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Short note
An ornithopod dinosaur from the Late Cretaceous of West Antarctica

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Introduction

In February 1989, the partial skeleton of an ornithopod dinosaur was discovered during a British Antarctic Survey (BAS) expedition, supported by RRS *John Biscoe*, to the James Ross Island area, east of the Antarctic Peninsula. This was only the second dinosaur to be found in the continent of Antarctica, the first being an ankylosaur collected three years earlier (Olivero *et al.* 1986, Gasparini *et al.* 1987, Gasparini 1988, Gasparini & Olivero 1989, Olivero *et al.* 1991).

Locality and horizon

The specimen came from the Cape Lamb Member of the Lopez de Bertodano Formation on Vega Island (Crame *et al.* in press). Although the bones were found between 171.5 and 186.5m above the base of this member (member B;Pirrie *et al.* in press), none was located *in situ*, despite excavation adjacent to, and above the highest occurrence of bone. Because of the restricted area of scatter, however, the specimen is unlikely to have moved far downhill. The surrounding lithology is silty mudstone and the sedimentology and fauna indicates deposition on a deep shelf below storm wave base but adjacent to land (Pirrie *et al.* in press). The bones were associated with abundant ammonites of the genus *Gunnarites* as well as a variety of other marine molluscs and terrestrially derived wood. The ammonites and dinocysts indicate an age range for the Cape Lamb Member of late Campanian to early Maastrichtian (Pirrie *et al.* in press).

Discovery, collection and preparation

The new discovery was made by Peter Bengston of the Paleontological Institute, University of Uppsala while making a collection of ammonites on Vega Island. Several vertebrae and parts of long bones were found on the surface. The material was passed to JJH, who visited the site and collected numerous extra bones and bone fragments, including both the upper and lower jaws. After the exposed bone fragments were cleared from a surface area of about 150 m^2, approximately one tonne of the surface debris (regolith) was dry-sieved through a 4 mm mesh sieve. This resulted in the recovery of many more bone fragments and some isolated teeth.

Recovery of as many of the bone fragments as was practically possible was vital for the task of reconstructing the bones. Although they had been much shattered by frost action, most of the fragments were unworn, which facilitated their reassembly. This was begun by J.J.H. and completed later by S.E.K.S. Preparation of the bones involved a combination of chemical and mechanical techniques. Dilute acetic acid was employed initially to soften the partially enclosing calcareous concretions (Lindsay 1987, and references therein), followed by mechanical removal of the matrix.

The dinosaur specimen

Identity

The specimen comprises the following cranial material; near complete left and right dentaries and maxillae, isolated cheek and palatal elements, and partial braincase. Postcranial elements include cervical, dorsal and sacral vertebrae; parts of both scapulae, coracoids and humeri; and iliac and ischial fragments. The specimen has been deposited in the Department of Palaeontology, Natural History Museum, London, under the registration number BMNH BAS R.2450.

Many features of the specimen are consistent with those of the Hypsilophodontidae, a morphologically conservative group of small to medium-sized (2–4 m long) bipedal ornithopod dinosaurs (Sues & Norman 1990). However, the bones preserved indicate an animal of some 4–5 m in length, which would be one of the largest hypsilophodontids. The morphology of the dentaries, maxillae and their dentition shows characters typical of hypsilophodontids. In particular, the shape of the tooth crowns and their pattern of primary and secondary ridges, although unique, resemble those of other hypsilophodontids. The humeri and pelvic elements show some characters in common with *Dryosaurus* and *Valdosaurus*. These two genera, hitherto regarded as hypsilophodontids (e.g. Galton 1983), were placed in a separate family, Dryosauridae, by Milner & Norman (1984), and are now regarded as plesiomorphic members of the Iguanodontia, a more derived ornithopod clade including

iguanodontids and hadrosaurs (Sereno 1986). A descriptive and systematic account of the Vega Island specimen is currently being prepared for publication by the present authors.

Palaeobiogeographical significance

Hypsilophodontids are currently known from Asia, Australia, Europe and North America, and range from the Middle Jurassic to the Late Cretaceous. Four taxa occur in the late Campanian to Maastrichtian of western North America (Sues & Norman 1990) and are thus contemporaneous with the Antarctic animal; and several Southern Hemisphere hypsilophodontids have been described from the Early Cretaceous of Victoria, Australia (Rich *et al.* 1988, Rich & Rich 1989). Dryosaurids are known from North America and Africa from the Late Jurassic to Early Cretaceous (Galton & Taquet 1982). In addition, a partial ilium of a *Dryosaurus*-like ornithopod was reported from the Campanian-Maastrichtian of New Zealand by Wiffen & Molnar (1989).

This new Antarctic find extends the temporal and palaeogeographical range, and the diversity of southern high latitude ornithopod dinosaurs, from that described by Rich & Rich (1989) in the Early Cretaceous of south-eastern Australia. It raises questions about the mechanisms for palaeobiogeographical distribution of southern hemisphere dinosaurs in the Late Cretaceous, to be addressed by the present authors elsewhere.

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