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CARLO NANNARONE <sup>(1)</sup>, MASSIMILIANO BILOTTA <sup>(2)</sup>

## THE RARE AMMONITE *KONDILOCERAS MANCIATII* FUCINI, 1901 FROM THE SINEMURIAN BEDS OF MONTE CETONA (SIENA, TUSCANY, ITALY)

**Abstract** - C. NANNARONE, M. BILOTTA, *The rare ammonite Kondiloceras manciatii Fucini, 1901 from the Sinemurian beds of Monte Cetona (Siena, Tuscany, Italy).*

The discovery of a specimen referable to *Kondiloceras manciatii* is reported. After its creation by Fucini in 1901, this species of a monotypic genus has been subject to contrasting interpretations both in terms of systematic and stratigraphic position. From this latter point of view, the new specimen was found together with *Asteroceras*, which allows to date it unequivocally to a Late Sinemurian (Early Jurassic) age, and more in particular to the Obtusum Zone.

**Key words** - Ammonites, Early Jurassic, Monte Cetona, Siena, Tuscany, Italy

**Riassunto** - C. NANNARONE, M. BILOTTA, *Il raro ammonite Kondiloceras manciatii Fucini, 1901 negli strati sinemuriani del Monte Cetona (Siena, Toscana, Italia).*

Viene riportato il ritrovamento di un esemplare ascrivibile a *Kondiloceras manciatii*, specie di un genere monotipico istituito da Fucini nel 1901, che dopo la sua creazione è stato oggetto di interpretazioni contrastanti sia come collocazione sistematica che posizione stratigrafica. Da quest'ultimo punto di vista, il nuovo esemplare è stato trovato insieme ad *Asteroceras*, e ciò permette di attribuirlo in modo inequivocabile al Sinemuriano superiore (Giurassico inferiore), e più in particolare alla Zona a Obtusum.

**Parole chiave** - Ammoniti, Giurassico inferiore, Monte Cetona, Siena, Toscana, Italia

### INTRODUCTION

In the first part of his extensive monograph on the ammonite faunas of Monte Cetona, Fucini (1901) described the new genus *Kondiloceras* and its only species *K. manciatii*. Originally based on a single specimen lacking precise stratigraphic reference, so far this taxon has been found only once after its creation (Fucini, 1906). The few mentions to *Kondiloceras* in the subsequent literature denote diverging opinions regarding its systematic position and above all its possible age. Fucini (1901, pp. 14-15), albeit with some doubts, dated the sample to the Sinemurian, recognizing its provenance from the same Rosso Ammonitico in which he already described many Oxynoticeratidae. The

material collected a few years later in Gerfalco (another Tuscan locality, about 80 kilometers north-west of Monte Cetona), allowed the same author to confirm what he had previously only hypothesized (Fucini, 1906, pp. 633-634).

However, most of the later publications ignore this conclusion, so much so that Arkell *et al.* (1957, p. L249) reports a “?Upper Pliensbachian” age for *Kondiloceras*. This idea was perhaps advanced to support the collocation of the genus in the Polymorphitidae and, although it is not incompatible with the overall stratigraphic range of the faunas of Monte Cetona described by Fucini (1901), it seems in any case quite arbitrary.

Subsequently, the form at issue is mentioned, or at most briefly discussed, in just under ten publications (Géczy, 1972; Donovan & Forsey, 1973; Schlatter, 1980; Wiedenmayer, 1980; Dommergues, 1987; Wright *et al.*, 1996; Pal *et al.*, 2006; Venturi & Bilotta, 2010). Among them, Donovan & Forsey (1973, p. 15) deal with the taxonomic position: based on the aspect of the earlier part of the last whorl they consider it more probable an affinity with the Oxynoticeratidae rather than with the Polymorphitidae. As for the stratigraphic position, they limit themselves to state that the holotype comes from an “uncertain horizon, said to be Sinemurian”. Doubts on the family-level assignment are also expressed by Dommergues (1987, p. 113). On the other hand, Wiedenmayer (1980, p. 178) has no objections in placing *Kondiloceras* among the Polymorphitidae, and indeed refers to it a single specimen of the German form named by Quenstedt (1884, plate 27, fig. 8) as *Ammonites nodoblongus*; the genus is therefore dated to the Early Pliensbachian (Jamesoni Zone, Taylora Subzone). Schlatter (1980) recognizes that this individual differs from the remaining *A. nodoblongus* samples (which he uses to establish his new species *Platypleuroceras enzenharti*), but observes its bad preservation state, therefore deeming its identification with the Tuscan genus as not confirmable.

