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A FOSSIL CHELONIAN OF PROBABLE LOWER CRETACEOUS AGE FROM VICTORIA, AUSTRALIA

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Abstract

A fossil chelonian from Carapook, Western Victoria, originally recorded by F. Chapman is re-described. Due to the nature of the matrix it is concluded that the provenance of the specimen is within the Lower Cretaceous Merino Group. The fossil possesses characters that exclude it from any known family of Chelonia and it is described (*Chelycarapookus arcuatus*) as a new genus within a new family (Chelycarapookidae) that is erected to include it.

Introduction

The single specimen described in this paper is housed in the palaeontological collection of the National Museum of Victoria, (P13160). It was presented to the National Museum by Mr J. S. Macpherson and has been illustrated and described by Chapman (1919). He referred it 'with some reservation' to the same species as the extant Murray River tortoise, *Emydura macquari*, and suggested that it probably was of Pleistocene age. There is now some doubt about this age assignment and, furthermore, it is clear from Chapman's published figure and his description of what he thought to be impressions on the carapace of remains of the pelvic girdle, that he misinterpreted several aspects of the morphology of the specimen. For these reasons a re-description of this unique fossil is justified.

Occurrence

The exact provenance of this fossil cannot be established with absolute certainty; the museum label states that it came from an ironstone bed, three feet from the surface, at Carapook, near Casterton. The community of Carapook, as well as the entire Parish of Carapook, lies well within exposures of the Lower Cretaceous Merino Group. In this region the Merino Group is a series of gently dipping arkosic sandstones of Lower Cretaceous age (Kenley 1954, Evans 1961, Dettman 1963). The interfluves are commonly tablelands capped by a thin layer of lateric ironstone and the fossil, which is preserved as an ironstone cast with little bone remaining, almost certainly came from this ironstone horizon.

Kenley (op. cit.) has shown that the ferruginous capping layer is not a stratigraphic rock unit but most likely represents an old erosional surface and is, therefore, found in rocks of different age. In some areas the laterites are fossil soils (referred to as the 'Dundas laterites') developed in Cainozoic deposits, while to the W. along the Kanawinka and Weecurra faults, the Merino Group is bounded by ferruginous Tertiary marine deposits. However, in the Parish of Carapook no Tertiary sediments have been recorded, although the W. portion of the Parish has been mapped in detail, and in at least one locality the ironstone horizon is seen to transgress the bedding in the Merino Group (P. R. Kenley, pers. comm.) and is, therefore, an alteration of that Group and of Lower Cretaceous age.

It is likely that the fossil tortoise came from this Lower Cretaceous ironstone horizon for two reasons: (1) it is the only known source within the Parish of Cara-

pook from which to derive a fossil preserved in ironstone, and (2) in thin-section the matrix of the specimen is similar in its constituents and grain size to rock of the ironstone horizon, which is predominantly limonite with about 20 per cent quartz grains (Kenley, pers. comm.).

Description

The fossil is an internal mould of the shell of a chelonian with some bone remaining in the centre of the plastron and along the left margin and right posterior quarter of the carapace (Plate 2). Impressions are present of vertebrae, ribs, some of the sutures of the dermal bones, and the anterior buttress. There are no impressions of scutes on the external surface of the bone. The matrix also contains fragments of wood.

Plastron: The bones of the plastron are shown in Fig. 1. As the anterior

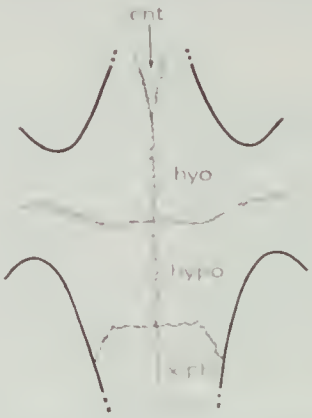

Fig. 1—The plastral bones of the holotype of *Chelycarapookus arcuatus* sp. nov. (Nat. Mus. Vict. P13160). Abbreviations are for entoplastron, hyoplastron, hypoplastron, and and xiphiplastron. x 2/3.

portion is missing the shapes of the epiplastral bones and the anterior extension of the entoplastron cannot be determined. However, it is clear that the posterior portion of the entoplastron was wedge-shaped and interealated between the anterior regions of the hyoplastral bones. The hyoplastral and hypoplastral bones make up most of the plastron with each hypoplastron extending slightly posteriorly to partially bound the lateral margin of the adjoining xiphiplastron. The posterior portion of the plastron is missing, so nothing is known of the shape of the xiphiplastral notch, nor can it be deduced if the pelvic girdle was attached to this area. There are no mesoplastra.

