PALAEOPELAGOS, 1996, 6: 193 - 200

Hildoceratinae (Ammonites) from the transition between the *H. serpentinus* and *H. bifrons* Zones of the Massicci Perugini area, Umbria, Italy

Francesco Macchioni[1] & Federico Venturi[2]

[1] V. Sacco e Vanzetti 25, 06063 Magione (PG) (Italy)

[2] Dip. Scienze della Terra, Università degli Studi, P. zza dell'Università 1, 06100 Perugia (Italy)

ABSTRACT - Some aspects of nomenclature are treated with regard to some ammonites species present at the early-middle Toarcian boundary. The study was undertaken for the necessity of classify some forms collected during an accurate sampling accomplished in two Toarcian outcrops of Rosso Ammonitico in the Massicci Perugini area (Migiana di M. Malbe e F. so della Colognola). The analytical results are that, *H. bifrons* var. *laticosta* Bellini and *H. sublevisoni* var. *raricostata* Mitzopoulos must be considered, in order, nomen oblitum and *nomen dubium*. In the studied sections, the first species of *Hildoceras* Hyatt, appearing in stratigraphic order after the last *O. douvillei* (Haug), is *H. caterinii* Merla, followed by *H. sublevisoni* and after by *H. lusitanicum* Meister. This succession is congruous with the general evolution trend showed by this genera. As recognised by previous authors the species cited are accompanied by many transitional forms. This great variety of morphologies could be ascribed to a polyphyletic origin of *Hildoceras*.

KEY WORDS: ammonites, Hildoceratinae, *Hildoceras*, nomenclature, systematics, central Apennines, Italy.

INTRODUCTION

The abundance, the wide geographic distribution and the rapidity of evolution makes *Hildoceras* Hyatt one of the most biostratigraphically useful genera of the whole Toarcian. For the same reasons it is one of the more studied forms of this period and a complete list of the authors who treated this argument is impossible to give. Those who must be cited include Hyatt (1867), Bellini (1900), Prinz (1904), Renz (1911), Meister (1913), Fucini (1905, 1919), Mitzopoulos (1930), Merla (1932), Geczy (1967), Buckman (1909-1930), Gabilly (1976). Each one of these works contain figures of holotypes of both species and varieties. Whilst evolutionary aspects were treated by Elmi (1977), Gallitelli Wendt (1969), Venturi (1972, 1975, 1991) and Gabilly (1976).

A recent investigation, accomplished by Macchioni in the Rosso Ammonitico of Migiana di M. Malbe and F. so della Colognola sections in the Massicci Perugini area (western-central Umbria) furnished about 300 samples of ammonites. They were all

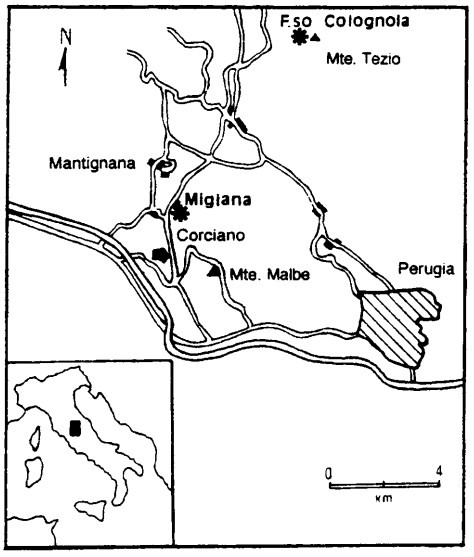


Fig. 1 - Location of the studied sections.

extracted from the half metre thick beds, around the *H. serpentinus* and *H. bifrons* border. More than fifty percent of them are attributable to the subfamily Hildoceratinae. During the examination of the fauna, almost immediately, a difficult of classification of some individuals arose. This was partially due to a certain degree of disorder caused by insufficient or incomplete diagnosis of the holotypes, moreover, as said also by Jiménéz & Rivas (1992), to the attempts of adapting European forms to Mediterranean ones or conversely. This latter aspect led to inconsistencies in the specific and sub-specific attributions between authors.

