

THE LOWER LIASSIC AMMONITES
NEOMICROCERAS GEN. NOV. AND
PARACYMBITES

by D. T. DONOVAN

ABSTRACT. *Neomicroceras commune* gen. et sp. nov., family Eoderoceratidae, is described and figured from the Raricostatum Zone of the British Lower Lias. The genus *Paracymbites* Trueman and Williams 1927, from the same zone, is revised from the original types and other material, and placed in the family Oxynoticeratidae.

STUDY of the Lower Liassic ammonites from the Geological Survey borehole at Witney (Apley Barn), Oxfordshire, has led to the recognition of a new genus, here named *Neomicroceras*, and to the revision of another, *Paracymbites* Trueman and Williams, which was previously known only from a figure of the inner whorls. Both genera are now fully described and figured.

The following abbreviations are used: BM = Palaeontology Department, British Museum (Natural History). GSM = Geological Survey and Museum, London.

SYSTEMATIC DESCRIPTIONS

Order AMMONOIDEA

Family EODEROCERATIDAE Spath 1929

Subfamily EODEROCERATINAE Spath 1929

Genus NEOMICROCERAS gen. nov.

Type species. Neomicroceras commune sp. nov.

Diagnosis. Evolute ammonites of the family Eoderoceratidae with simple, radial ribs on the whorl-side. The ribs may bear small tubercles at their ventral ends. The suture-line is very simple: the saddles are broad, rounded, and never constricted at their bases; the external saddle is bifid or trifid, the other saddles are not normally divided. The genus is a homeomorph of *Crucilobicerias* but is distinguished from it by the different, much simpler suture-line and by the shorter smooth stage, up to 0.35 cm. diameter compared with about 0.5 cm. in *Crucilobicerias*. The single known species is small, never exceeding 20 mm. diameter.

Remarks. *Neomicroceras* is placed in the Eoderoceratinae on account of its similarity to the inner whorls of the less strongly ornamented species of *Crucilobicerias*. Its range, as at present known, lies entirely above that of *Crucilobicerias* and it could have evolved from that genus. No intermediate forms are known. The suture-line of *Crucilobicerias* passes through a stage similar to that of *Neomicroceras* during its ontogeny, as shown by Schindewolf (1962, text-figs. 107*b*, *c*). By a diameter of about 1.0 cm., however, the *Crucilobicerias* suture-line has many more indentations than that of *Neomicroceras* and [Palaeontology, Vol. 9, Part 2, 1966, pp. 312-18, pl. 53.]

the external and sometimes other saddles have constricted bases, a feature never observed in the new genus.

Other genera of Eoderoceratinae in the British Raricostatum Zone (*Eoderoceras*, *Bifericeras*) show sutural development and complexity very like that of *Cruciloboceras*.

Neomicroceras commune sp. nov.

Plate 53, figs. 1–4, text-fig. 1

Holotype. GSM 87550 from the Lower Lias of the Apley Barn Borehole, near Witney, Oxfordshire.

Paratypes. GSM 87551, 87553–6, from the same borehole as the holotype.

Other material. GSM 87557–60 from the Witney (Apley Barn) Borehole. Three specimens from the Dundry Borehole, Somerset, GSM 87561–3. Three specimens from Ballintoy, Co. Antrim, in the Ulster Museum and Art Gallery, Belfast, on a tablet numbered 674–1931. Geological horizon: In the Witney (Apley Barn) Borehole the genus ranges from 464 to 486½ ft. and lies entirely within the range of the ammonite *Leptechioceras*. It therefore occurs in the Macdonnelli Subzone of the Raricostatum Zone as currently defined (Dean, Donovan, and Howarth 1961, p. 460). The specimens from the Dundry Borehole are from the same subzone. The Irish specimens are not dated.

Description. The shell is evolute, with very little overlap between successive whorls. The largest individuals, around 16 mm. in diameter, consist of five and a half whorls. The first three whorls increase rapidly in size and the umbilicus is about 40 per cent. of the diameter at a size of 5 mm. On the last two and a half whorls the increase is more gradual and the umbilicus widens to about 52 per cent. at full size. The whorl height is about 27 per cent. of the diameter, and the whorl thickness 25 per cent. at full size.

