

THE UPPER DEVONIAN INDEX AMMONOID *CHEILOCERAS* FROM NEW SOUTH WALES

by T. B. H. JENKINS

ABSTRACT. *Cheiloceras acutum* (Münster) from a presumed equivalent of the Baldwin Formation (Upper Devonian) near Tamworth, N.S.W. is described as the first occurrence of this index genus in eastern Australia.

AMMONOID cephalopods of Devonian age are very rare in eastern Australia. Teichert's (1948) description of goniatites from the Buchan district of Victoria was the first authentic report of Devonian ammonoids from eastern Australia, previous records being probably erroneous (Teichert 1943). Subsequently, Pickett (1960) has described a new species of clymenid and a doubtful *Platyclymenia* from different horizons in the Upper Devonian of northern New South Wales. Taxonomic work by Erben (1960) has indirectly contributed to a revised view of the correlation of Teichert's Buchan goniatites (Philip and Pedder 1964), but there have been no further records of Devonian ammonoid discoveries in eastern Australia. The present note is thus only the third such published record. A fourth occurrence is mentioned herein and will shortly be documented.

The goniatites here recorded were found near Keepit Dam (see text-fig. 1), a recently completed structure on the Manilla (or Namoi) River between the towns of Manilla, Tamworth, and Gunnedah. A reasonably complete statement of the regional geology of the surrounding country has been achieved by the work of several authors summarized by Voisey and Williams (1964) and White (1964, 1965). The present writer has mapped formations in detail through a north-south belt which includes Keepit Dam.

The dam lies on the western limb of the long submeridionally trending syncline which, by reversals of plunge, forms the closed Werrie and Belvue Basins. Dips are consistently 40° to 50° at N. 30° to 55° E. within the area of text-fig. 1, and only minor faulting occurs. The succession is broken by a disconformity at the base of the Carboniferous strata, with the lowest Carboniferous formation overstepping northwards on to lower beds within the Upper Devonian. Evidence from fossil ammonoids points to the absence hereabouts of the upper half of the Upper Devonian.

There is also a possibility of an erosional break lower in the Upper Devonian, at the base of what has been called the Keepit Conglomerate, but there is no local evidence for an angular unconformity at this horizon such as has been claimed for adjacent areas (White 1964, 1965).

Below the Keepit Conglomerate the Upper Devonian succession near the dam consists chiefly of volcanic detritus. It contains a thick unit, over 2,000 ft., of alternating shales and tuffs which yield marine fossils (including *Cheiloceras*) at the level indicated in text-fig. 2.

Described specimens are in the fossil collection of The University of Sydney Geological Department and are referred to by USGD catalogue numbers.

SYSTEMATIC DESCRIPTION

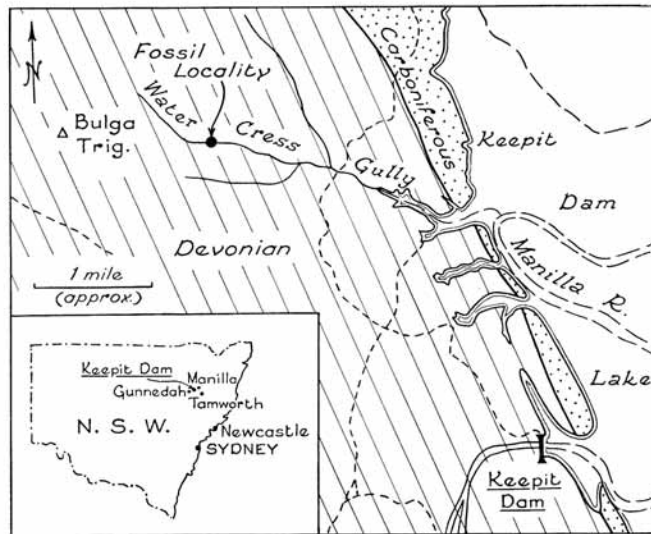
Superfamily CHELOCERATAEAE Frech 1897

Family CHELOCERATIDAE Frech 1897

Genus CHEILO CERAS Frech 1897

Type species (by subsequent designation of Wedekind 1918, p. 144): *Goniatites subpartitus* Münster 1839, p. 18 (loc. cit. fide Frech 1902, p. 69).

Remarks. The mode of division of the dorsal lobe of the suture has been mainly used to separate from *Cheiloceras* Frech 1897 the subgenera *Torleyoceras* Wedekind 1918 (?=



TEXT-FIG. 1. Map of Water Cress Gully locality, showing tracks.