Despite all evidence, Wright *et al.* (1996, p. 187) consider the holotype of Fucini (1901) as a poorly preserved

<sup>(1)</sup> via del Palazzone 3, 52044 Cortona (AR); carlo.nannarone@gmail.com

<sup>(2)</sup> via San Severino 21, 06038 Spello (PG); massimiliano.bilotta@gmail.com

Corresponding author: Massimiliano Bilotta (massimiliano.bilotta@gmail.com)

specimen of the Late Cretaceous taxon *Barroisiceras*, therefore relegating *Kondiloceras* among the *nomina dubia*. This interpretation is difficult to accept because all the material figured by Fucini (1901) undoubtedly is Early Jurassic in age, as confirmed by Dommergues *et al.* (1994), and also because no Late Cretaceous sedimentary unit crops out on Monte Cetona (Passerini, 1964; Carmignani & Lazzarotto, 2004; Conti *et al.*, 2020). Nevertheless, acritically following such a questionable opinion, Howarth (2013) deletes the genus from the Jurassic ammonoids listed in the most recent edition of the "Treatise on Invertebrate Paleontology". On the contrary, Venturi & Bilotta (2010, p. 239) recognize full validity to *Kondiloceras*, considering it datable to the Sinemurian, and suggest a possible close relationship with the Sinemurian-Pliesbachian form *Phricodoceras*.

The aim of the present note is to provide new data in order to clarify the taxonomic validity and most of all the age of this rare and hitherto widely misunderstood ammonoid, thanks to a discovery made at Monte Cetona, area of provenance of the holotype of Fucini (1901).

#### GEOLOGICAL SETTING OF THE AREA AND DESCRIPTION OF THE NEW FINDING

Located at the south-eastern end of the province of Siena not far from the borders with Umbria and Lazio, the Monte Cetona falls within the Sheet 321 of the Regional Geological Map 1:10,000 (Costantini, 2005). From the structural point of view, it is a recumbent anticline with a north-south axis, belonging to the outermost portion of the Tuscan Nappe, and is made up of Mesozoic marine limestones from the Tuscan Succession (Fucini, 1905b; Jacobacci, 1962; Passerini, 1964; Bodechtel, 1969; Lazzarotto *et al.*, 2014 and references cited therein). This area is considered as classical for the Early Jurassic Tethyan ammonites and has been the subject of various studies since the early 1900s (Fucini, 1901-1905a; Fischer, 1971; Dommergues *et al.*, 1994; Venturi & Nannarone, 2002; Blau & Meister, 2011). On the sides of Monte Cetona various abandoned quarries are present, and even outside them it is at times possible to notice some more or less extensive outcrops of various Tuscan sedimentary units, despite the widespread vegetation cover. Among them, the Rosso Ammonitico Formation is especially interesting from the paleontological point of view; in the literature, it is usually dated to the lower-middle part of Early Jurassic (Costantini, 2005; Conti *et al.*, 2020).

