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A Jurassic ammonite from South Africa

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With 2 figures in the text

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Summary: Recent work has indicated the presence of marine lower Upper Jurassic sediments at Brenton (Knysna), South Africa. Apart from being the first recorded onshore occurrence of marine Jurassic sediments from South Africa, the age determination is significant for the timing of the southern part of the East/West Gondwana split (DINGLE & KLINGER, 1971). The discovery of an Upper Jurassic ammonite from the Brenton beds lends further support to the previous age determination.

Key words: Ammonoidea (*Hybonoticerias*), Kimmeridgian, marine milieu, continental drift, Gondwana; South African Republic (Brenton).

1. Introduction

Intermontane Mesozoic basins occur in the southern part of South Africa from Port Elizabeth in the east to Worcester in the west. (A full account of the regional and local stratigraphy of the area is given by DINGLE & KLINGER, 1972.) Marine sediments are known only from the Algoa, Plettenberg Bay and Knysna outliers. The marine sediments of the Algoa outlier have been dated as being of Upper Valanginian age on the basis of ammonites (SPATH, 1930), but the Knysna and Plettenberg Bay outliers have received little attention because of poor outcrops and lack of diagnostic fossils. Until the discovery of Jurassic ostracods, the opinion was prevalent that the marine sediments (Brenton beds) of the Knysna outlier (Fig. 1) were of the same age as the Sundays River Formation sediments of the Algoa basin (i. e. SCHWARZ, 1915; DU TOIT, 1954; HAUGHTON, 1963, 1969). This misconception probably originated from ROGER'S statements (1909) that "... the fauna of these beds is not identical with that of the Sundays River beds in the Uitenhage area, but very like it, and the similarity justifies the inclusion of the Brenton beds in the Uitenhage series." and also "... in 1905 Dr. KITCHIN recognized *Acanthodiscus*, sp. . . ." (Range — L. Hauterivian).

Due to the limited extent and non-economical nature of the Brenton beds the fallacious belief in the equality of the Brenton beds with the Sundays River Formation was adhered to until recently.

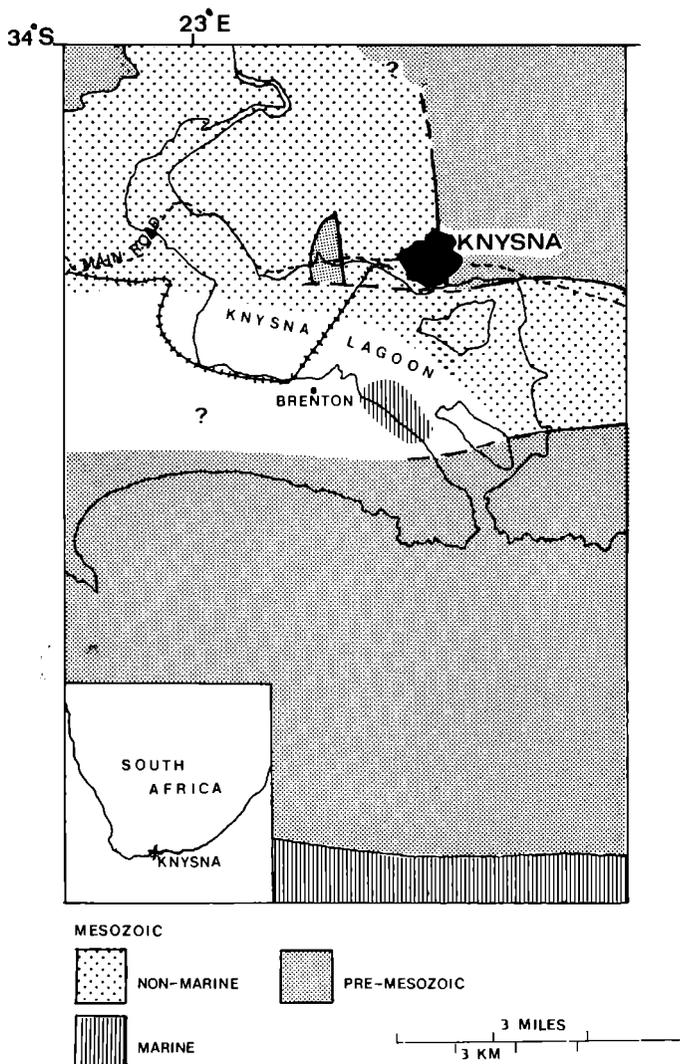


Fig. 1. Locality map of Brenton beds (after DINGLE & KLINGER, 1972).

The current search for hydrocarbons both onshore and offshore has renewed interest in these Mesozoic outliers, and at the request of SOEKOR (Suidelike Olie Eksplorasië Korporasie) a micropaleontological investigation was carried out in 1970 which subsequently led to a lower Upper Jurassic dating.