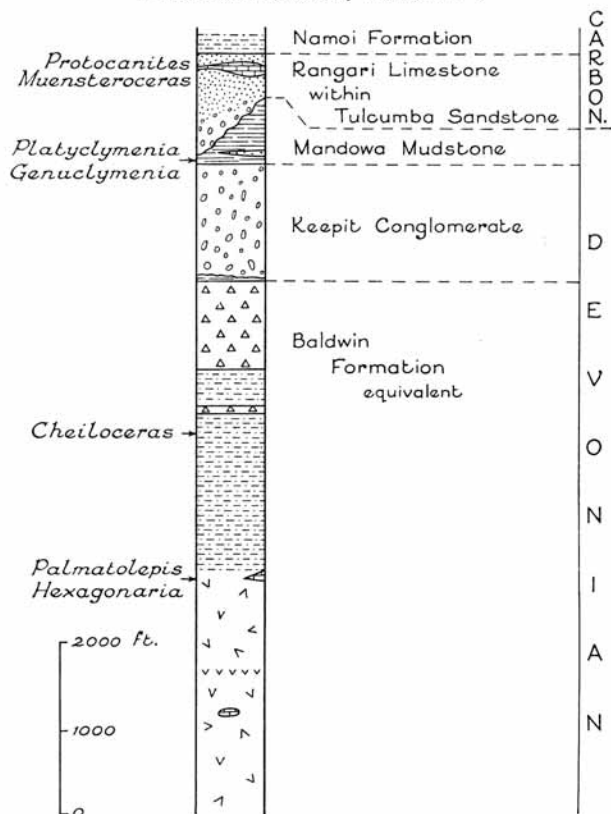
Staffites Wedekind 1918) and *Dyscheiloceras* Schmidt 1921 and the genus *Paratorleyoceras* Bogoslovsky 1957, thus leaving *Cheiloceras* (*Cheiloceras*) to receive the species having an undivided, flat, or gently bowed dorsal lobe of the suture.

In the southern hemisphere *Cheiloceras* is known only from Western Australia (Fitzroy Basin) but is now known from all the northern continents having been recently reported from North America (House 1962, House and Pedder 1963).

Cheiloceras (*Cheiloceras*) *acutum* (Münster)

Plate 72, figs. 4-6; text-fig. 3 a-e

- 1839 *Goniatites acutus* Münster, p. 110, pl. 16, fig. 11 (fide Frech 1902, p. 71).
- 1852 *Goniatites retrorsus* var. *acutus* G. and F. Sandberger, p. 108, pl. 10, fig. 10; pl. 10a, figs. 1, 2.
- 1902 *Cheiloceras acutum* Münster emend. Sandberger; Frech, p. 71, pl. (3)4, fig. 6.
- 1918 *Cheiloceras acutum* Sandberger; Wedekind, p. 146, fig. 46, i.
- 1918 *Cheiloceras acutum* Frech; Wedekind, pl. 18, fig. 7.



TEXT-FIG. 2. Stratigraphic column for the area near Keepit Dam, showing ammonoid horizons.

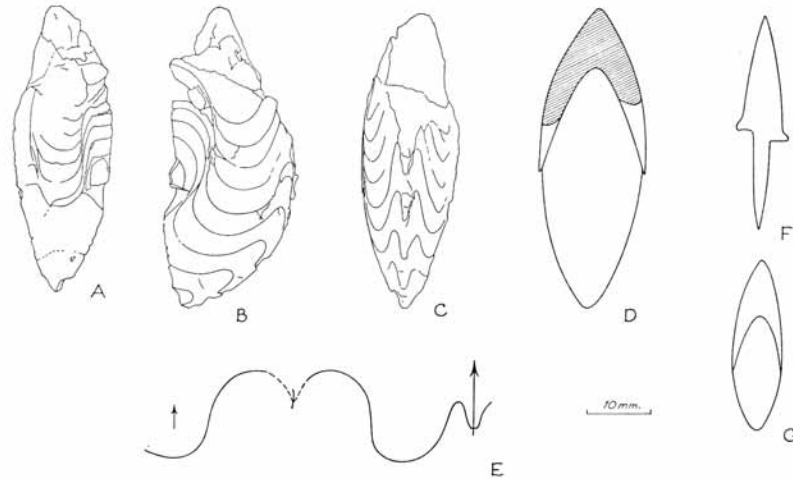
Material. One specimen, an uncrushed internal mould of a segment of the outer whorl, lacking the umbilicus but preserving the greater part of several sutures (external and internal) and a part of the body chamber.

Description. Shell form thickly lenticular with whorls deeply overlapping. Whorl sides are flatly curved and meet at an acute angle along the venter. No trace of an umbilical shoulder is to be seen. The dorsum is more broadly rounded, the flanks of the impressed area converging to a wider but still noticeable angulation. Whorl sides and the adjacent flanks of the impressed area converge very gradually towards the axis of coiling; extrapolation of the partial cross-section (text-fig. 3d) suggests a closed umbilicus.