The whorl side is smooth or faintly undulating to a diameter of about 35 mm. when regular ribbing begins. The rib-frequency rises from about 25 to the whorl at a diameter of 6 mm. to from 33 (holotype) to 40 (paratype no. 87554) at full size in the Witney (Apley Barn) material. Two of the Ballintoy examples have closer ribbing. They are provisionally regarded as individual variants as there is not enough material available to demonstrate the existence of a distinct, more closely ribbed species. The variation in rib-frequency within the Witney assemblage is normal for a Liassic ammonite species. The ribs are very slightly convex forwards and bear small tubercles at the ventral ends. All the Witney specimens are pyritized internal moulds but the Ballintoy examples retain the shell and show that the tubercles, blunt on the internal mould, are sharp on the shell. The Irish material also shows that the shell is striate between the ribs. In some individuals the ribs continue very faintly across the arched venter.

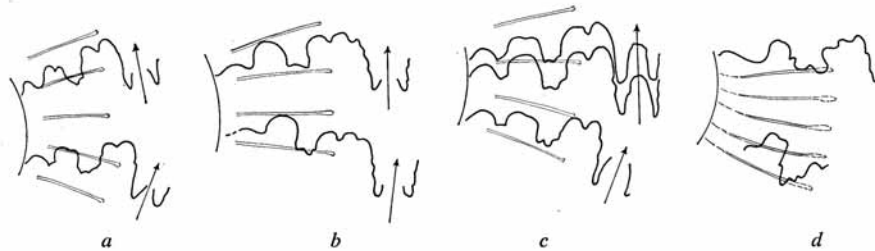
The body-chamber is about three-quarters of a whorl. Individuals retaining the body-chamber have the last two or three suture-lines approximated and are assumed to have been adult.

Examples of the external suture-line, which is the distinguishing feature of *Neomicroceras*, are shown in text-fig. 1. The external saddle is divided into two or three folioles. The other two saddles are normally broadly rounded but the larger sometimes shows incipient, and occasionally more distinct subdivision. This feature varies between successive suture-lines of the same individual (text-fig. 1a, c).

Family OXYNOTICERATIDAE Hyatt 1875
Genus PARACYMBITES Trueman and Williams 1927

Type species. Paracymbites obsoletus Trueman and Williams by original designation.

The holotype of the type species (GSM 51464) is from the Lower Lias of Stanton Fields cutting, about 10 miles north-east of Cheltenham, Gloucestershire (see Richardson, 1918, p. 17). The other fossils recorded from the cutting by Richardson indicate that the Oxynotum, Raricostatum, and Jamesoni Zones were exposed in the cutting, but there is no more precise information as to the horizon of the holotype.



TEXT-FIG. 1. External suture-lines of *Neomicroceras commune* gen. et sp. nov. from the Lower Lias, Raricostatum Zone, of the Witney (Apley Barn) Borehole, Oxfordshire (*a-c*) and from Ballintoy, Co. Antrim (*d*). *a*, Paratype, GSM 87553; *b*, Paratype, GSM 87554; *c*, Holotype, GSM 87550, last three suture-lines; *d*, Ulster Museum and Art Gallery, 674-1931. Arrows mark mid-ventral lines. All $\times 8$.

Diagnosis. Small involute ammonites rarely exceeding 15 mm. in diameter. The earliest whorls have a roughly semicircular section; on the last whorl the whorl-section becomes parallel-sided with arched venter. Each whorl almost completely covers the preceding one. The umbilicus is about one-quarter of the diameter, and may open out slightly with the last whorl. Ill-defined simple folds or ribs are present on the whorl-side of some individuals. A very faintly marked keel may be present on the earlier part of the last whorl. The aperture is plain with a blunt ventral rostrum. The body-chamber is probably about three-quarters of a whorl. The external suture-line consists of three saddles each of broadly arched form with slight indentations. *Paracymbites* differs from other Lower Jurassic ammonites of broadly similar aspect as follows: *Protocymbites* (Hettangian) is distinguished by its stronger and more regular ribbing; *Cymbites* (Sinemurian) by its much more excentric coiling, the adult whorl-height being about 35 per cent. of the diameter compared with 45 per cent. in *Paracymbites*; *Metacymbites* (Pliensbachian)

EXPLANATION OF PLATE 53

Figs. 1-4. *Neomicroceras commune* gen. et sp. nov., Lower Lias, Raricostatum Zone, of the Witney (Apley Barn) Borehole, Oxfordshire. 1, 2, Holotype, GSM 87550, $\times 4$; 3, Paratype, GSM 87555, $\times 6$; 4, GSM 87559, $\times 4$.