The Ostracoda species described by one of us (R. V. D. in DINGLE & KLINGER, 1972) are all new, but quite unlike those of similar facies from the Sundays River Formation, showing greatest affinities to the Callovian fauna of the Majunga basin (Madagascar), described by GREKOFF (1963). This indirect approach to age-determination may be criticized, and it was thought desirable to re-examine the macrofauna to either substantiate or to doubt the microfaunal dating.

From the available literature it is clear that no conspecific species occur in both the Sundays River Formation and the Brenton beds. The only macrofossil which could be of aid is the "*Acanthodiscus*" mentioned by ROGERS (1909); the credibility of the generic determination having been dismissed as a mis-identification (DINGLE & KLINGER, 1972). No ammonites were found during fieldwork by one of us (H. C. K.), but a quarter of a whorl of an ammonite in the "Cape of Good Hope Geological Survey" collection, part of which is housed in the Geological Survey, Pretoria, was found. Both the catalogue reference and the nature of the matrix affirm the Brenton beds origin. No information regarding the collector is provided in the catalogue, and whether this specimen is the same as that mentioned by ROGERS (1909) is impossible to say as neither description nor illustration of the ammonite were given. Judging by the lack of interest this area has received since the early pioneer days of ROGERS and SCHWARZ, the possibility cannot be ruled out.

2. Systematic description

Class	Cephalopoda	CUVIER, 1797
Order	Ammonoidea	ZITTEL, 1884
Suborder	Ammonitina	HYATT, 1899
Superfamily	Perisphinctacea	STEINMANN, 1890
Family	Aspidoceratidae	ZITTEL, 1895
Subfamily	Simoceratinae	SPATH, 1924
Genus	<i>Hybonoticerias</i>	BREISTROFFER, 1947

Hybonoticerias aff. *hildebrandti* (BEYRICH)

Figs. 2a—2d

- Compare: 1875 *Aspidoceras* sp. indet., WAAGEN, p. 6, pl. 3, figs. 1—1 a, 2—2 a.
 1877 *Ammonites hildebrandti* BEYRICH, p. 101.
 1894 *Waagenia hildebrandti* (BEYRICH); FUTTERER, p. 6, pl. 3, figs. 1, 1 a, 2, 2 a.
 1927 *Waagenia hildebrandti* (BEYRICH) FUTTERER; SPATH, p. 647, with synonymy.

Material: Cat. no. 151h, Geological Survey South Africa, Pretoria.
 Locality—Brenton.