One of these outcrops is the overturned succession visible along the pathway between the main quarry and the secondary quarries on the south-eastern side of the mountain (Fig. 1). Proceeding towards north-

east from Cava di Pietra, on the left side of the path a pack of reddish, micritic and mildly marly calcareous beds is present, referable to the Rosso Ammonitico Formation. These beds yielded *Asteroceras*, *Arnioceras*, *Epophioceras* and *Angulaticeras*, which testify the Obtusum Zone (beginning of the Upper Sinemurian in the standard scheme of Page, 2003). Along the slope to the right of the pathway, about 5 meters below it, there is a second pack of beds, still belonging to the Rosso Ammonitico Formation, but characterized by a slightly darker color than the previous ones, and most of all by a different fossil content. Here, forms such as *Gleviceras* or *Parasteroceras*, bispinate eoderoceratoids and *Paltechioceras* are found, overall indicative of the Raricostatum Zone (third part of the Upper Sinemurian in the standard scheme).

In a point of the slope located between the two mentioned groups of beds, an erratic block was collected amidst the debris resulting from the original excavation of the pathway. Its light red color was identical to that of the upper banks; on its surface, an *Asteroceras* and another ammonite were found. This latter has coiling, ornamentation and suture line completely similar to those of the holotype of *Kondiloceras manciatii*.

Although it is an erratic block, a clear stratigraphic reference can be attributed to it based on the presence of *Asteroceras*, an ammonoid known exclusively in the Obtusum Zone, of which it is the main index form (Page, 2003). As far as can be ascertained, no specimen correctly ascribable to this genus has ever been reported in older beds (for example in the Turneri Zone) or in more recent ones (for example in the subsequent Oxynotum and Raricostatum Zones). Consequently, the block belongs with certainty to the mentioned interval. Indeed, it is reasonable to assume that it physically comes from the pack of upper beds (the ones on the left side of the pathway), with which it shares color and, more importantly, guide fossil.

#### MATERIALS AND METHODS

The sampling was performed with traditional methods, using normal tools such as hammer and chisel. Size and conservation of the fossil samples did not requested particular cleaning / preparation techniques, and for their study direct observation or, at most, a common magnifying glass was sufficient.

The taxonomic identification was also carried out in a classical way, jointly evaluating all the available elements (coiling; aspect of whorl section and ventral area; ornamentation; conformation of the suture line, etc.) and comparing them with those of the original forms reported in the literature.