Carapace: Sutures of the costals, a few neurals, and some of the peripheral bones can be discerned. It is not possible to make out sutures of a proneural and, as the posterior margin of the carapace is missing, any remnant of a pygal bone is absent. There is no indication as to whether the pelvic girdle was attached to the carapace or not.

Neurals are probably present between costals 1 through 4, though detail is not well preserved in the anterior half of the carapace, so there may be some doubt about this. However, neurals are clearly present between costals 4 through 7 and

these increase in size posteriorly (Plate 2). On the first pair of costals anterior to the fusion of the ribs are a pair of fossae ('f' on Plate 2 and Fig. 2A). This area is smooth in other chelonians and the function of these unique depressions is not clear.

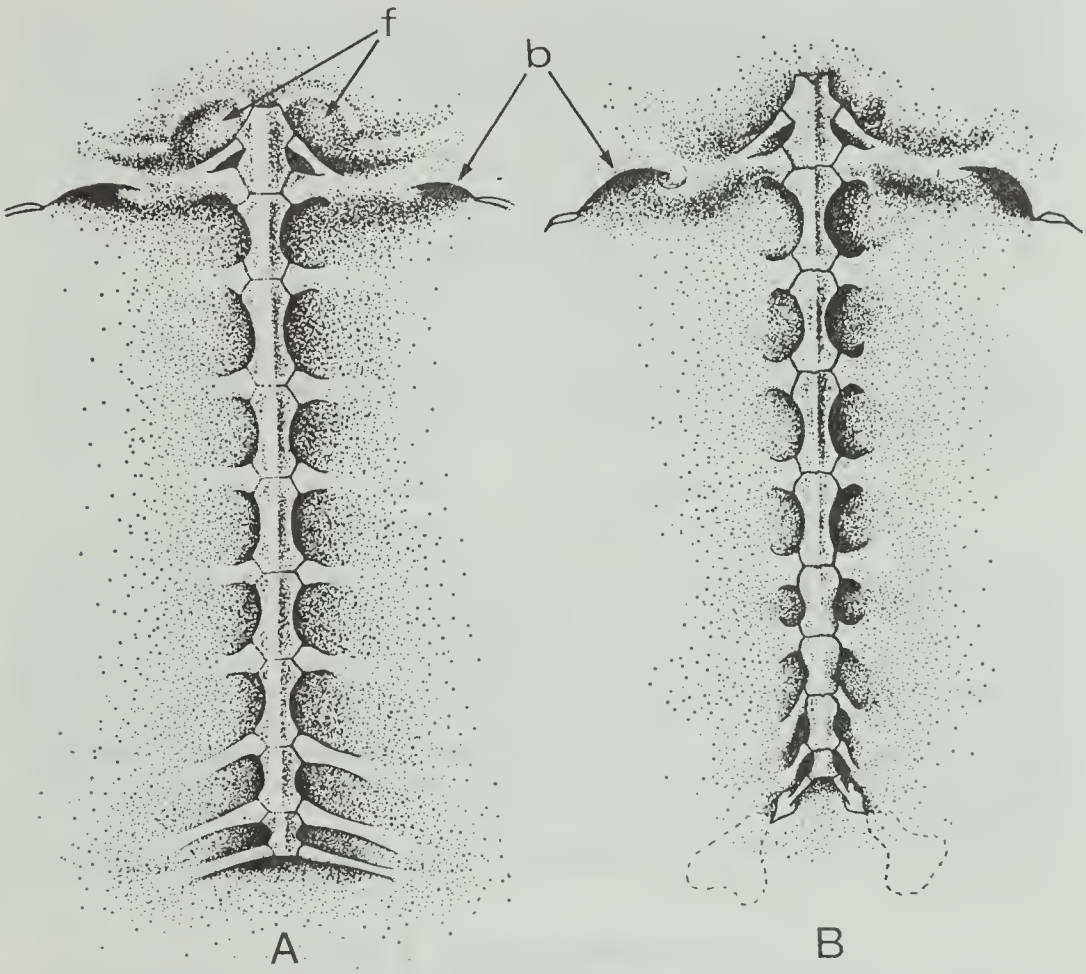

Fig. 2—A. A reconstruction of a portion of the anterior buttress and the dorsal vertebrae and ribs of the holotype of *Chelycarapookus arcuatus* sp. nov. Note the increasing extension of the posterior ribs before their fusion with the carapace. B. The same region of the extant chelid, *Emydura macquari*, for comparison. Abbreviations. b, anterior buttress; f, fossae unique to *C. arcuatus*. x 3/4.