Figs. 5-12. *Paracymbites dennyi* (Simpson), Lower Lias, Raricostatum Zone. 5-7, GSM 51464, the holotype of *P. obsoletus* Trueman and Williams, Stanton Fields cutting, Glos., $\times 4$; 8, GSM 87552, Witney (Apley Barn) Borehole, Oxfordshire, $\times 4$; 9, 10, GSM Zd 3034, Folly Lane Brickpit, Cheltenham, Glos., $\times 4$; 11, 12, GSM Zd 3035, the holotype of *P. undulatus* Trueman and Williams, Folly Lane Brickpit, Cheltenham, Glos., $\times 4$.

by more excentric coiling, more depressed body-chamber, and suture-line with constricted bases to the saddles; and *Onychoceras* (Upper Toarcian) by more excentric coiling and stronger ornament, and more deeply incised suture-line.

Paracymbites dennyi (Simpson)

Plate 53, figs. 5–12, text-fig. 2

- Ammonites Dennyi* Simpson 1843, p. 9.
Ammonites Dennyi Simpson 1855, p. 38.
Phylloceras Loscombi, Sowerby (*pars*); Blake 1876, p. 296.
Ammonites Dennyi Simpson 1884, p. 66.
Oxynoticeras dennyi, Simpson sp.; Buckman 1909, pp. 7*b*, *c*, pl. 7, figs. 1, 1*a*, 2, 3.
Cymbites sp. Richardson 1918, p. 17, pl. 2, fig. 31.
Oxynoticeras dennyi (Simpson) Buckman; Spath 1925, p. 111.
Paracymbites obsoletus Trueman and Williams 1927, p. 247, pl. 27, fig. 8*a–c*.
Paracymbites undulatus Trueman and Williams 1927, p. 248.
Cymbites? dennyi (Simpson); Howarth 1962, p. 104.
non Cymbites cf. obsoletus (Trueman and Williams); Schindewolf 1961, p. 214, pl. 30, figs. 14–16, text-figs. 18, 19.

Types. Syntypes are four pyritized internal moulds in Whitby Museum on a tablet numbered 470. Three were figured for the first time by Buckman (1909). The fourth, a nucleus 4 mm. in diameter still attached to matrix, is probably conspecific with the others. It has not been figured. Buckman wrote '1 and 2 agree with SIMPSON'S measurement; but fig. 1 seems to agree best with his description: therefore it is presumably the holotype'. The present writer disagrees; for example, Simpson wrote '[height of the] outer whorl about $\frac{1}{2}$ the diameter', a statement which applies to Buckman's fig. 2 but not to his fig. 1. Howarth (1962) accepts the original of Buckman's fig. 1 as holotype or lectotype, and the present writer prefers to regard it as lectotype designated by Buckman.

The holotype of *Paracymbites obsoletus* Trueman and Williams (1927), is in the Geological Survey Museum, no. 51464. It is refigured in the present paper, Plate 53, figs. 5–7. The holotype of *Paracymbites undulatus* Trueman and Williams is GSM Zd 3035. It has not been previously figured and is now shown in Plate 53, figs. 11, 12.

Other material. The species appears to be fairly common in the Lower Lias clays of Gloucestershire and Worcestershire and examples from various localities are preserved in the British Museum (Natural History) (nos. C6111*a*, C16666–9, C67060, and C67061) and in the Geological Survey Museum (nos. 24629, Zd 2954 (figured by Richardson, 1918, pl. 2, fig. 31), Zd 3034, Zd 3048, Zd 3072–4. The Witney (Apley Barn) Borehole yielded GSM 87552. The species does not appear to have been found on the Dorset coast.

Geological age. The horizon of *Paracymbites dennyi* in Yorkshire, as recorded by Simpson, would fall within the lower part of the Raricostatum Zone; Mr. L. Bairstow kindly informs me that he has not re-found the species during his work at Robin Hood's Bay. The Gloucestershire and Worcestershire specimens are not usually well dated, being finds from clay banks and spoil heaps. The Witney (Apley Barn) Borehole specimen comes from the Raricostatum Zone.

