

## PRELIMINARY AMMONITE ZONATION FOR THE LOWER CRETACEOUS OF THE MEDITERRANEAN REGION

Lower Cretaceous Cephalopod Team  
Working Group of IGCP Project 262

Report by **Philip J. Hoedemaeker** (1) and **Luc Bulot** (2)

### PARTICIPANTS

**E. Avram** (Univ. Bucarest, Roumania)  
**R. Busnardo** (Univ. Lyon, France)  
**M. Company** (Univ. Granada, Spain)  
**G. Delanoy** (Mus. Nat. Hist. and Univ. Nice, France)  
**M. Kakabadze** (Georgia SSR Academy of Sciences, Tbilisi, USSR)  
**E. Kotetishvili** (Georgia SSR Academy of Sciences, Tbilisi, USSR)  
**J. Krishna** (Univ. Benares, India)  
**I. Kvantaliani** (Georgia SSR Academy of Sciences, Tbilisi, USSR),  
**J.L. Latil** (EPHE, Dijon, France)  
**L. Memmi** (Tunisian Geol. Survey, Tunis, Tunisia)  
**P.F. Rawson** (Univ. College London, Great Britain)  
**J. Sandoval** (Univ. Granada, Spain)  
**J.M. Tavera** (Univ. Granada, Spain)  
**J.P. Thieuloy** (Univ. Grenoble, France)  
**G. Thomel** (Mus. Nat. Hist. and Univ. Nice, France)  
**Z. Vasicek** (Univ. Ostrava, Czechoslovakia)  
**J. Vermeulen** (Univ. Nice, France).

### RESUME

Ce rapport préliminaire correspond à la synthèse des discussions de la réunion de travail du Working Group Céphalopodes du Crétacé inférieur du PICG 262 : Corrélations du Crétacé de la Téthys. Il se compose d'une proposition de schéma zonal pour la province méditerranéenne et de notes explicatives sur le choix des espèces-index de certaines unités biostratigraphiques.

### ABSTRACT

This preliminary report is the synthesis of the discussions held during the workshop of the Lower Cretaceous Working group of IGCP 262 : Tethyan Cretaceous Correlation. It presents a proposition of zonal scheme for the mediterranean province and justifications about the choice of the index-species for some biostratigraphical units.

(1) National Museum of Natural History, Leiden, THE NETHERLANDS

(2) Réserve Géologique de Haute-Provence, Digne, FRANCE et I. S. T., Université de Bourgogne, 6, Bd Gabriel, 21100 Dijon, FRANCE

## I. INTRODUCTION

The Lower Cretaceous Cephalopod Working Group of the IGCP-Project 262: Tethyan Cretaceous Correlation, organized a workshop with the aim to provide the participants of the project with a standard ammonite zonation for the Lower Cretaceous of the Mediterranean region.

This workshop was held at the *Reserve géologique de Haute-Provence* (Alpes de Haute-Provence, Digne) on the 11th to 15th of July, 1990. Only the preliminary results of this meeting are published here. Detailed logs and full description of faunas will be published in a separate volume, which will appear in 1992.

The Working Group did not discuss stage boundaries. Only the IUGS Subcommittee on Cretaceous Stratigraphy has the authority to formulate proposals on this matter.

It was agreed upon that in principle zones should be defined by the first appearance of its index species. For the sake of stability in stratigraphic nomenclature a few exceptions on this principle were allowed. In addition a diagnostic association of ammonite species should be indicated, by which the zone can be recognized if the index species is rare or not found.

It was also agreed upon that zones should be accepted only if described in literature with sufficient detail, as to allow recognition outside the area in which it was firstly described. The only exception allowed was the zones of lower and lower upper Barremian, on the condition that a detailed description has to be published in that separate volume to be published in 1992.

Finally it was considered wise not to change the current zonation too drastically and to preserve stability in stratigraphic nomenclature as much as possible. The Working Group reached consensus upon the following standard zonal scheme for the Mediterranean region.

## II. ZONAL SCHEME

Table on separate page.

## III. EXPLANATIONS

1) *Berriasella jacobi* has been preferred as index species of the first Berriasian zone, because this species appears at the base of this zone, whereas *Pseudosubplanites euxinus* probably appears at a higher level.

