F5547), both from Patteramordu, north-eastern South Australia. The specimens are different in colour and preservation and are not from the same individual. De Vis's characterization of the species was based entirely on the more complete proximal portion and I select this as lectotype of *Anas strenua*. Its measurements (mm) are: proximal width 16.9, width of shaft at midpoint 6.5, depth of shaft at midpoint 5.4, depth of head 6.1. The other specimen measures 12.8 in distal width and 7.7 in depth through external condyle.

The lectotype of *Anas strenua* is correctly referred to the genus *Anas*. It is too large for *A. gibberifrons* and too small for *A. superciliosa*. As De Vis (1906) noted, it agrees in general size with *A. rhynchotis*. However, the shaft is much more robust and the pneumatic opening more circular in outline than in *A. rhynchotis*. In these respects and in every other detail, the fossil exactly matches the humerus of a male *Anas castanea* (G. E. Woolfenden coll. 2179) with which I compared it (Plate 5G, H). The very heavy shaft of the humerus in this species is particularly distinctive. I have no hesitation in synonymizing *Anas strenua* De Vis, 1906, with *Anas castanea* (Eyton, 1838).

The distal end of a humerus that De Vis assigned to *Anas strenua* is slightly larger than the comparable portion in *A. castanea* and is possibly from a small individual of *A. superciliosa*.

Anas gracilipes

De Vis (1906: 14) applied this name to a right tarsometatarsus (QM F5540) from Kalamurina and a left coracoid (QM F5539) from Coopers Creek (Lower Cooper). Because De Vis based the specific name on characters of the hind limb, I designate the tarsometatarsus as lectotype of *Anas gracilipes*. Its measurements (mm) are: length 36, proximal width 7.8, least width of shaft 3.8, depth through middle trochlea 5.0. The coracoid measures 4.1 in least width of shaft and 13.7 in distal width but is too abraded for an accurate measurement of total length.

The lectotype is in the general size range of *Anas castanea*, *A. gibberifrons* and *Malacorhynchus membranaceus*. It differs from *Malacorhynchus* in its more robust shaft, much heavier external trochlea, longer external crest of the hypotarsus and the square rather than more pointed articular surface of the internal cotyla. It agrees with *Anas castanea* and differs from *A. gibberifrons* in that the proximal end does not have the appearance of being rotated medially, the shaft is not so swollen beneath the external cotyla, and the posterior face has a distinct intermuscular line leading distally from the most internal hypotarsal canal (lacking in *A. gibberifrons*). In all of its particulars this specimen (Plate 5K, L) agrees very closely with the tarsometatarsus of a female *Anas castanea* (USNM 500292). *Anas gracilipes* De Vis, 1906, ought therefore to become a synonym of *Anas castanea* (Eyton, 1838).

The coracoid assigned to *Anas gracilipes* differs in a number of respects from that of *Malacorhynchus* but agrees with *Anas* and falls in the size range of *A. castanea* and *A. gibberifrons*. The shaft is more robust than in the series of *A. gibberifrons* that I examined. This specimen, too, is probably referable to *A. castanea*, although it differs somewhat in proportions from the two specimens of that species available to me.

Nettapus eyrensis

De Vis (1906: 16) based this species on a worn distal end of a right humerus (QM F5545), and the scapular end of a left coracoid lacking most of the head (QM F5546), both from Coopers Creek (Lower Cooper), north-eastern South Australia. I designate the humerus as lectotype of *Nettapus eyrensis*, because most of the description was based on this specimen. Its measurements (mm) are: depth of external condyle 5.7, width of shaft at proximal border of brachial depression 6.6, depth of shaft at same point 4.5.

Both of the above specimens are much too large for any known form of *Nettapus*. The humerus is too large and heavy for *Malacorhynchus* and both specimens are too small for *Anas rhynchotis*, *Anas superciliosus* or *Aythya australis*. Given the very imperfect state of the two fossils, it is difficult to determine whether they belong to *Anas castanea* or *A. gibbberifrons*, because females of the former overlap in size with males of the latter. There is no reason, however, to suspect that either of these late Pleistocene fossils represents an extinct species. The humerus is larger than in most examples of *A. gibberifrons* and in its heavier shaft it more closely resembles *A. castanea* (Plate 5I, J), a specis now known from the fossil record of the same area (see *Anas strenua* and *Anas gracilipes* above). I therefore recommend that *Nettapus eyrensis* De Vis, 1906, be synonymized with *Anas castanea* (Eyton, 1838). The fragment of a coracoid assigned to *eyrensis* probably cannot be identified with certainty.

Dendrocygna validipinnis

De Vis (1888: 1282) based this supposed whistling-duck on the proximal half of a left humerus (QM F1125) and a complete right ulna (QM F5551) both from Chinchilla. I designate the more diagnostic humerus as lectotype of *Dendrocygna validipinnis*. Its measurements (mm) are: proximal width 21.8, width of shaft at break 6.6, depth of shaft at break 5.7. The ulna measures (mm) as follows: length 92.3, proximal depth 9.5, distal depth 8.9, width of shaft at midpoint 4.6, depth of shaft at midpoint 5.3.