A peculiar feature of this fossil is the extension of the posterior sets of ribs to result in their fusing to the costals a greater distance from the midline than do the anterior ribs. A reconstruction of that portion of the vertebral column with ribs associated with the carapace is shown in Fig. 2 along with the same region from an extant Australian chelid tortoise, *Emydura macquari*. In *E. macquari* the last few sets of ribs become slightly reduced in size and their points of fusion to the

carapace are not extended laterally. This is the case with all extant chelonians as well as those fossils in which this area has been described.

The lateral shift of the point of fusion to the costals of the posterior ribs is accommodated on the carapace by the previously mentioned increase in size of the posterior neurals.

There are no characters remaining on this fossil to indicate to which suborder, Cryptodira, Pleurodira, or Amphychelydia, it may belong. Furthermore, the combination of characters on the specimen does not fit the description of any family of chelonians, and I therefore propose that a new family with the following systematic position be erected to include it.

Class Reptilia

Subclass Anapsida

Order Chelonia

Suborder uncertain

Chelycarapookidae fam. nov.

It is premature, with only a single specimen in hand, to provide a complete diagnosis for the family. The description of the specimen as a new, monospecific genus will suffice for this purpose until more material is uncovered.

Chelycarapookus gen. nov.

Type species: **Chelycarapookus arcuatus** sp. nov.

Diagnosis of Genus: Chelonians possessing the following features: paired fossae on the first costals at the dorsal end of the anterior buttress; a posterior extension of the entoplastron to separate the anterior one-third of the hyoplastra; hypoplastra projecting posteriorly on to the lateral margin of the xiphiplastra; mesoplastra lacking; buttress narrow (less than one-quarter the overall length of the carapace); neurals probably present between all costals, but certainly present between costals 4 through 7 and increasing in size posteriorly beginning with number 5; point of fusion of the ribs to the costals becoming further from the midline in passing from the 4th costal to the 9th.

Etymology: From *chelys*, a turtle, and Carapook, the name of the Parish from which the specimen was collected.

Chelycarapookus arcuatus sp. nov.

(Pl. 2; Figs. 1, 2A)

Holotype: National Museum of Victoria P13160. This is a cast in ironstone of the inside of a chelonian shell which shows most of the sutures of the dermal bones and the positions of the ribs and vertebrae. No elements of the skull, girdles, nor limbs are preserved and there is no trace of the scute pattern. There are no referred specimens.

Locality and Horizon: The holotype was collected by Mr J. W. Macpherson at Carapook, Victoria. The exact provenance was not recorded at the time of collection but it seems certain, due to the limonitic nature of the matrix, that the specimen came from a known ironstone horizon in the Merino Group, which is of Lower Cretaceous age.

DIAGNOSIS: The same as for the genus. The specific name refers to the bow-like structure formed by the arcuate costals and extended ribs immediately anterior to the sacral region.

Discussion

The existence of *Chelycarapookus arcuatus* sp. nov. in a fluviatile environment in the Cretaceous of Australia does not throw much light on the ancestry of the turtle fauna of inland Australian waters, which today consists of a single family of pleurodires, the Chelidae. The fossil record of freshwater and terrestrial chelonians in Australia is scant and may be summarized as follows. From the Merino Group at Casterton, only 8 miles from Carapook, Krausé (1886) has recorded a fragment of a turtle shell which unfortunately can no longer be located. Lydekker (1889), de Vis (1897) and Longman (1929) have identified pieces of turtle shell from the Pleistocene of Queensland as chelids though these are fragmentary and lack diagnostic generic characters. There is only one occurrence of chelids so far recorded from the Tertiary of Australia (Warren 1969) though others are known and are currently being studied by Mr E. S. Gaffney of the American Museum of Natural History (Gaffney, pers. comm.). The described specimens are from Oligocene-Miocene sediments of Tasmania and cannot be distinguished from the extant chelid, *Emydura macquari*, which suggests a conservative evolutionary rate in this group. The only terrestrial chelonian known from Australia is the Pleistocene amphychelidian, *Meiolania platyceps*, recorded from Queensland and Lord Howe Island (Anderson 1925).

Chelycarapookus arcuatus possesses a suite of characters that exclude it from the Meiolaniidae, which probably had a reduced shell with fontanelles, and from the Chelidae. It is possible that the Australian Chelidae could have evolved from such an ancestor by the loss of neurals, which is characteristic of Australian chelids with the exception of *Chelodina oblonga* where a variable number may be present (Burbidge, pers. comm.), and by the reduction of the lateral extension of the posterior ribs. This is, however, a premature speculation. The phylogenetic position of *Chelycarapookus arcuatus* cannot be established with certainty until the anatomy of the skull and cervical vertebrae are known and the relationship of the pelvic girdle to the shell has been established, that is whether it was sutured to the carapace and plastron as it is in most amphychelidians (but not in the more advanced genus *Meiolania*) and in all members of the Chelidae.