The aim of this work is to publish the results obtained from the analysis of literature. This would help to determine which species must be take as reference for a better definition of the limit between the *H. serpentinus* and *H. bifrons* Zones. These stratigraphic implication will be examined in a future paper.

ANALYSIS

Forms present at the lower-middle Toarcian boundary, immediately succeeding the last Orthildaites gr. douvillei (Haug), were attributed in literature to the following species (here reported by original designations): a) *H. sublevisoni* Fucini, 1919; b) *H. bifrons* var. *laticosta* Bellini, 1900; c) *H. sublevisoni* var. *raricostata* Mitzopoulos, 1930; d) *H. caterinii* Merla, 1932; e) *H. bifrons* var. *lusitanica* Meister, 1913. Their histories, their distinctive morphological features and validity are re-examined below. In this study *H. graecum* Renz and *H. acarnanicum* Mitzopoulos, are not included as they have been discussed before by Elmi (1977), Gallitelli Wendt (1969), Gabilly (1976), Jiménéz e Rivas (1992) and Howarth (1992).

a) *Hildoceras sublevisoni* Fucini, 1919. It was proposed by the author without indication of the type. In the synonymies were included two specimens first classified as *H. levisoni* Simpson. One was figured by the same Fucini (1905; pl. 6, fig. 3) and the another one by Dumortier (1874; pl. 9, fig. 3-4). These are really diverse for degree of coiling, shape of whorl section and ornamentation. The first one is moderately evolute (do/d= 0, 38), nearly sub-quadrate and with ribs starting after the umbilical wall. The second one is evolute, sub-rectangular and with ribs always at least reaching the umbilical wall. The latter was designated as lectotype by Merla (1932) so it must be take in the reference (see Gallitelli Wendt, 1969).

Gabilly (1976) had this individual in vision, he briefly described it, but strangely omitted to provide a photograph or measurements. However he said that the lectotype of *H. sublevisoni* possessed very rursiradiate ribs (V-scriptiradiate?), till 20 mm diameter, then becoming progressively rectiradiate. He recognized too a fickle mid (?) lateral furrow on some whorls.

b) *Hildoceras bifrons* var. *laticosta* Bellini, 1900. In the original designation it is reported only that this form differs from *H. bifrons* Bruguiére in its ribs spacing. But in the drawing are observable numerous angulate ribs, in the inner whorls, becoming almost immediately rectiradiate at the diameter of 37 mm (approx). Gabilly (1976) considered this form as senior sinonimy of *H. sublevisoni*. On the other hand it was not recorded as valid name for more than fifty years (Gabilly, *ibidem*).

Though there is a quite resemblance between the original drawing of Bellini and the specimen figured by Ridente (1996), the almost complete absence of ornamentation on the outermost half whorl in the latter, lead us to consider that they are not the same individual.

H. sublevisoni, H. bifrons var. *serraticosta* Bellini and *H. caterinii* Merla, were all included by Howarth (1992) in *H. laticosta*. Nevertheless English forms differs from both pictures of Bellini and Ridente in lacking the smooth periumbilical band, a character, which is recognisable in the lectotype of *H. sublevisoni* too.

c) *H. sublevisoni* var. *raricostata* Mitzopoulos, 1930. Only one slightly deformed specimen was figured by the author, in which ornamentation of internal whorls is not visible. In papers treating specimens collected in Mediterranean sequences, the name is reported as originally designated or sometimes as a true specific name of *Hildoceras*.