EXPLANATION OF PLATE 72 (see also p. 456)

Figs. 4-6. *Cheiloceras* (*Cheiloceras*) *acutum* (Münster) from an equivalent of the Baldwin Formation in Water Cress Gully, 1.9 miles north-west of Keepit Dam, near Tamworth, N.S.W. Ventral, lateral, and dorsal views respectively of USGD6870, $\times 2$.

Maximum dimension of the specimen is 46 mm., measured as an incomplete chord of the venter's spiral curve and ending adorally within the body chamber. Diameter of the entire shell therefore exceeded 46 mm. by an amount depending mainly on the unknown length of the body chamber. Maximum whorl width of the preserved segment is 15.1 mm.; the reconstruction (text-fig. 3*d*) shows whorl width as 16.5 mm. at a diameter of 47 mm.



TEXT-FIG. 3. *a-e*, *Cheiloceras (Cheiloceras) acutum* (Münster), based on specimen USGD6870. *a-c*, dorsal, lateral, and ventral views; *d*, cross-section, reconstructed from preserved portion shown by oblique ruling; *e*, suture. *f, g*, based on specimens USGD 6871 and 6872 respectively, cross-sections of two indeterminate external moulds. All $\times 1$. All specimens from the same bed in an equivalent of the Baldwin Formation.

Sutures have six lobes, of which the pair on the umbilicus is partly inferred, the umbilicus being missing (text-fig. 3*e*). The ventral lobe and flanking saddles are narrow elements, in contrast to the broad, rounded character of other preserved sutural elements. External sutures are spirally confluent where the broad, slightly asymmetrical U-shaped lateral lobe passes into a wide, evenly rounded dorso-lateral saddle. Internal sutures are similarly confluent where the flatly rounded dorsal lobe passes into the adjacent saddle.

Remarks. In shell form and external suture *Cheiloceras acutum* (Münster) closely resembles the coeval *Tornoceras acutum* Frech so that complete internal moulds of the two species are homoeomorphic. Distinctions have been recognized on form of growth-lines and on internal sutures (e.g. Wedekind 1908, p. 585; 1918, p. 101). The internal suture of *Tornoceras acutum* Frech shows a deep, narrow dorsal lobe flanked by broader saddles (Wedekind 1908, pl. 39, fig. 4; Schindewolf 1923, p. 508). The broad, flatly rounded dorsal lobe of the present specimen is typical of *Cheiloceras* sensu stricto and resembles that of the internal suture of *C. circumflexum* Sandberger which was cited by Wedekind (1908, p. 585) as similar to that of *C. acutum*.

Petter (1959, p. 195) has pointed out that *Tornoceras iowaense* Miller 1938 may belong

to *Cheiloceras acutum* since neither its internal suture nor its growth-lines have been recorded.

The specimen here described is the largest heretofore figured as, or authentically assigned to, *Cheiloceras acutum*. Lange (1929, p. 36) records a specimen 90 mm. in diameter but indicates doubt on generic allocation. The venter of the described specimen is somewhat more acute than that of other figured specimens of *C. acutum* but since whorl shape changes with growth to a more acute form of venter, this constitutes no objection to the specific allocation (cf. Sandberger 1852, pl. 10a, fig. 2).

Cheiloceras acutum seems to be previously recorded only from Germany. Wedekind noted *acutum* as a rare species of the lower portion of the *Cheiloceras* Stufe (= IIa). Lange (1929) named '*?Cheiloceras acutum*' as a zonal fossil for the lowest of three subdivisions of the *Cheiloceras* Stufe.

Other material. Two indeterminable external moulds of coiled cephalopods were found in the bed of tuff which yielded *C. (C.) acutum*. The cross-section of one of these external moulds (text-fig. 3a) may be compatible with an immature stage of *C. (C.) acutum*. The other mould is a slightly asymmetrical oxycone (text-fig. 3f) with an umbilical structure somewhat similar to that figured by Clarke (1899, p. 112) for *Tornoceras uniangulare* (Conrad), i.e. the umbilical lip is produced laterally giving a small spiral prominence on the axis of coiling.

Horizon and locality. The specimens were found in Water Cress Gully, 1.9 miles north-west of Keepit Dam, which is on the Manilla (= Namoi) River, between Tamworth and Gunnedah in northern New South Wales. The fossil locality is in shaly volcanic tuff, a presumed equivalent of the Baldwin Formation. According to local inhabitants it is close to the spot whence Mitchell (1921, 1924) described *Merista plebeia* Sowerby and other brachiopods. The horizon is some 3,000 ft. below another ammonoid bed with *Platyclymenia* and *Genuclymenia*, indicating *Platyclymenia* Stufe and strongly suggesting an expanded stratigraphic succession. The bed with *Cheiloceras acutum* is some 1,700 ft. above the highest known local occurrence of the conodont *Palmatolepis*.