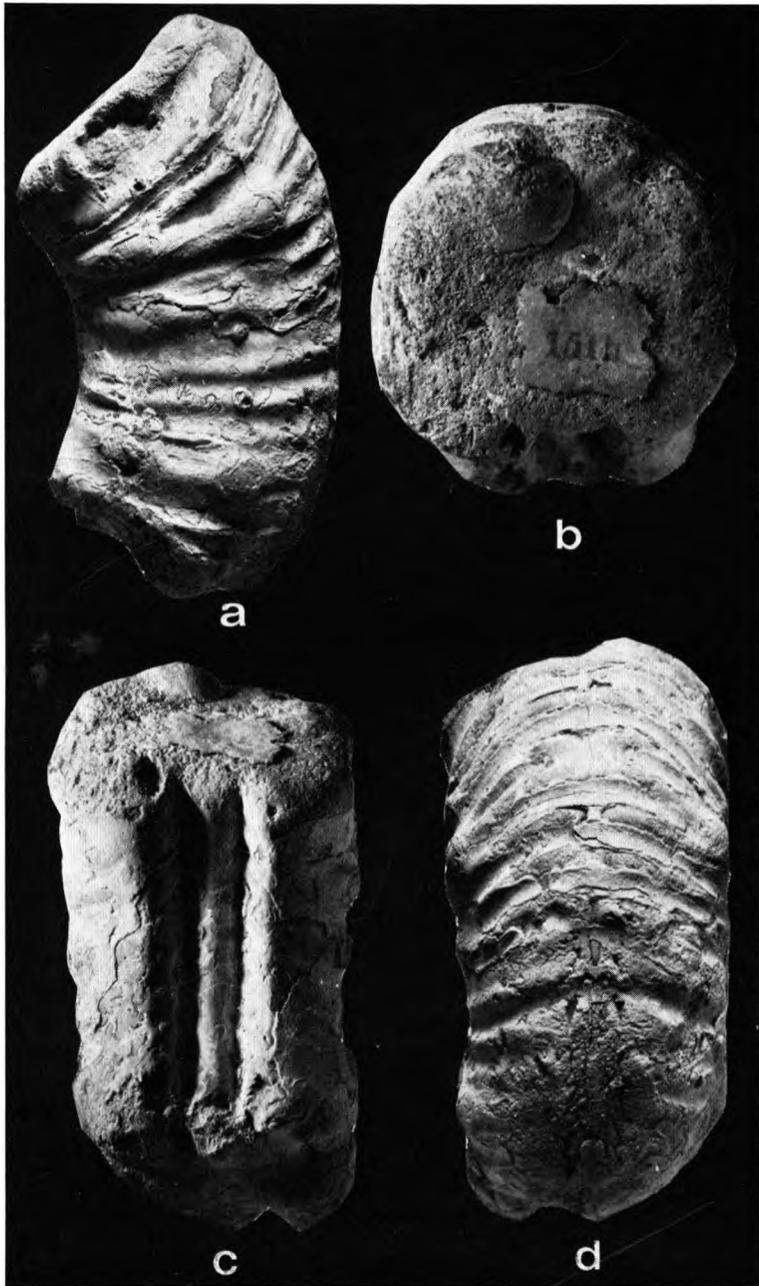


Fig. 2 a—2 d. *Hybonoticeras* aff. *hildebrandti* (BEYRICH). Lateral, transverse, dorsal and ventral views of specimen 151h. Natural size.

Description: The specimen is a wholly septate fragment of just under one quarter of a whorl, with a maximum whorl height of 35 mm. It is phosphatised, and retains much of the original nacreous aragonitic shell. The dorsum preserves an impression of the ventral part of the inner whorl. This was compressed, with a venter bearing a pair of sharp, continuous beaded keels on either side of a deep, broad, rounded siphonal groove, whilst slight indentations in the umbilical wall of the outer whorl suggest that the inner whorl bore laterally directed tubercles or spines on the ventral shoulder.

In contrast, the outer whorl is slightly depressed (whorl breadth: whorl height ratio is 1.07), with a polygonal rounded whorl section, the greatest breadth being at the umbilical bulla. The coiling appears to have been rather evolute, with a moderately deep umbilicus, a rounded umbilical wall and shoulder, gently inflated sides, rounded ventrolateral shoulders and a flattened venter, faintly concave over the siphuncular area.

Ornament consists of about nine narrow, rounded primary ribs which arise at the umbilical seam, strengthen across the umbilical wall and are straight and faintly rursiradial across the flanks, sweeping forwards across the ventrolateral shoulder, crossing the venter in a distinct sinus-form.

Three of the primary ribs bear strong, rounded umbilical nodes and rather larger, rounded ventrolateral nodes. In one case a pair of ribs loop between these nodes, in another two ribs branch from the umbilical node, whilst each ventrolateral node gives rise to three secondary ribs, which loop across the venter.

The suture line is largely obscured by shell, but that on the outer whorl is symmetrical about the siphuncle, whereas traces of the suture within the dorsum of the outer whorl show a rather distinct asymmetry.

Discussion: The ornament of the inner whorl of this specimen (as preserved in the impressed area of the dorsum of the outer whorl), with beaded keels and lateral tubercles, shows very clearly that this is a *Hybonoticer*. These features characterise the genus (see WRIGHT 1957 for a full diagnosis) and compare well with typical species such as *Hybonoticer* *hybonotum* (OPPEL), *H. beckeri* (Neumayr) or *H. kachense* (SPATH).

The confusing aspects of this specimen and those which led to its reference to *Acanthodiscus* by KITCHIN (ROGERS, 1909) and hence the dating of the Knysna sediments as Neocomian, are the ornament and section of the outer whorl. Loss of the typical sulcate-bicariniate venter occurs, however, in some *Hybonoticer* species, such as *Hybonoticer* *hildebrandti* (BEYRICH), as represented by fragments figured by WAAGEN (1875, pl. 21, fig. 4; discussed by SPATH 1927, p. 647), FUTTERER (1894, pl. 3, figs. 2, 2a) and SPATH (1930a, fig. 4c). All these fragments show a similar ribbing and tuberculation style, and a loss of ventral keels and sulcus, leaving only a faint ventral depression, together with secondary ribs branching from ventrolateral tubercles and looping across the venter.

Our fragment differs in details of ornament, and is depressed, rather than compressed. We have therefore determined it as *Hybonoticer* *aff. hildebrandti* (BEYRICH).

Age: *Hybonoticer* has a known time range from the Middle Kimmeridgian *Hybonoticer* *beckeri* Zone to the Lower Tithonian *Hybonoticer* *hybonotum* Zone. Occurrences of material comparable to our specimen in Kutch and Kenya are thought to be Middle Kimmeridgian (SPATH, 1927, 1930a; ARKELL, 1956). *Hybonoticer* also occurs in the Middle Kimmeridgian of Somalia and Ethiopia (ARKELL, 1956) whilst in Madagascar, where the genus occurs in both Kimmeridgian and Tithonian, the closest comparisons are with formes from COLLIGNON'S (1959) Middle Kimmeridgian. A high Mid-Kimmeridgian age for our present specimen thus seems most likely.

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