2) Notwithstanding that *Pseudosubplanites grandis* appears low in the *Berriasella jacobi* Subzone, it is still possible to recognize a distinct ammonite association in the upper part of the *Berriasella jacobi* Zone for which no index species could be appointed yet. *P. grandis* is provisionally retained as the name for this subzone.

3) In order to avoid confusion it should be noted that the *Fauriella boissieri* Zone does not correspond to the original conception by KILIAN (1888) and the "COLLOQUE SUR LE CRETACE INFERIEUR" (1965). The definition of this zone has been modified so as to correspond to the first appearance of *Fauriella boissieri* as proposed by LE HEGARAT (1971).

4) Most of LE HEGARAT's (1971) subzones of the middle and late Berriasian have been maintained notwithstanding that they are not defined by the first appearance of the index species. It was considered wise to preserve stability in stratigraphic nomenclature. The *Berriasella callisto* Subzone has however been rejected by the Working Group and incorporated in the *Berriasella picteti* Subzone, because its ammonite association is not more than an impoverished *Berriasella picteti* association. The species *Berriasella callisto* already appears in the Paramimouna Subzone.

5) HOEDEMAEKER (1982) recognized in the section of Los Miravetes (Caravaca, SE Spain) a distinct ammonite association between the associations of the former Callisto Subzone and the *Thurmanniceras otopeta* Zone. He called it *Tirnovella alpillensis* Subzone. The depositional Transgressive System Tract, Highstand System Tract and Lowstand System Tract that contain this ammonite association have been indicated in SE France, but generally lack ammonites. As *Tirnovella alpillensis* already appears in the Picteti Subzone, another index species has to be chosen in the future. The biostratigraphic interval, which will remain un-named until a new index species could be indicated, is characterized by the first appearance of ammonite species, hitherto considered characteristic for the Valanginian. However, the Working Group recommended to leave this association provisionally in the *F. boissieri* Zone until full description of the fauna.

		ZONES	SUBZONES	HORIZONS	
ALBIAN	UPPER	S. (S.) dispar (20)	S. (S.) dispar S. (F.) blancheti		
		M. inflatum E. lautus			
	MIDDLE	E. loricatus			
		H. dentatus	H. spathi (19) L. lyelli (19)		
	LOWER	D. mammillatum			
		L. tardefurcata			
APTIAN	UPPER	H. jacobi			
		A. nolani	D. nodosocostatum		
	MIDDLE	C. tobleri			
		E. subnodosocostatum			
	LOWER	D. furcata			
		D. deshayesi			
		D. weissii			
		D. tuarkyricus			
BARREMIAN	UPPER	C. securiformis (15)		T. turkmenicum (16)	
		I. giraudi (14)			
		H. feraudianus			
		S. sartousiana (13) A. vandenheckei (13)			
	LOWER	H. caillaudi	(12)		
		N. pulchella			
		S. nicklesi			
		S. hugii			
HAUTERIVIAN	UPPER	P. angulicostata auct. (11)			
		B. balearis			
		un-named association (10)			
		S. sayni			
	LOWER	L. nodosoplicatum	C. cruasense (9) L. nodosoplicatum O. (J.) jeannoti (8)		
		C. loryi A. radiatus	C. loryi (8)		
VALANGINIAN	UPPER	N. (T.) callidiscus			
		H. trinodosum		C. furcillata (7) O. (O.) nicklesi (7)	
		S. verrucosum (6)			
	LOWER	B. campylotoxus			
		T. pertransiens			
		T. otopeta			
BERRIASIAN	UPPER	F. boissieri (3)	un-named association (5)		
			B. picteti	(4)	
			M. paramimouna		
	D. dalmasi				
	MIDDLE	T. occitanica	B. privasensis		
			T. subalpina		
LOWER	B. jacobi (1)	P. grandis ? (2)			
		B. jacobi			

6) It should be noted that the *Saynoceras verrucosum* Zone does not correspond to the original conception by LORY (1898) and the "COLLOQUE SUR LE CRETACE INFERIEUR" (1965). The definition of this zone has been modified to correspond to the first appearance of *S. verrucosum* as defined by MOULLADE and THIEULOY (1967).