The humerus in *Dendrocygna* has a very large pneumatic opening, which is conspicuously lacking in the lectotype of *D. validipinnis* (Plate 6J). The ulna in *Dendrocygna* is proportionately much longer and more slender than in that assigned to *D. validipinnis*. Both of the fossil specimens are easily identified as belonging to the distinctive genus *Biziura*

and at the species level there is no doubt that *Dendrocygna validipinnis* De Vis, 1888, is a synonym of *Biziura lobata* (Shaw, 1796).

Biziura exhumata

De Vis (1889: 57) founded this species on a single left tarsometatarsus (QM F1133) from Chinchilla. This bone is unquestionably that of a *Biziura*. A left femur (QM F7057) from Chinchilla is identified in De Vis's hand as *B. exhumata* but is not mentioned in the literature of this species. From the late Pleistocene sites in north-eastern South Australia De Vis (1906) referred the proximal end of a left humerus (QM F5536), the distal end of a right tibiotarsus (QM F5537) and the anterior portion of a synsacrum (QM F5538) to *B. exhumata*. The synsacral fragment is that of a cormorant (*Phalacrocorax*); the other two specimens and the femur from Chinchilla are correctly assigned to *Biziura*.

The amount of individual and sexual variation in size and minor osteological features in modern *Biziura lobata* is truly extraordinary and any assessment of fossils pertaining to this genus must take this fact into account. The late Pleistocene humerus assigned to *B. exhumata* is inseparable from the humeri of males of *B. lobata* and the tibiotarsus of the same age is matched by a large female of *B. lobata*. Of greater interest is the status of the four Plio-Pleistocene specimens of *Biziura* from Chinchilla (including the types of *Dendrocygna validipinnis*). The ulna is well within the range of variation of males of *Biziura lobata*. However, its colour and preservation are different from the other three specimens of *Biziura* from Chinchilla and it is just possible that this specimen may have come from one of the nearby late Pleistocene sites in Darling Downs rather than from Chinchilla (see Olson 1975 for a summary of this problem). The humerus (lectotype of *Dendrocygna validipinnis*) is intermediate in proximal width (21.6 mm) between five males (23.7–26.1 mm) and three females (16.3–19.5 mm) of *B. lobata*. Thus, if it were from a male it might indicate a slightly smaller bird than the modern form. The femur from Chinchilla is almost an exact match for that of the smallest of the three female *B. lobata* examined (Plate 6M, N). The tarsometatarsus (holoytpe of *B. exhumata*) is slightly smaller than in the smallest available specimen of *B. lobata* (Plate 6K, L), although it is too worn for any accurate measuremnts. Thus, the preliminary indication is that the Plio-Pleistocene representative of *Biziura lobata* may have been slightly smaller than its modern derivative. I found no consistent differences other than size between the fossils and the living examples that cannot be attributed to intraspecific variation and I do not regard either the fossil or the present series of modern *B. lobata* as adequate to determine the subspecific status of the Plio-Pleistocene *Biziura*.

On the basis of priority, *Biziura exhumata* De Vis, 1889, becomes a synonym of *Dendrocygna validipinnis* De Vis, 1888. Thus, if the Plio-Pleistocene *Biziura* proves to be a recognizable temporal form it would have to be known as *Biziura lobata validipinnis* (De Vis, 1888). Until this can be established, *Dendrocygna validipinnis* and *Biziura exhumata* can be regarded as synonyms of *Biziura lobata*.

DISCUSSION

Apart from the elimination of nine fossil species from future catalogues of fossil birds, little of interest has emerged from this study of De Vis's fossil ducks. We learn that *Anas superciliosa, Aythya australis* and *Biziura lobata* have been present in Australia since the late Pliocene or early Pleistocene but this is not exactly unexpected. There is also the possibility that *A. australis* and particularly *B. lobata* were somewhat smaller in Plio-Pleistocene times.

The late Pleistocene records of *Anas castanea* from the presently arid regions round Lake Eyre are of some interest, because this is well north of the present range of the species as shown in Frith (1967: 204). The species was evidently more abundant and widespread at that time and has since suffered reduction in range by progressive desiccation of the interior of Australia and perhaps by competition with *A. gibberifrons*, a congener of similar size. *Anas castanea*, with a rather restricted and evidently reduced range in Australia and with distinctive races in New Zealand, the Auckland Islands and Campbell Island, would appear to be an older species than *A. gibberifrons*; the latter is much more abundant in Australia and apparently does not vary from New Guinea and Australia to New Zealand, in which last place it is less common and a recent colonizer.