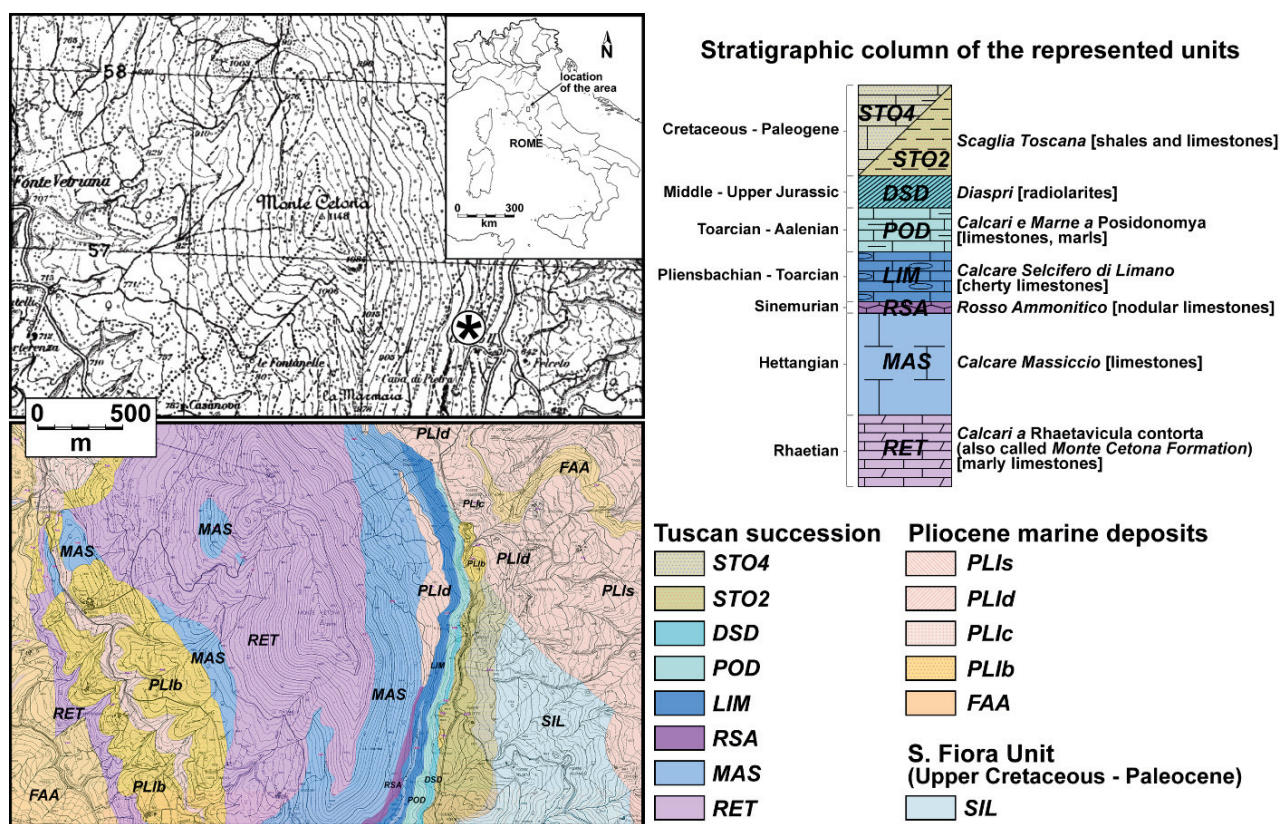


Figure 1. Geographic location of the Monte Cetona outcrop where the studied specimen has been found, as indicated by a black asterisk on white background. A geological map of the area (from Regione Toscana, 2015) and a stratigraphic column of the main sedimentary units here represented are provided as well. Abbreviations are as follows: DSD: radiolarites (Diaspri); FAA: blue-grey clays and silty clays (Argille azzurre); LIM: grey cherty calcilutites (Calcare Selcifero di Limano); MAS: massive limestones (Calcare Massiccio); PLIb: polygenic marine conglomerates; PLIc: bioclastic calcarenites and calcirudites; PLId: polygenic breccias; PLIs: yellow sandstones and sands; POD: limestones and marls with pelagic bivalves (Calcari e Marne a Posidonomya); RET: black or gray marly and dolomitic limestones (Calcari a *Rhaetavacula contorta*, also called Monte Cetona Formation); RSA: Rosso Ammonitico; SIL: grey-brown argillites and calcilutites (Sillano - S. Fiora Formation); STO2: Scaglia Toscana, Dudda Calcarenites member; STO4: Scaglia Toscana, Sugame Marls member.

## RESULTS AND DISCUSSION

### Description of the specimen

It is an almost entirely septate internal mould; in its final part the beginning of the body chamber can be noticed. One of the two sides, which was exposed on the bed surface, is worn out.

The specimen has a diameter of about 4.5 cm; it is flattened, with moderately involute coiling and higher than wide whorl section. The inner whorls are poorly preserved and therefore not clearly visible.

The ornamentation is formed by straight ribs on the flank, becoming coarser and broader proceeding towards the ventral margin, where they end with large tubercles, which alternation gives the venter a typical knobby profile.

The suture line, as far as can be seen, is not very indented and has long lobes (especially L), quite narrow and spaced. The E lobe cannot be observed due to the

wear of the ventral area; the U2 lobe is rather well developed, being a little shorter than L; U3 is about half as long as U2. The ES saddle has a fairly pronounced A lobe originating from the base of L and inclined towards E; the LS1 saddle is apparently broader and more advanced than ES.

As said above, all the morpho-structural character correspond fully to those of the holotype of *Kondiloceras manciatii*; we therefore identified our sample as belonging to this species (Figs 3, 4).

