

AN OCCURRENCE OF THE
TETHYAN AMMONITE *MENEGHINICERAS*
IN THE UPPER LIAS OF THE YORKSHIRE
COAST

by M. K. HOWARTH

ABSTRACT. A single specimen of *Meneghiniceras lariense* (Meneghini) found in the *Semicelatum* Subzone, *Tenuicostatum* Zone, of the Upper Lias of the north Yorkshire coast, is the only example of the genus found north of the Alps or outside the Tethyan area, and is stratigraphically the youngest occurrence of the genus.

IN 1974 Professor Dr. Ulrich Lehmann of the Geological-Palaeontological Institute of Hamburg University found a specimen of *Meneghiniceras lariense* (Meneghini) in bed 31 of the outcrop of the Grey Shales on the foreshore at Hawsker Bottoms, near Whitby, Yorkshire (grid ref. NZ 948078). This bed is at about the middle of the *Semicelatum* Subzone, the top subzone of the *Tenuicostatum* Zone of the Upper Lias (Howarth 1973, pp. 240-244). Professor Lehmann most kindly presented the ammonite to the collections of the British Museum (Natural History) (reg. no. C. 79625), and has entrusted its description to me. It is worthy of description because *Meneghiniceras* is a typical 'Tethyan ammonite' and this is the first discovery of a specimen outside Tethys. The discovery is also remarkable because of the intensive collecting done in the coastal exposures of the Yorkshire Lias by myself and many others, yet no example of *Meneghiniceras*, nor any other Tethyan ammonite, has ever been found (or recognized) before. Chance discoveries of single specimens like this at large distances from their normal provinces, demonstrate either the wide dispersal of ammonites that can occur after death, or the wide movements made by isolated individuals during life, or the incompleteness of the fossil record where only a very small proportion of a population became preserved as fossils. There is no evidence in this case as to which of these possibilities is the most probable.

Family JURAPHYLLITIDAE Arkell, 1950
Genus MENEGHINICERAS Hyatt, 1900

Type species. Ammonites (Phylloceras) lariensis Meneghini, 1874, by original designation.

Meneghiniceras lariense (Meneghini)

- 1874 *Ammonites (Phylloceras) lariensis* Meneghini, p. 80, pl. 17, figs. 1, 2.
1895 *Rhacophyllites lariensis* (Meneghini) var. *dorsinodosus* Bonarelli, p. 335 (for Meneghini 1875, pl. 17, fig. 1 only).
1895 *Rhacophyllites lariensis* (Meneghini) var. *bicolorae* Bonarelli, p. 355 (for Meneghini 1875, pl. 17, fig. 3).
1900 *Rhacophyllites lariensis* (Meneghini) var. *costicillata* Fucini, p. 154, pl. 20, fig. 3.
1969 *Meneghiniceras lariense* (Meneghini); Pinna, p. 17, pl. 6, fig. 2 (neotype figured).

- 1969 *Meneghinceras dorsinodosum* (Bonarelli); Pinna, p. 17, pl. 13, fig. 3 (neotype for *dorsinodosum* figured).
 1974 *Meneghinceras lariense* (Meneghini); Fantini Sestini, pp. 217-219, pl. 19, figs. 1, 2 (see for full synonymy).

Type. Of the two syntypes figured by Meneghini (1875, pl. 17, figs. 1, 2), one (fig. 1) was used as the type of var. *dorsinodosum* by Bonarelli (1895, p. 335), and the other (fig. 2) was designated lectotype of the species by Fucini (1901, p. 75). This lectotype was destroyed in 1943 (Pinna 1969, p. 8) and a neotype was designated and figured by Pinna (1969, p. 17, pl. 6, fig. 2) as a replacement.