Description. The shell form has been described in the generic diagnosis. The coiling of the last whorl is excentric and variable; in some individuals, including the lectotype, the umbilicus opens out suddenly at the beginning of the last half-whorl, but in others, such as Buckman's fig. 2, this opening out is more gradual. The lectotype represents one extreme of variation in this character. The adult umbilicus varies between about 23 and 28 per cent. of the diameter (25 per cent. in the lectotype), and the whorl height just

behind the adult aperture is around 45 per cent. of the diameter. The shell may be almost smooth but is usually plicate, the folds—they are hardly ribs—having a slightly sigmoidal course following that of the growth-lines, and dying out half to two-thirds of the way from the umbilical suture to the mid-ventral line. The number of these folds varies



TEXT-FIG. 2. External suture-lines of *Paracymbites dennyi* (Simpson) from the Lower Lias, Raricostatum Zone, from the north end of the Hunting Butts tunnel, Cheltenham, Glos. (a), Folly Lane brick pit, Cheltenham (b, c), and the Witney (Apley Barn) Borehole, Oxfordshire (d). a, GSM Zd 3048; b, GSM Zd 3035, the holotype of *P. undulatus* Trueman and Williams; c, GSM Zd 3034; d, GSM 87552. Arrows mark mid-ventral lines. Straight lines are guide lines. All $\times 8$.

widely, from a few irregularly developed ones to over twenty to the whorl. The venter is obtusely angular for the first half of the last whorl but usually becomes rounded on the second half. On account of the frequency of specimens complete with body chamber about 15 mm. in diameter, the change in coiling which precedes the attainment of this size, and the absence of any larger specimens, a size of about 15 mm. was probably adult. Suture-lines are often irregularly spaced so that it is difficult to judge whether or not they are approximated before the body-chamber. The external suture-line (text-fig. 2) has three saddles on each side of the venter. The external one is roughly parallel-sided, and moderately indented; this character varies among individuals, and sometimes between the two sides of the same individual (text-fig. 2a). The other two saddles vary from being smooth (text-fig. 2d) to slightly indented (text-fig. 2b, c). The suture-line ascends towards the umbilical suture so that the lateral lobes lie well above the guide-line.

Synonymy. The holotype of *P. obsoletus* is wholly septate and only 8 mm. in diameter. The shell-form, ornament, and suture-line are sufficiently close to *P. dennyi* for *P. obsoletus* to be regarded as synonymous with Simpson's prior species. The other species placed in the genus by Trueman and Williams in 1927, *P. undulatus*, was not illustrated by them at the time. The holotype is now figured (pl. 53, figs. 11, 12) and is regarded as inseparable specifically from *P. dennyi*. Trueman and Williams did not say what they considered to be the differences between their two species.

Relationships and systematic position. The present writer is impressed by the similarity between *Paracymbites* and *Cheltonia*, an oxynoticeratid genus of the late Oxynotum Zone. *Cheltonia* is small (usually 25 mm. or less) and its affinities are beyond doubt, for it is almost indistinguishable from the inner whorls of *Oxynoticeras* except for slightly excentric coiling and a modified body chamber. *Cheltonia* has in common with *Paracymbites*: change of whorl-section with growth, ornament on whorl side, aperture, and angular venter giving place to rounded on the last half-whorl. The main differences lie

in the greater whorl thickness of *Paracymbites*, and the absence of the corrugated venter which precedes the aperture in *Cheltonia*. On account of this close resemblance *Paracymbites* is placed in the family Oxynoticeratidae.

The similar genus *Cymbites* has been the subject of an exhaustive study by Schindewolf (1961), who regards *Paracymbites* as a synonym of *Cymbites*. The present writer disagrees with this view. In fairness it should be noted that *Paracymbites* is almost impossible to interpret from Trueman and Williams's original figures, and that the body-chamber, which provides the clearest difference from *Cymbites*, was not figured by them. Schindewolf figured three ammonites (1961, pl. 30, figs. 14, 15, 16*a, b*) as *Cymbites* cf. *obsoletus* (Trueman and Williams), but the present writer believes that they are not related to that species. The reasons for this are the coiling, which closely resembles that of *Cymbites* proper, and the ornament which passes undiminished in strength across the whorl-side on to the venter, a character of *Cymbites* (cf. Schindewolf's other figures of the genus) but not of *Paracymbites*.