Following Gabilly (1976) and Howarth (1992), the type must be considered as a morphotype of *Orthildaites douvillei* (Haug) because it has straight ribs at 35 mm diameter. This would permit it to be distinguished from *H. caterinii* and *H. sublevisoni*. The same Gabilly (1976), in his designation of *Hildoceras* Hyatt said: " Hildoceratinae dont la ligne radiale est V-scriptiradiée, au moins pendant une partiè de l'ontogénèse" (p. 126, lines 1-2). This easily applicable criterion, does not allow us to consider *H. sublevisoni* var. *raricostata* as a particular species of *Hildoceras* or as a junior synonym of *O. douvillei*.

d) *Hildoceras caterinii* Merla, 1932. The author records the absence of a mid-lateral furrow and the curved dipping of the umbilical wall. For Gabilly (1976) distinctive characters from *H. sublevisoni* are sub-quadrate whorl section and backward ribbing. Although Merla (1932) recommend the latter aspect should not be over-rated. Howarth (1992) and Jiménéz & Rivas (1992) includes such specimen in *H. laticosta* and *H. sublevisoni* respectively.

e) *H. bifrons* var. lusitanica Meister, 1913. The holotype is slightly evolute with ribs starting after the umbilical wall. The same relief of ribbing delineate as a light mid-lateral furrow. Ribs are V-scriptiradiate till 50 mm diameter at least. Jiménéz e Rivas (1992) retains it as a morphotype of *H. sublevisoni.*

INTERPRETATION

a) The lack of a photograph of Dumortier's original force us to take his drawing as reference. Its comparison with specimens collected by Gabilly (1976) would help too in classifying. Differences between French individuals and Fucini's *Hildoceras levisoni* (pl. 6, fig. 3) leads us to consider that they must be included in different taxa.

b) Following Gabilly (1976), *H. bifrons* var. *laticosta* is now a *nomen oblitum* because it was not identified for more than fifty years. However accepting its validity, the unsatisfactory resemblance between Bellini's original drawing and the specimen of Ridente (1996) implies the designation of a neotype. But this is unrealisable because both the stratigraphic and geographic location, of Bellini's specimen, are unrecorded.

c) The absence of discernible ornamentation in the inner whorls of *H. sublevisoni* var. *raricostata* allows us consider it either as an *Hildoceras* or an Orthildaites Buckman. So it must be retained a *nomen dubium* for the impossibility of defining its distinctive generic and specific characters. In fact in the collected material were found some forms possessing V-scriptiradiate ribs till 20 mm diameter, after assuming an orthildaitic pattern. Following Gabilly (1976) these must be ascribed to the genera *Hildoceras.*

d) *H. caterinii* is abundant and easy separable too from *O. douvillei*, *H. lusitanicum* and *H. sublevisoni* and is morphologically intermediate between the first and the third one. In the studied sections, this latter aspects is confirmed by stratigraphic evidence, contrary to what was obtained in France by Gabilly (1976).

The supracitate specimens, with V-scriptiradiate ribs till 20 mm (approx) diameter, can be included in *H. caterinii.*

e) In considering *H. bifrons* var. lusitanica, now *H. lusitanicum* (Elmi, 1967) together with *H. sublevisoni* one risks increasing the existing confusion, relieved by the same Jiménéz e Rivas (1992). It must be noted too that the first one was proposed six years earlier than the second.

CONCLUSIONS

In summary, *Hildoceras* species here retained as valid names are *H. caterinii*, *H. sublevisoni* and *H. lusitanicum.* The first occurrence of the hildoceratitic character, *sensu* Gabilly (1976), take place by proterogenesis in a gradual but rapid manner, in *H. caterinii.* This is followed first by *H. sublevisoni* and after by *H. lusitanicum.* All of them are accompanied by some transitional forms of uncertain systematic position, in fact there is not only confusion in literature and nomenclature. Part of the problem is really objective

and complicated by the phenomena of polymorphism (Elmi, 1967; Jiménéz & Rivas, 1992) though here it was undetected. Instead there were here recognised many evolutionary and/or morphologic "attempts" of brief chronological duration. Some of them show ancestral characters of *Orthildaites* for palingenesis (Gabilly, 1976; Jiménéz e Rivas, 1992), other ones in course of study, have a typical hildaitic ornamentation in the outer whorls.

So it is possible too that the origin of such specimens could be *Hildaites* Buckman and not *Orthildaites*. A polyphyletic origin would also explain the wide morphological spectra observed by many authors perhaps partially hidden by evolutive convergence.