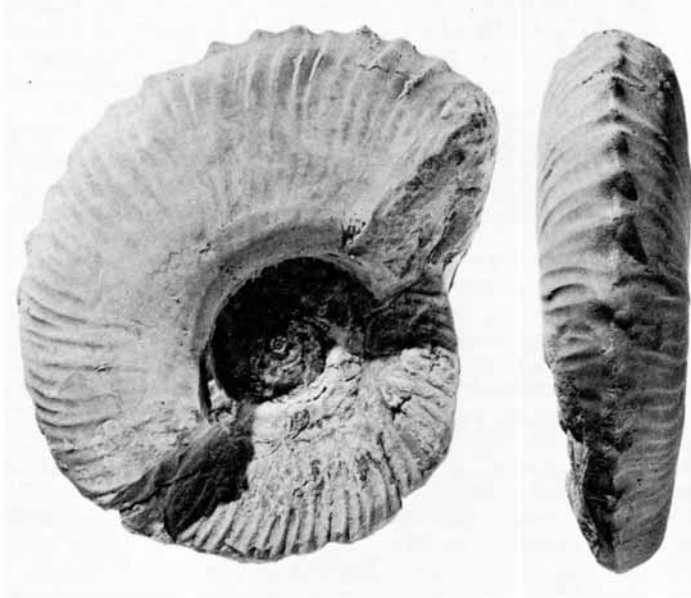
Description. The specimen consists of solid pyritized inner whorls, followed by crushed whorls for the remainder of the phragmocone, then a solid, mainly uncrushed body chamber. The innermost whorls (text-fig. 1) are preserved as a solid internal



TEXT-FIG. 1. Innermost whorls of text-fig. 2, enlarged $\times 7.5$, showing evolute whorls and two constrictions.

cast of iron pyrites on the exposed side only, the preserved part not quite reaching the middle of the venter. Some of the septa are preserved and the outline of the protoconch is just visible. The diameter at the mouth of the protoconch is approximately 0.23 mm, and this is followed by $3\frac{1}{8}$ whorls ending at 3.2 mm diameter at the end of the solidly preserved part. The first three whorls are almost completely evolute, with a whorl breadth that appears to exceed the whorl height throughout (i.e. a depressed whorl cross-section), and they have no ornament, except for three oblique constrictions on the last whorl. The suture-lines are at an early stage of development and show three saddles on the side of the whorl, but neither the mid-ventral nor the mid-dorsal parts are clearly seen. These solid inner $3\frac{1}{8}$ whorls are followed by crushed whorls up to $6\frac{5}{8}$ whorls from the protoconch. Whorls from $3\frac{1}{8}$ to $6\frac{1}{4}$ are very poorly preserved, with no ornament or constrictions visible and only small parts of the suture-lines can be seen, some of which have phylloid saddle endings. The whorl from $6\frac{1}{4}$ to $6\frac{5}{8}$ is the smaller half of the outer whorl, and here ornament can be seen to consist of slightly prorsiradiate ribs on the outer half of the side of the whorl, that curve forwards on approaching the venter. The inner half of the whorl side appears to be smooth, but traces of two constrictions cross the whorl. The shape of the middle of the venter is not clearly seen due to crushing, but it appears to be bluntly angled without a differentiated keel and without mid-ventral tubercles. On this and at least the previous whole whorl, the whorls have become much more involute.

The last half whorl is body chamber (text-fig. 2) and the present aperture is probably at or very close to the mouth border. The body chamber is about half involute, with nearly flat whorl sides, an arched venter, a bluntly angled umbilical edge, and a narrow sloping umbilical wall. The smooth inner whorl side and the prorsiradiate ribs on the outer part of the whorl side are now more clearly seen; the venter is bluntly angled at the beginning, then mid-ventral clavate tubercles quickly develop on the final quarter whorl. The ribs are joined in twos or threes to the tubercles and some of them



TEXT-FIG. 2. *Meneghiniceras lariense* (Meneghini), bed 31, Grey Shales, *Semicelatum* Subzone, *Tenuicostatum* Zone, Hawsker Bottoms (NZ 948078), Whitby, Yorkshire. BM C. 79625. Natural size.

