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E. SCHWEIZERBART'SCHE VERLAGSBUCHHANDLUNG
(NÄGELE u. OBERMILLER)
On the existence of heteromorph ammonoids in the Lias

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With 1 Figure in Text

Abstract: Consequent on a re-examination of the type and only specimen of Arcuceras marthae Potonie, it is concluded that this fossil is not an ammonoid. There is, therefore, no reason to suppose that heteromorph ammonoids existed in Liassic times. The derivation of the heteromorph family Spiroceratidae from Parkinsoniidae is accepted, and consequent changes in classification are discussed.

Introduction

In the recently-published section 'Mollusca 4: Cephalopoda, Ammonoida' of the Treatise on Invertebrate Paleontology (1957) the existence of a family of heteromorph or 'uncoiled' ammonites in the Lias (Pliensbachian) is accepted without question, and its existence affects the derivation postulated for the well-known Middle Jurassic heteromorphs. This family, the Arcucerasidae, is founded on a single
specimen, and in view of the phylogenetic role which has been attached to the family in the Treatise it seemed to us desirable that the specimen should be investigated.

F. A. QUENSTEDT figured an indifferently preserved fossil, which he took to be a heteromorph ammonoid (‘Hamites’), in 1886 (p. 590, pl. 70, fig. 45). It was stated to be from the Lias δ of the Breitenbach near Reutlingen, Swabia. QUENSTEDT pointed out in the text that he only had this single, imperfect fragment (... der einzige undeutliche Bogen ...), the significance of which could only be assessed when more material had been found. In 1929 POTONIE proposed a new genus and species for this specimen, _Arcuceras marthae_ POTONIE (1929, p. 226), but did not describe any additional material. To the best of our knowledge, no further discoveries of Liassic heteromorphs have been reported since. In a review of Jurassic ammonoid classification ARKELL set up a new family, Arcuceratidae, to accommodate the genus (1950, p. 359), placing it in a new superfamily Spirocerataceae which included also the family Spiroceratidae HYATT 1900.

**Description of the type of _Arcuceras marthae_**

We have examined the original of QUENSTEDT’s plate 70, figure 45¹, and have reached the conclusion that it is not an ammonoid. It is a curved; tapering structure, compressed in the plane of the bedding surface on which it lies. The apical part of the specimen shows no features at all. Under a low-power binocular microscope the remainder can be clearly seen to consist of segments about 1 mm long. In several places the segments are seen to be separated by thin calcareous partitions, whose edges, the ‘septal sutures’, are straight. There are remains of a calcareous external wall, largely removed by weathering. A transverse section has been cut near the larger end but shows no special features.

It is clear from the above description that the fossil is not an ammonoid. Its true nature is uncertain, but it appears not to be a cephalopod of any kind. Conceivably it is part of the stem or arm of a crinoid.

**The origin of the Spiroceratidae**

ARKELL in the Treatise stated (1957, p. 206) that ‘The presence of _Arcuceras_ in the Lias makes it unlikely that Spiroceratidae are derived from Parkinsoniidae, despite strong resemblance to _Streconoceras_. The hypothesis adopted here is that Spirocerataceae are derivatives of Lytoceratina, perhaps of Ectocentritidae, analogous with the many Cretaceous uncoiled forms generally agreed (since HYATT, 1900) to have arisen from Lytoceratina.’

¹ Preserved in the Geol.-Paläont. Institut und Museum der Universität Tübingen; Typenkatalog Ce 5/70/45.
Schindewolf (1953, p. 123) has already refused, on account of the suture-line, to place Strenoceras and Spiroceras in the Lytoceratina. This author also rejected the derivation of both these genera from the Parkinsoniidae, for the reason that Strenoceras shows “orthochron” disposition of the umbilical lobes (U₁ appears first), whereas Parkinsonia shows “heterochron” disposition (U₁ later than U₁₁). Since, however, Westermann (1956, pp. 246, 270, 273) has shown that orthochron genera can occur in groups of ammonites most of which are heterochron, this objection does not hold, and the close relationship between Strenoceras and Parkinsonids may be admitted.

Since Arcuceratidae are non-existent as an ammonoid family, Arkell’s objection to the obvious derivation of the Spiroceraatidae, from Strenoceras, now appears to be definitively removed. The exact correspondence between the ornament of Strenoceras and Spiroceras, coupled with the fact that both are of the same age (Upper Bajocian) would seem to render their close relationship beyond doubt. The peculiar form of the Spiroceras suture-line (Schindewolf, 1951, p. 30; U₁ the largest lobe on the whorl-side) has been declared by Westermann to be a consequence of the heteromorph shell-form. We believe, also, therefore, that either Spiroceraatidae were derived from Strenoceras, or that they have an immediate ancestor in common.

Classification

Consequent on the conclusion reached in the last section, the Spiroceraatidae must be transferred from the Suborder Lytoceratina, in which they are placed in the Treatise, to the Suborder Ammonitina. It is doubtful whether, in view of the close similarity (except in shell-form) to certain Parkinsoniidae, the separate Superfamily Spirocerataceae needs to be maintained; if not, it becomes a junior synonym of Perisphinctaceae Steinmann, 1890, of which Spiroceraatidae becomes a family.

„Arcuceras marthae Potonié“, Orig. of Quenstedt, 1886, pl. 70, fig. 45. × 2.
References to Literature


Kies-Tillite, ein pleistozänes Festgestein
glazialer Entstehung

Von A. Schüller, Berlin

Mit 3 Abbildungen im Text