### Remarks

Despite showing an overall morphology compatible with that of other Jurassic ammonoids, *Kondiloceras* presents a peculiar combination of characters that makes its taxonomic position difficult to assess. Coiling and partly ornamentation recall some species of *Phricodoceras*, a genus known in the Late Sinemurian

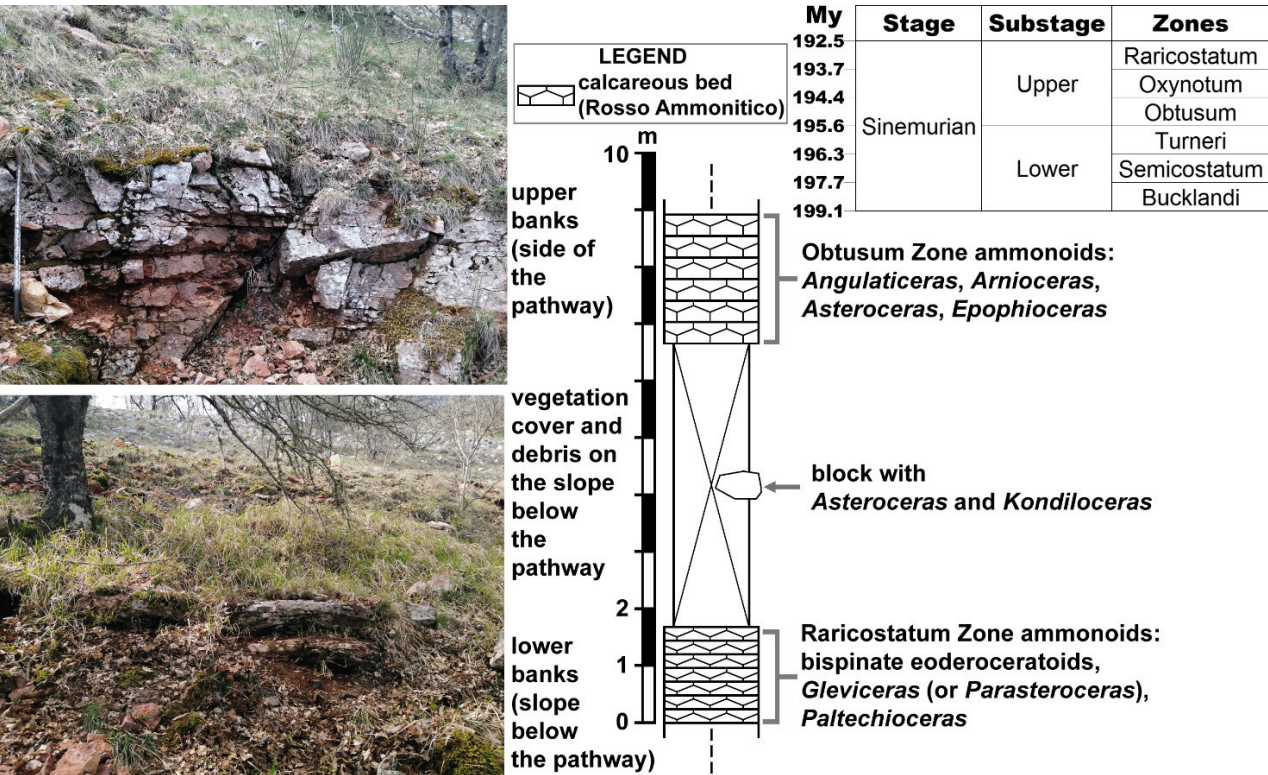


Figure 2. The studied outcrop (top left: upper banks, located on the side of the pathway; bottom left: lower banks, located along the slope below the pathway) and its log with the recovered ammonite taxa (right). For reference, the standard zonal scheme of the Sinemurian (from Page, 2003) is reported as well, integrated with geochronological data based on Storm *et al.* (2020).