bend suddenly backwards just before reaching the tubercles. There are ten ventral tubercles and twenty-three ribs on a length of exactly one-quarter whorl ending two tubercles before the aperture. The last two tubercles appear to be diminishing in size and the venter and umbilical border become excentric, resulting in a slight decrease in whorl height at the aperture, suggesting that it is at or very close to the adult mouth border. If so, the complete ammonite has $7\frac{1}{8}$ whorls from the protoconch, and has an adult body chamber of slightly less than half a whorl in length. Parts of the last suture-line occur on the beginning of the uncrushed final half whorl and triple phylloid endings can be seen to the 1st and 2nd lateral and the two auxiliary saddles outside the umbilical seam. The diameter at the aperture is 93 mm, and the diameter at the final suture-line is 71 mm. Approximate whorl dimensions shortly before the aperture are: diameter 87.0 mm, whorl height 36.7 mm (0.42 of the diameter), whorl breadth 24.7 mm (0.28), width of umbilicus 25.5 mm (0.29).

Remarks. *Meneghiniceras* is a monospecific genus of the family Juraphyllitidae, characterized by an obtusely angled venter on the outer one or two whorls of the phragmocone, and by a row of mid-ventral tubercles on the adult body chamber.

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The most closely related genus is *Harpophylloceras*, which differs in having an obtuse ventral keel up to the end of the adult body chamber. Both genera, like other members of the Juraphyllitidae, have larger umbilici (usually 15–30% of the diameter) than contemporaneous members of the family Phylloceratidae. The full synonymy of the species *M. lariense* (Meneghini) was given by Fantini Sestini (1974, p. 217), and her complete list of figured specimens is not repeated here. Instead, only those references concerned with the taxonomic names and their type specimens are included in the synonymy above, and it will be seen that three varietal names have been proposed. They are for three Italian specimens that have more numerous rounded ventral tubercles (var. *dorsinodosus*) or more ribs (var. *bicolorae*) than the typical form, or (var. *costicillata*) are possibly transitional to *H. eximium*. I agree with Fantini Sestini (1974, p. 219) that these differences are not more than individual variation between specimens, reflecting the type of preservation and the presence or absence of shell in some cases, and there is no need to raise any of them to specific rank, as was done by Pinna (1969, p. 17, pl. 3, fig. 13) for *dorsinodosum*. In fact the considerable number of Italian specimens that have been figured show that the density of the ribbing varies between fine and moderately coarse, and the ventral tubercles are variously small or moderate in size and may be rounded or clavate.

The Yorkshire specimen has slightly less than half a whorl of adult body chamber, and it seems probable that this is the full extent of the adult body chamber in this species. The ventral tubercles appear to be a feature of the adult body chamber only, and the size range of complete adults is about 50–105 mm. The largest known specimen is from Taormina, Sicily, and was figured by Fucini (1923, p. 104, pl. 7, fig. 4); it is 105 mm diameter at the mouth border and has very long pointed mid-ventral tubercles, whose length probably shows the shape of the outer surface of the shell. The Yorkshire specimen is 93 mm diameter and is one of the larger specimens in the size range; its body chamber is an internal mould and its smaller rounded tubercles show the form of the inside surface of the shell. Rounded tubercles and the fairly widely spaced ribs is a combination of characters that cuts across the 'varieties' discussed above, and is further evidence that they are no more than differences between individuals.

The earliest whorls are seen well in the Yorkshire specimen and they have not been described before in *Meneghiniceras*. The first three whorls after the protoconch are depressed and almost completely evolute, then rapidly become more involute on the fourth and fifth whorls, while constrictions appear on the third whorl. In these characters they are generally similar to the early whorls of *Tragophylloceras* (another genus of the Juraphyllitidae) described by Spath (1914). The suture-lines have triple phylloid endings and agree with other Juraphyllitidae.