Trueman and Williams did not place *Paracymbites* in a family, but suggested that it might be 'a dwarfed member of the Deroceratidae' [*recte* Eoderoceratidae] (1927, p. 248). In the Treatise (Arkell, 1957, p. L240) it was placed, as a subgenus of *Cymbites*, in the subfamily Cymbitinae Buckman 1919 of the family Arietitidae. Schindewolf (1961, p. 229) recognized a separate family Cymbitidae, *Paracymbites* being regarded as a synonym of *Cymbites*. I have remarked above that I disagree with Schindewolf on this point, and believe that his relegation of *Paracymbites* to the synonymy resulted from misidentification with that genus of German fossils which really belong to *Cymbites*. The present revision has shown that the closest similarities of *Paracymbites* are with *Cheltonia* and it is accordingly placed in the family Oxynoticeratidae and regarded as a homeomorph of *Cymbites*. I support Schindewolf in regarding the Cymbitidae as an independent lineage having its origin early in the Lower Lias; my earlier view (1957, p. 416) that *Cymbites* was evolved from *Euagassiceras* is not supported by evidence from recent boreholes.

Acknowledgements. I wish to thank Dr. H. Ivimey-Cook of the Palaeontological Department, Geological Survey, for help in various ways. Dr. M. K. Howarth looked out material for me at the British Museum (Natural History). The photographs are by Messrs M. Holliday and B. Nettleton. The paper is published by permission of the Director of the Geological Survey of Great Britain.