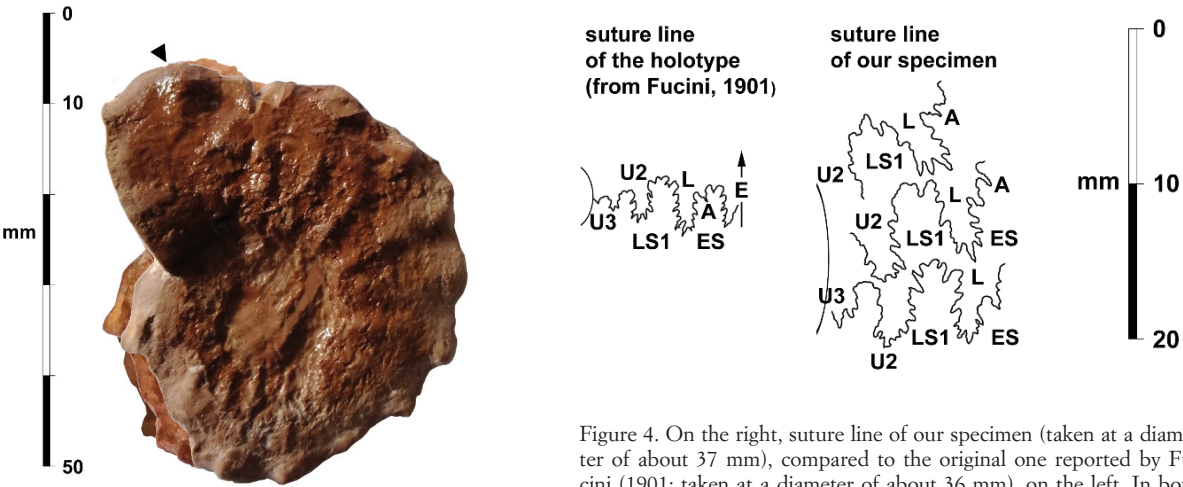


Figure 3. The sampled specimen of *Kondiloceras*. The black triangle indicates the beginning of the body chamber.

Figure 4. On the right, suture line of our specimen (taken at a diameter of about 37 mm), compared to the original one reported by Fucini (1901; taken at a diameter of about 36 mm), on the left. In both drawings, the main recognizable elements are indicated with the commonly used abbreviations for lobes and saddles: A = accessory lobe; E = external lobe; ES = external saddle; L = lateral lobe; LS1 = first lateral saddle; U2 = second umbilical lobe; U3 = third umbilical lobe.



and in most of the Pliensbachian, whilst the ventral area and the suture (except at small diameter) are not consistent with it. Similarities can also be found with typically Pliensbachian forms such as members of the Polymorphitidae (for example *Platypleuroceras*) and Amaltheidae, as already noted by Fucini (1901) himself, but we do not believe there are sufficient elements to place it close to them with certainty. Ultimately, *Kondiloceras* remains an enigmatic taxon and also due to its extreme rarity (ours is the third documented specimen in 120 years) it is not possible at the moment to advance satisfactory hypotheses of relationship.

### Stratigraphic attribution

The association of *Kondiloceras* with *Asteroceras* in the same calcareous block supports a Late Sinemurian age for the genus at issue, as observed by Fucini (1901; 1906), and indeed is an unequivocal element to date this taxon more precisely, referring it to the first Zone of the Upper Sinemurian (Obtusum Zone).

### CONCLUSIONS

The finding documented in the present paper allowed us to confirm not only the taxonomic validity of the genus *Kondiloceras* and of its sole species *K. manciatii*, but above all to clearly establish that it is a Late Sinemurian form.

This can provide a support to the studies on Early Jurassic stratigraphy and expands the general knowledge on the ammonoids of the Mediterranean Tethys. The ammonite faunas of this area are greatly rich and diversified, but often show still poorly understood elements. With its unique characters and uncertain affinities, *Kondiloceras* is a perfect example of these issues.

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