Any investigations at a boundary zones has a biostratigraphic implication. But further research is necessary to confirm if the observed stratigraphic occurrences: *O. douvillei-H. caterinii-H. sublevisoni-H. lusitanicum* will be found in other outcrops or if it could be influenced by local factors (Jiménéz e Rivas 1992). However this faunal succession is congruous with the general morphologic evolution of *Hildoceras* during its whole life, as perceived by Gallitelli Wendt (1969), Venturi (1972, 1975, 1991) and Gabilly (1976).

ACKNOWLEDGMENTS

Thanks are due to R. Rettori and A. Baldanza for their help, suggestions, and critical comments.

REFERENCES

ARKELL W. J. KUMMEL B. & WRIGHT C. W., 1957 - Mesozoic Ammonoidea. *In:* R. C. Moore: Treatise on Invertebrate paleontology, Part L, Mollusca 4: Cephalopoda-Ammonoidea, *Geol. Soc. Amer. Univ.* : 1-490.

BUCKMAN S. S., 1909-1930 - Yorkshire type Ammonites. Reprint in: *Cramer J. & Swann H. K. (Eds) Hist. Nat. Clas.* ; **I, II**: 1-78; **II, IV** & **V**: 5-88; VI, VII: 6-78.

ELMI S., 1977 - Differences chronologiques dans l'evolution morphologique des dimorphes d'une meme ligne (Ammonoïdes jurassiques). *Haliotis*, **6**: 71-95.

FUCINI A., 1905 - Cefalopodi liassici del Monte di Cetona, Parte V ed ultima. *Palaeontographia Italica*, **11**: 265-318.

GABILLY J., 1976 - Le Thoarcien à Thouars et dans le Centre-Ouest de la France. *Ed. Centr. nat. Rech. Scient: Les stratotypes français*, **3**: 1-217.

GALLITELLI WENDT M. F., 1969 - Ammoniti e stratigrafia del Toarciano Umbro-Marchigiano (Appennino Centrale). *Boll. Soc. Pal. It.*, **8(1)**: 11-62.

GÉCZY B., 1967 - Upper liassic Ammonites from Úrkút, Bakony Mountains, Transdanubia, Hungary. *Ann. Univ. Sc. Budapest, Sect. geol.*, **10**: 115-160.

GOY A. JIMENEZ A., MARTINEZ G. & RIVAS P., 1988 - Difficulties in correlating the toarcian Ammonite succession of the iberian and betic cordilleras. *In:* Rocha R. B. & Soares A. F. (Eds) *2nd Internat. Symp. on Jurassic. Strat. Lisboa* (cum bibl.), **1**: 155-178.

GUEX J., 1973 - Aperçu biostratigraphique des ammonites du Toarcien inférieur du Moyen-Atlas marocain et discussionsur la zonation de ces sous-étage dans les séries médeiterranéennes. *Ecl. geol. Helv.*, **66/3**: 493-523.

HOWARTH M. K., 1991-1992 - The Ammonite family Hildoceratidae in the Lower Jurassic of Britain. *Monograph of the Palaeontographical Society*. Part. **I** (1991): 1-106; part. **II** (1992): 107-200.

KOTTEK A. V., 1966 - Die Ammoniten abfolge des griechischen Toarcium. *Ann. geol. pays hellen.*, **17**: 1-157.

JIMÉNÉZ JIMÉNÉZ A. P. & RIVAS CARRERA P., 1992 - Hildoceratidae (Ammonitina) del Toarciense inferior y medio de las Cordilleras Béticas. España. *Bol. R. Soc. Esp. Hist. (Sec. Geol.)*, **87** (1-4): 37-113.

MENEGHINI J., 1867-1881 - Monographie des fosiles du Calcaire rouge ammonitique (Lias supérieur) de Lombardie et de l'Apenin Central. *In:* Stoppani A. : *Paléontologie Lombarde*, **4**: 1-242.

MERLA G., 1932 - Ammoniti Giuresi dell'Apppennino Centrale. I. Hildoceratinae. *Palaeontographia Italica*, **33**: 1-54.