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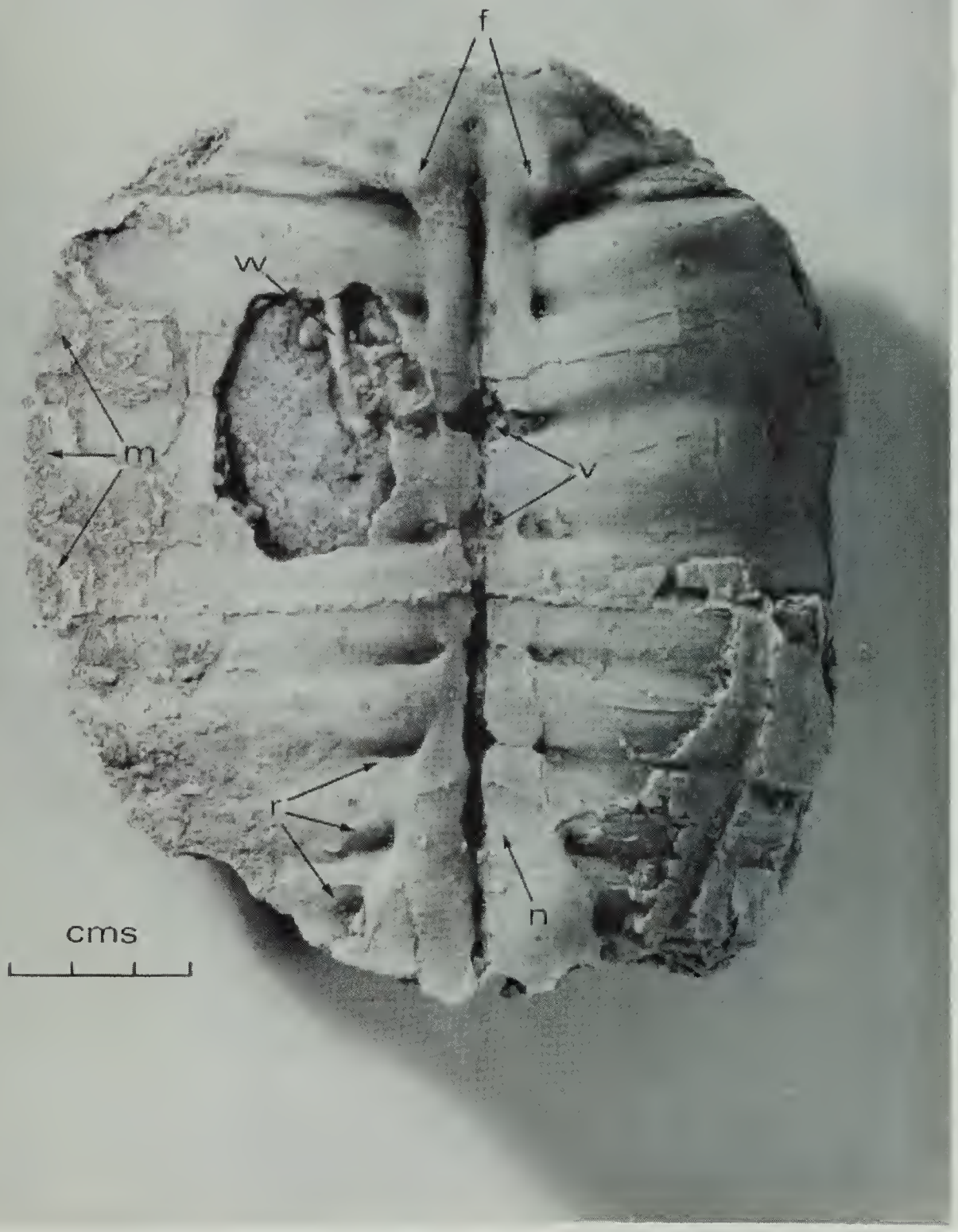
Explanation of Plate

PLATE 2

Dorsal view of the holotype of *Chelycarapookus arcuatus* sp. nov. (Nat. Mus. Viet. P13160). Abbreviations: f, fossae (which appear as eminences in the internal east); n, neural; m, remnants of bony marginals; r, casts of ribs at point of fusion with costals; v, casts of vertebrae; w, piece of wood in matrix. Note the increasing divergence of posterior ribs from the midline.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