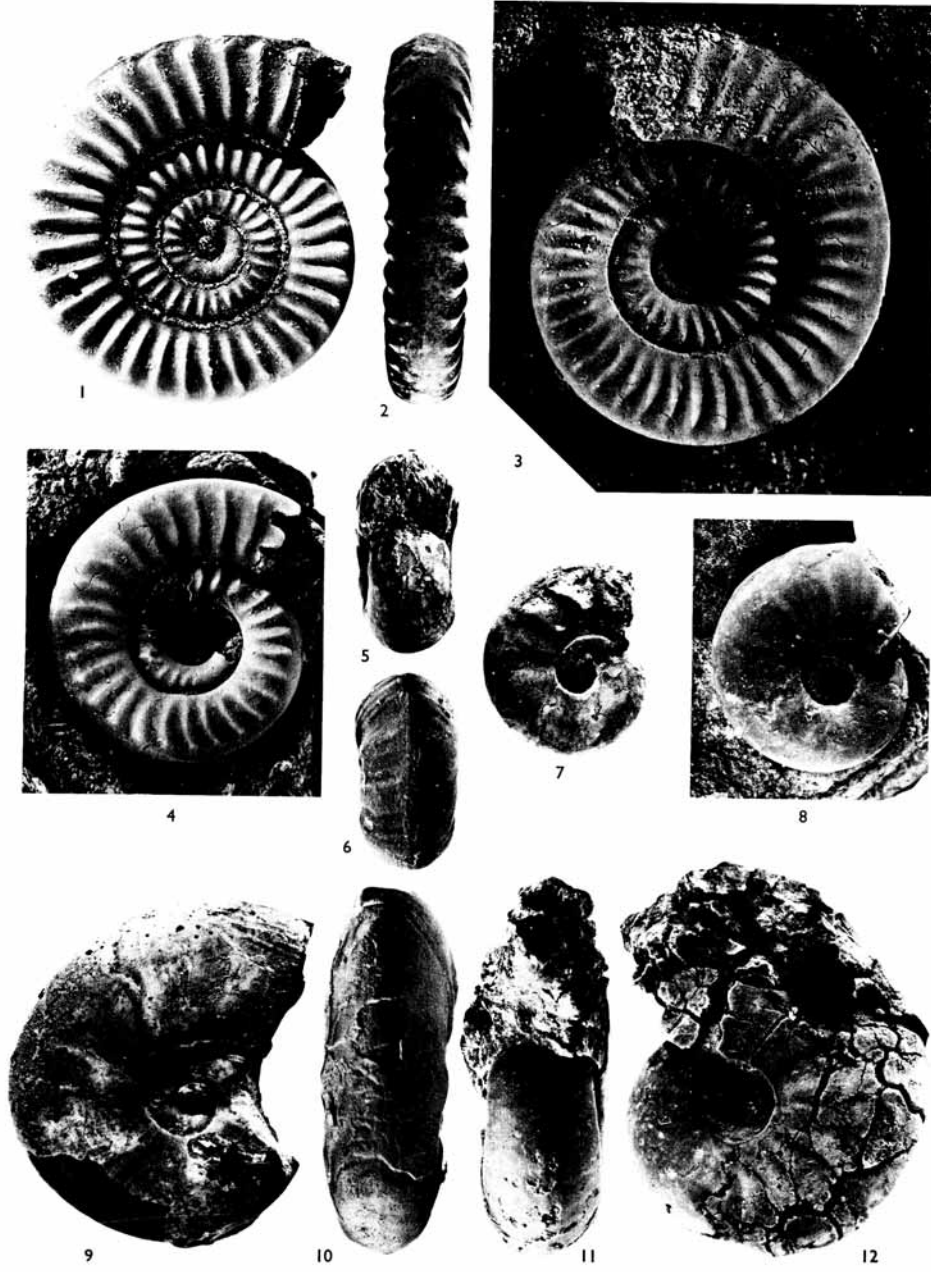
REFERENCES

- ARKELL, W. J. 1957. In R. C. Moore (ed.), *Treatise on Invertebrate Paleontology*, Part L: Mollusca 4. Cephalopoda: Ammonoidea. New York: Geol. Soc. Amer.
- BLAKE, J. F. 1876. Cephalopoda. TATE, R. and BLAKE, J. F. *The Yorkshire Lias*. London, 261–330.
- BUCKMAN, S. S. 1909. *Yorkshire type ammonites*, 1, (1). London.
- DEAN, W. T., DONOVAN, D. T., and HOWARTH, M. K. 1961. The Liassic ammonite zones and subzones of the north-west European province. *Bull. Brit. Mus. (Nat. Hist.) (Geol.)*, 4 (10), 435–505, pls. 63–75.
- DONOVAN, D. T. 1957. Notes on the species *Cymbites laevigatus* (J. de C. Sowerby) and on the genus *Cymbites* Neumayr. *Geol. Mag.* 94, 413–20.
- HOWARTH, M. K. 1962. The Yorkshire type ammonites and nautiloids of Young and Bird, Phillips, and Martin Simpson. *Palaeontology*, 5, 93–136, pls. 13–19.
- RICHARDSON, L. 1918. The geology (Lias and superficial deposits) of the Cheltenham–Stratford-on-Avon Railway (G.W.R.). *Trans. Woolhope Nat. Fld. Cl.*, vol. for 1914–17, 137–57, pls. 1–3.

- SCHINDEWOLF, O. H. 1961. Die Ammoniten-Gattung *Cymbites* im Deutschen Lias. *Palaeontographica*, **117**, Abt. A, 193–232, pls. 29–31.
- 1962. Studien zur Stammesgeschichte der Ammoniten. Lieferung II. *Abh. Akad. Wiss. Lit. Mainz* (Math.-naturw. Kl.) Jhrg. 1962, nr. 8, pp. 111–257.
- SIMPSON, M. 1843. *A monograph of the ammonites of the Yorkshire Lias*. London.
- 1855. *The fossils of the Yorkshire Lias; described from nature*. London and Whitby.
- 1884. *The fossils of the Yorkshire Lias; described from nature*. 2nd ed. London and Whitby.
- SPATH, L. F. 1925. Notes on Yorkshire ammonites. I.—On the genus *Oxynoticeras* Hyatt. *Naturalist, Lond.* April 1925 (no. 819), 107–12.
- TRUEMAN, A. E. and WILLIAMS, D. M. 1927. Notes on some Lias ammonites from the Cheltenham district. *Proc. Cotteswold Nat. Fld. Cl.* **22** (3), 239–53, pls. 27, 28.

D. T. DONOVAN
Department of Geology,
The University,
Hull.

Manuscript received 5 March 1965



DONOVAN, Lias ammonites