MITZOPOULOS M. K., 1930 - Beitrage zur Cephalopodenfauna des oberen Lias der Alta Brianza. *Pragmateiai tis Akadimias Atinan*, tomos **B**: 1-117.

RIDENTE D., 1996 - Variability patterns and classification of *Hildoceras* species based on tha assemblage from the "Rosso Ammonitico" near Terni, Umbria (Central Appennine). *Palaeopelagos*, this volume.

VENTURI F., 1972 - Evoluzione dei gusci in "Hildoceratidae e biostratigrafia del Toarciano al M. Serano (Umbria). *Boll. Soc. geol. It.*, **91**: 25-35.

VENTURI F., 1973 - La zona a Falcifer-Toarciano inferiore del Monte dell'Eremita (Monteleone di Spoleto, Umbria sud) e riflessi sulla Biostratigrafia del Rosso Ammonitico Umbro. *Boll. Soc. geol. It.*, **92**: 581-603.

VENTURI F., 1975 - Rapporti filetici fra i generi toarciani Mercaticeras, Brodieia, *Hildoceras*, Phymatoceras, Chartronia dell'Appennino Centrale. *Riv. Ital. Paleont.*, **81(2)**: 195-246.

VENTURI F., 1981 - Le "Rosso Ammonitico" du Toarcien Inferieur dans quelques localites de l'Apenin de Marche-Ombrie. Consequences sur la stratigraphie et la taxonomie des Ammonitina. *In:* Farinacci A. & Elmi S. *(Eds) Rosso Ammonitico Symposium Proceedings:* 581-602.

VENTURI F., 1985 - Ammoniti liassici dell'Appennino centrale, 2a ed., con Suppl. sugli Ammoniti del Dogger Inferiore. : 1-126.

VENTURI F., 1991 - Evoluzione iterativa di ammoniti carenati durante il Giurassico superiore. *Paleocronache*: 35-41.

ZANZUCCHI G., 1963 - Le ammoniti del Lias superiore (Toarciano) di Entratico. in val Cavallina (Bergamasco orientale). *Mem. Soc. It. Sc. Nat., Milano*, **13**: 101-146.

Plate 1

Fig. 1 - *Orthildaites douvillei* (Haug), 527MM5. 21; Zona a *H. serpentinus*.
Fig. 2 - *Hildoceras caterinii* Merla, 559MM5. 34; Zona a *H. bifrons*.
Fig. 3 - *Hildoceras sublevisoni* Fucini, 560MM5. 57; Zona a *H. bifrons*.

All figures are reproduced x 0.85.

Plate 2

Fig. 1 - Orthildaites douvillei (Haug), 528MM5. 15; Zona a *H. serpentinus*.
Fig. 2 - Orthildaites douvillei (Haug), 536MM5. 15; Zona a *H. serpentinus*.
Fig. 3 - *Hildoceras caterinii* Merla, 544MM5. 21; Zona a *H. serpentinus*.
Fig. 4 - *Hildoceras caterinii* Merla, 556MM5. 21 Zona a *H. serpentinus*.
Fig. 5 - *Hildoceras caterinii* Merla, 553MM5. 27; Zona a *H. bifrons*.
Fig. 6 - *Hildoceras lusitanicum* Meister, 064FCT3. 16; Zona a *H. bifrons*.
Fig. 7 - *Hildoceras lusitanicum* Meister, 065FCT3. 16; Zona a *H. bifrons*.

All figures are reproduced in natural size.