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REFERENCES

- BOGOSLOVSKY, B. I. 1957. New genera of Devonian ammonoids. *Materialy k osnovam paleontologii, Pal. inst., Acad. Sci. USSR*, **1**, 45-48. [In Russian.]
- CLARKE, J. M. 1899. The Naples fauna (fauna with *Manticoceras intumescens*) in western New York. *16th Ann. Rep. N.Y. State Geol.* 29-161, pl. 1-9.
- ERBEN, H. K. 1960. Primitive Ammonoidea aus dem Unterdevon Frankreichs und Deutschlands. *Neues Jb. Geol. Paläont., Abh.* **110**, 1-128, pl. 1-6.
- FRECH, F. 1897. *Lethea geognostica*, Theil I; *Lethea palaeozoica*, Lief. **1**, Stuttgart.
- 1902. Über devonische Ammonoiten. *Beitr. Paläont. Geol. Öst.-Ung.* **14**, 27-111, pl. 2-5.
- HOUSE, M. R. 1962. Observations on the ammonoid succession of the North American Devonian. *J. Paleont.* **36**, 247-84, pl. 43-48.
- and PEDDER, A. E. H. 1963. Devonian goniatites and stratigraphical correlations in Western Canada. *Palaeontology*, **6**, 491-539, pl. 70-77.
- LANGHE, W. 1929. Zur Kenntnis des Oberdevons am Enkeberg und bei Balve (Sauerland). *Abh. Preuß. geol. Landesanst., N.F.* **119**, 1-132, pl. 1-3.
- MITCHELL, J. 1921. Some new brachiopods from the Middle Palaeozoic rocks of New South Wales. *Proc. Linn. Soc. N.S.W.* **45**, 543-51, pl. 31.
- 1924. A further reference to the occurrence of *Merista plebeia* Sowerby in New South Wales. *Ibid.* **49**, 499-503, pl. 53.

- MÜNSTER, G. Graf zu. 1839. *Nachtrag zu den Goniatiten des Fichtelgebirges. Beiträge zur Petrefactenkunde*, Heft 1, 16–31, pl. 3. Bayreuth.
- PETTER, G. 1959. Goniatites dévoniennes du Sahara. *Mém. Carte géol. Algér. Paléont.* 2, 1–313, pl. 1–26.
- PHILIP, G. M. and PEDDER, A. E. H. 1964. A re-assessment of the age of the Middle Devonian of south-eastern Australia. *Nature*, Lond., 202, 1323–4.
- PICKETT, J. W. 1960. A clymeniid from the *Wocklumeria* zone of New South Wales. *Palaeontology*, 3, 237–41, pl. 41.
- SANDBERGER, G. and SANDBERGER, F. 1850–56. *Systematische Beschreibung und Abbildung der Versteinerungen des rheinischen Schichtensystems in Nassau*. 1–564, pl. 1–39 (Atlas). Wiesbaden.
- SCHINDEWOLF, O. H. 1923. Beiträge zur Kenntnis des Paläozoicums in Oberfranken, Ostthüringen und dem Sächsischen Vogtlande. I, Stratigraphie und Ammonoitenfauna des Oberdevons von Hof. a. S. *Neues Jb. Min. Geol. Paläont.* 49, 250–357, 393–509, pl. 14–18.
- SCHMIDT, H. 1921. Das Oberdevon-Culm-Gebiet von Warstein i. W. und Belecke. *Jb. Preuß. geol. Landesanst.* 41, 254–339, pl. 12.
- TEICHERT, C. 1943. The Devonian of Western Australia. A preliminary review. *Am. Jour. Sci.* 239, 148–53.
- 1948. Middle Devonian goniatites from the Buchan district, Victoria. *J. Paleont.* 22, 60–67, pl. 16.
- VOISEY, A. H. and WILLIAMS, K. L. 1964. The geology of the Carroll-Keepit-Rangari area of New South Wales. *J. Proc. roy. Soc. N.S.W.* 97, 65–72.
- WEDEKIND, R. 1908. Die Cephalopodenfauna des Höheren Oberdevon am Enkeberge. *Neues Jb. Min. Geol. Paläont.* 26, 565–634, pl. 39–45.
- 1918. Die Genera der Palaeoammonoidea (Goniatiten), (Mit Ausschluss der Mimoceratidae, Glyphioceratidae und Prolecanitidae). *Palaeontographica*, 62, 85–184, pl. 14–22.
- WHITE, A. H. 1964. *Geological map of New England 1 : 100,000, Attunga sheet (No. 321), with marginal text*. The University of New England, Armidale, New South Wales, Australia.
- 1965. The stratigraphy and structure of the Upper Palaeozoic sediments of the Somerton-Attunga district, N.S.W. *Proc. Linn. Soc. N.S.W.* 89, 203–17.

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RAWSON, *Hypophylloceras* from the Speeton Clay
JENKINS, *Cheiloceras* from New South Wales