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DR STORRS L. OLSON, *National Museum of Natural History, Smithsonian Institution, Washington, DC 20560, USA.*

PLATE 5

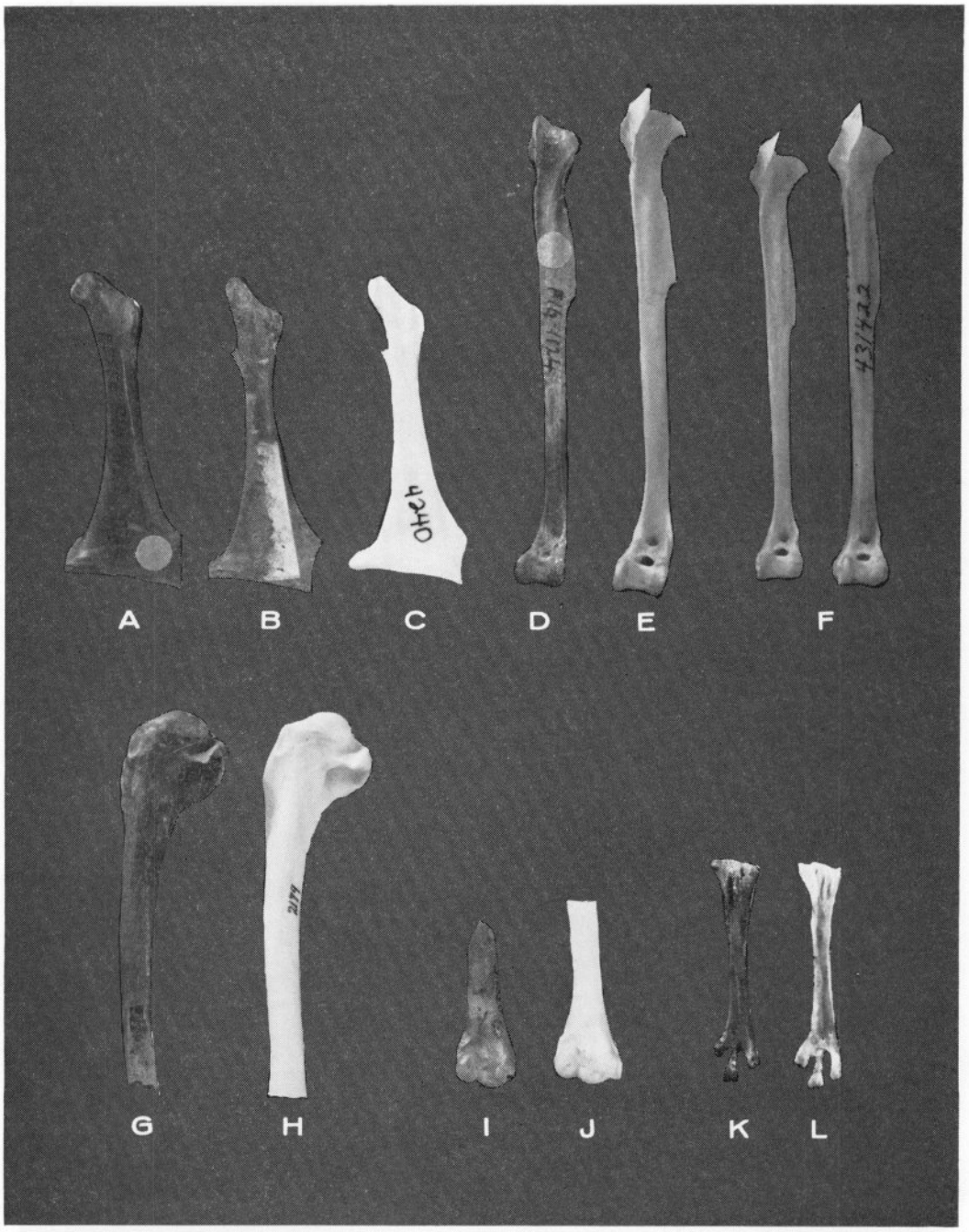

Plate 5. **A** lectotype left coracoid of *Nyroca robusta* (= *Anas superciliosa*); **B** holotype left coracoid of *Nyroca reclusa* (= *Aythya australis*); **C** left coracoid of modern *A. australis*; **D** lectotype left tibiotarsus of *Anas elapsa* (= *Aythya australis*). **E** left tibiotarsus of modern *Aythya australis* (not a particularly small individual); **F** two left tibiotarsi of modern *Aythya collaris* to show the amount of intraspecific differences in size and proportions in this genus; **G** lectotype left humerus of *Anas strenua* (= *A. castanea*); **H** left humerus of modern *A. castanea*, male; **I** lectotype distal end of right humerus of *Nettapus eyrensis* (= *Anas castanea*); **J** distal end of right humerus of modern *A. castanea*, female. **K** lectotype right tarsometatarsus of *Anas gracilipes* (= *A. castanea*); **L** right tarsometatarsus of modern *A. castanea*, female. All figures natural size.