Plate 1

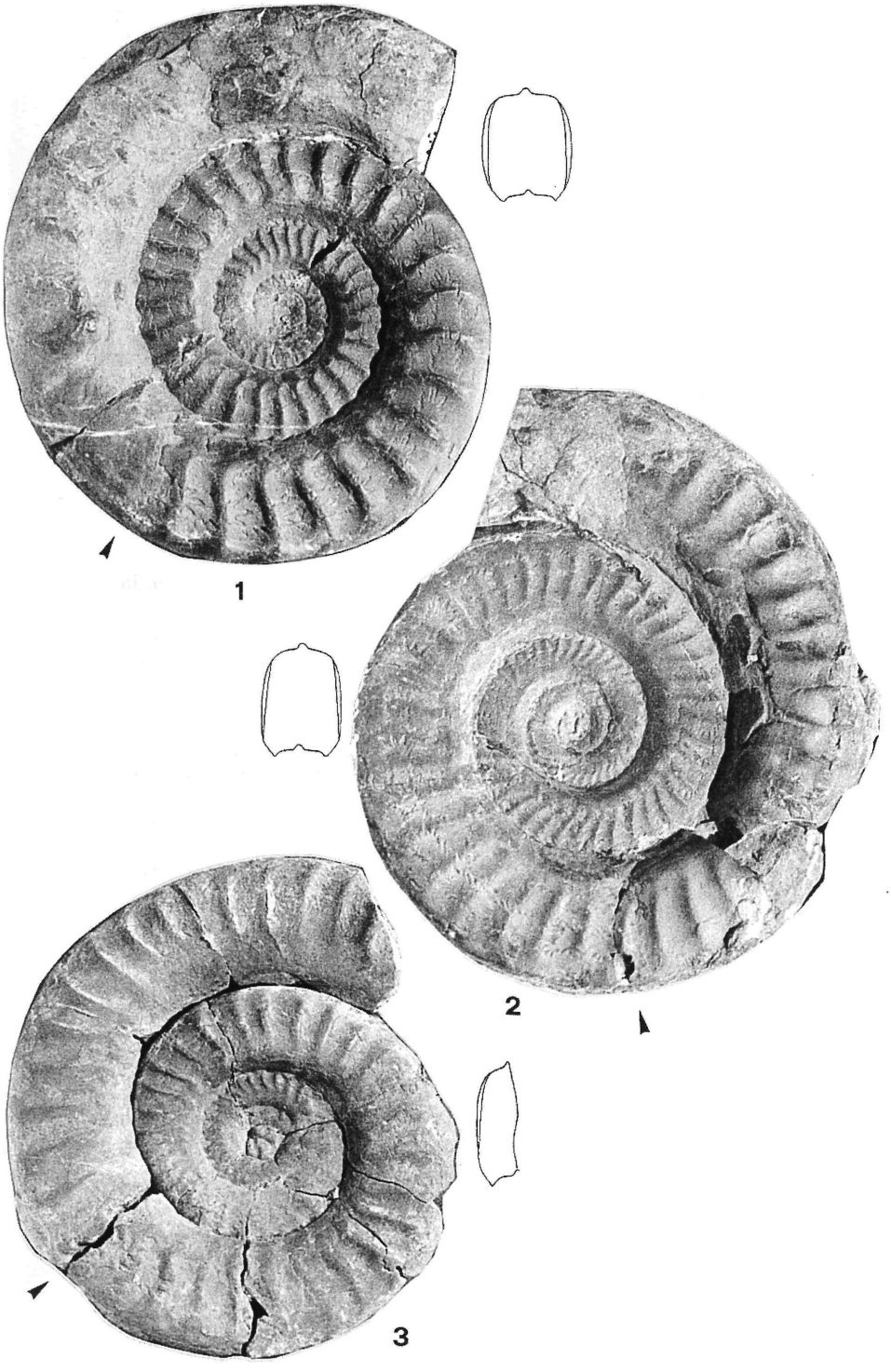