Other British Juraphyllitidae have been described by Howarth and Donovan (1964) and this Yorkshire *Meneghiniceras* is a new record for Britain, or for any part of Europe north of the Alps. The known geographical distribution of *Meneghiniceras* is Italy and Sicily (the main area with probably more than 100 specimens known), Switzerland, Austria, Czechoslovakia, Hungary, and southern Spain (Andalusia), the records from which can be found in Fantini Sestini's (1974) description. A hitherto unrecorded occurrence is in the Middle Lias (i.e. Domerian) of Algeria, represented by specimen C. 52918 (British Museum (Nat. Hist.) collection) from between Tola

Guiolet and Lac Goulmine in the Djurdjura mountain range. This specimen is a half whorl fragment, half phragmocone, half adult body chamber, of about 68 mm maximum diameter, and agrees in all respects with the Italian fauna. All these specimens come from the *Margaritatus* and *Spinatum* Zones, i.e. the Domerian, though the stratigraphy in Italy is not always so accurate, and some examples may be from the *Tenuicostatum* Zone at the base of the Toarcian. In Hungary, Géczy's (1972, pp. 55–58) records show that specimens first appear in the *Davoei* Zone at the top of the Carixian (Lower Pliensbachian). The Yorkshire specimen is from the *Semicelatum* Subzone, the top subzone of the *Tenuicostatum* Zone, and is the youngest occurrence of *Meneghiniceras* recorded so far.

REFERENCES

- ARKELL, W. J. 1950. A classification of Jurassic ammonites. *J. Paleont.* **24**, 354–364.
- BONARELLI, G. 1895. Fossili domeriani della Brianza. *Rc. Ist. lomb. Sci. Lett.* (2) **28**, 326–341.
- FANTINI SESTINI, N. 1974. Phylloceratina (Ammonoidea) del Pliensbachiano italiano. *Riv. ital. Paleont. Stratigr.* **80**, 193–250, pls. 19, 20.
- FUCINI, A. 1900. Ammoniti del Lias medio dell'Appennino centrale. *Palaeontogr. ital.* **5**, 145–185, pls. 19–24.
- 1901. Cefalopodi liassici del Monte di Cetona. *Ibid.* **7**, 1–89, pls. 1–14.
- 1923. Fossili domeriani dei dintorni di Taormina. *Ibid.* **26**, 75–116, pls. 5–8.
- GÉCZY, B. 1972. Ammonite faunae from the Lower Jurassic standard profile at Lókút, Bakony Mountains, Hungary. *Annls Univ. Scient. bpest Rolando Eötvös, Geol.* **15**, 47–77, pls. 1–7.
- HOWARTH, M. K. 1973. The stratigraphy and ammonite fauna of the Upper Liassic Grey Shales of the Yorkshire coast. *Bull. Br. Mus. nat. Hist. (Geol.)*, **24**, 235–277, pls. 1–9.
- and DONOVAN, D. T. 1964. Ammonites of the Liassic family Juraphyllitidae in Britain. *Palaeontology*, **7**, 286–305, pls. 48, 49.
- HYATT, A. 1900. *Cephalopoda*. In ZITTEL, K. A. *Textbook of Palaeontology*. 1st English edition, transl. and ed. EASTMAN, C. R., pp. 502–592.
- MENEGHINI, G. 1867–1881. *Monographie des fossiles du calcaire rouge ammonitique (Lias supérieur) de Lombardie et de l'Apennin central*. Milan. Pp. 1–24, pls. 1–6 (1867); pp. 25–48, pls. 7–11, append. pl. 1 (1870); pp. 49–80, pls. 12–16, append. pl. 2 (1874); pp. 81–104, pls. 17–20, append. pp. 1–16, pls. 3, 4 (1875); pp. 105–112, pls. 21, 22, append. pp. 17–40, pls. 5, 6 (1876); pp. 113–128, pls. 23–25 (1878); pp. 129–242, pls. 26–31, append. pp. 41–56, pl. 7 (1881).
- PINNA, G. 1969. Revisione delle ammoniti figurate da Giuseppe Meneghini nelle Tav. 1–22 della 'Monographie des fossiles du calcaire rouge ammonitique' (1867–1881). *Memorie Soc. ital. Sci. nat.* **18**, 1–21, pls. 1–6.
- SPATH, L. G. 1914. The development of *Tragophylloceras loscombi* (J. Sowerby). *Q. Jl geol. Soc. Lond.* **70**, 336–362, pls. 48–50.

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