

*The Australian Cretaceous ichthyosaur
Platypterygius australis: understanding its
taxonomy, morphology, and palaeobiology*

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ABSTRACT

The Cretaceous ichthyosaur *Platypterygius* was one of the last representatives of the Ichthyosauria, an extinct, secondarily aquatic group of reptiles. Remains of this genus occur worldwide, but the Australian material is among the best preserved and most complete. As a result, the Australian ichthyosaur fossil finds were used to investigate the taxonomy, anatomy, and possible locomotory methods and behaviours of this extinct taxon.

Understanding the importance of the Australian *Platypterygius* species has been complicated by the use of two specific names, *P. australis* and *P. longmani*, and confused further by the loss of holotype material. Examination of Australian material has demonstrated that both species belong to the same taxon. *P. australis* was shown as the valid taxon name, relegating *P. longmani* to a junior synonym, and thus resolving the taxonomic uncertainty of the only Australasian ichthyosaur that can be identified to species-level.

Examination of *P. australis* postcranial anatomy revealed four postcranial characters that, used in conjunction with previously identified cranial and postcranial diagnostic features, distinguish the Australian taxon from other species of *Platypterygius*. The morphology of the postcranial elements (including bones that had not previously been described for the genus) was then used to hypothesise the locomotory mode in this ichthyosaur based on osteological comparisons with extant marine mammals. Results indicated that a decoupled locomotor system was most plausible for *P. australis*, where the caudal fin was used for long distance swimming and the broad forelimbs for manoeuvring. In addition, the broad forelimbs, for which the genus is named, are thought to increase acceleration when either stationary or whilst moving.

In addition to the functional studies, palaeobehaviour in this ichthyosaur could also be inferred from bite traces. Palaeopathologies in the form of bite marks on a partial ichthyosaur skull were examined. The bite marks were attributed to another ichthyosaur (most likely of

the same species), thus indicating that *P. australis* individuals engaged in aggressive behaviour.

This thesis examined the known Australian ichthyosaur material to address taxonomic, anatomical, and behavioural aspects of *Platypterygius*, and demonstrated the utility of the Australian Cretaceous record for this purpose. Collection of additional specimens, particularly from localities in Western Australia and South Australia where diagnostic remains are yet to be found, would significantly add to our knowledge of this extinct taxon.

DECLARATION

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution to Maria Zammit and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference is made in the text.

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