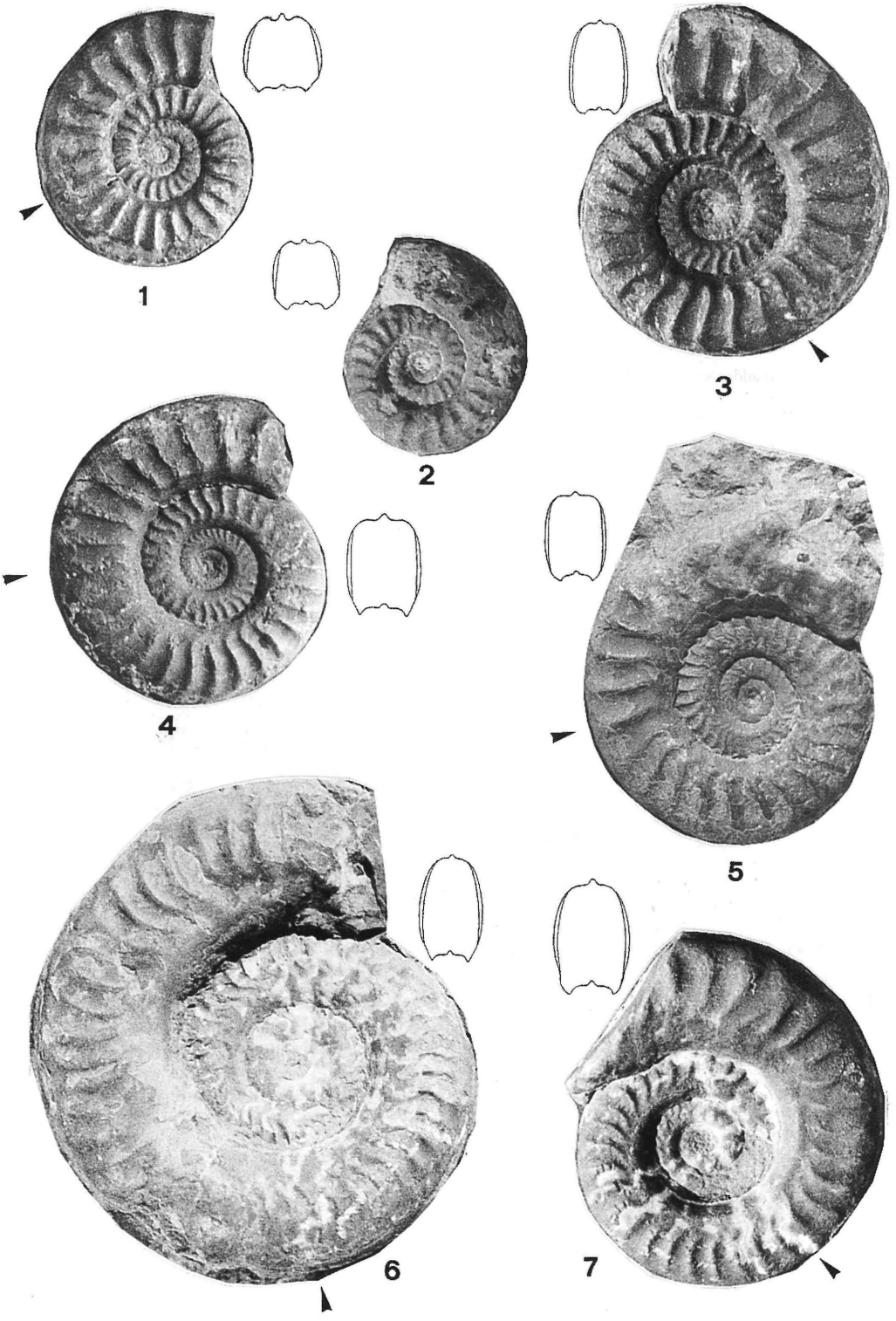


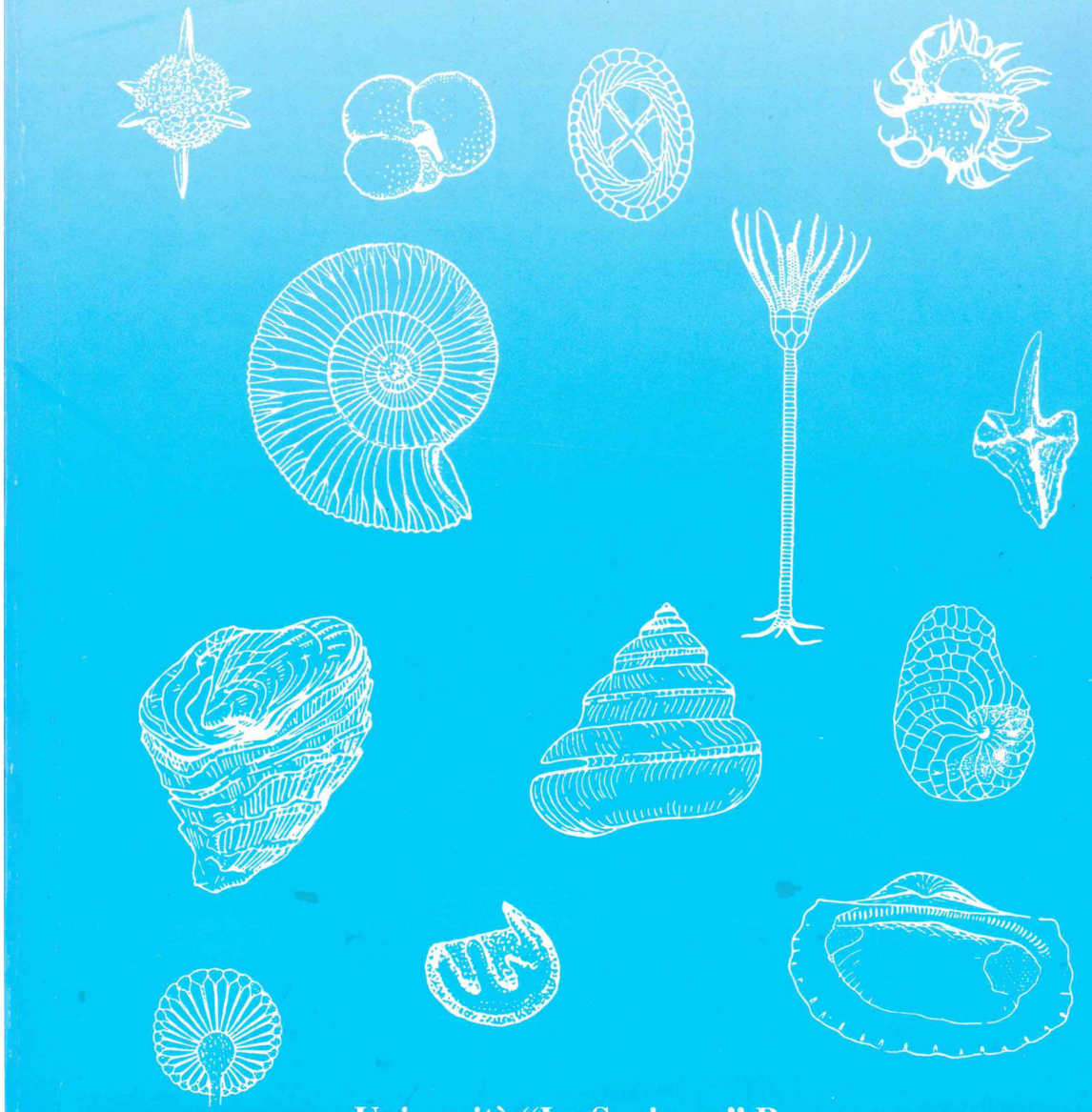
Plate 2



ISSN 1121 - 1393

PALAEOPELAGOS

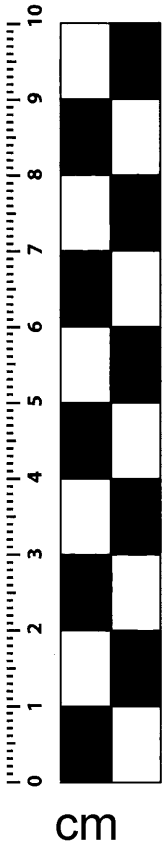
Volume 6 - 1996



Università "La Sapienza" Roma

Licenziato alle stampe il 20 dicembre 1996
Finito di stampare Aprile 1997

Tipolitografia RIVER PRESS srl - Roma


0
1
2
3
4
5
6
7
8
9
10
cm