7) Within the *Himantoceras trinodosum* Zone two horizons could be distinguished (THIEULOY, FUHR and BULOT, in press): a lower one with *Olcostephanus (Olcostephanus) nicklesi* (= senior synonym of *O. (O.) sanctifirminensis*) and an upper one with *Criosarasinella furcillata*. Only after wider geographic recognition they might become subzones.

8) In SE France the *Crioceratites loryi* Zone could be divided in two horizons: a lower *Crioceratites loryi* horizon and an upper *Olcostephanus (Jeannoticeras) jeannoti* horizon. Detailed sections will be published in the 1992 volume. Only after wider geographic recognition they might become subzones.

9) *Cruasiceras cruasense* Zone has hitherto only been recognized in SE France, where it characterized the beds between the last *Lyticoceras nodosoplicatum* and the first *Subsaynella sayni*. Awaiting its recognition in other parts of the Mediterranean, it is here considered a subzone of the *Lyticoceras nodosoplicatum* Zone.

10) This association correspond to the *Plesiospitidiscus ligatus* Zone formerly introduced by Moullade and Thieuloy (1967). Since, "true" *P. ligatus* have been proved to occur in the *S. sayni* Zone, the spitidiscids formerly referred to this species await full revision by Thieuloy and the association remains un-named.

11) Awaiting revision of *Pseudothurmannia angulicostata* (the holotype of which has been refound), the Working Group recommends to use *P. angulicostata auctorum* as index of the uppermost zone of the Hauterivian.

12) The formerly published zonations of the Lower Barremian were not considered workable by the Working Group. The tentative zonation proposed herein will be described and discussed in details in the 1992 volume.

13) *A. vandenheckei* and *S. sartousiana* zones correspond to Busnardo's (1984) "E." *barremense* Zone. Because of ambiguous interpretation of "E." *barremense* the Working group rejects Busnardo's zone in favour of *A. vandenheckei* and *S. sartousiana* zones.

Both of them will be defined in the 1992 volume.

14) *Imerites giraudi* was preferred by the Working Group as a zonal name above *Heteroceras astieri* because the true identity of *H. astieri* is still poorly known and because *I. giraudi* has a short range and a wide geographic distribution. The base of the zone can be recognized by the first appearance of *Imerites* and *Eristavia*.

15) Although *Colchidites securiformis* has not been recorded from the Barremian type-area, this well known name was preserved as a zonal name. The *Colchidites* from the upper part of the stratotype have yet not been identified to the species level, but in other sections of the Angles-Barreme area, *Colchidites* of the *sarasini* group was found in the uppermost Barremian. This group also occurs in the ammonite assemblage of the *C. securiformis* Zone in Georgia.

16) Because of its restricted geographic distribution, the *Turkmeniceras turkmenicum* Zone of Soviet workers is recommended by the Working Group to be used as a horizon.

17) For the Aptian, the zonation developed in Georgia has been adopted because it has been proved to be workable. A detailed zonation of the French Aptian is still not available.

18) A threefold division of the Aptian is maintained. It remained unsolved whether the *Dufrenoya furcata* Zone should mark the base of the Middle Aptian or the top of the Lower Aptian.

19) The Albian zones developed by SPATH and OWEN are easily recognizable in the Mediterranean region. However, of all the subzones recognized in the sub-boreal region only those of *Lyelliceras lyelli* and *Hoplites spathi* are usable in the Mediterranean region.

20) Owen divided the *Stoliczkaia (Stoliczkaia) dispar* Zone in two subzones: a lower *Mortoniceras rostratum* Subzone and an upper *Mortoniceras perinflatum* Subzone. Since paleontological studies have proven that true *M. rostratum* is restricted to the *M. perinflatum* Subzone along with *S. (S.) dispar* (full argumentation to be published by J. L. LATIL in 1992 volume). Therefore, the Working Group proposed to divide the *Dispar* Zone into a lower *Stoliczkaia (Faraudiella) blancheti* Subzone and an upper *S. (S.) dispar* Subzone. Though the name *S. dispar* for the last zone of the Albian should be changed in accordance with the zonal definition adopted, it was nevertheless retained for sake of stability in the stratigraphic

**nomenclature.**

#### **IV. CONCLUDING REMARKS**

This zonal scheme should be considered provisional. The Working Group is well aware of the scheme being unsatisfactory on many points. Many imperfections are still to be removed and we have not always been consequent to the before worded principles in all instances.

**Notwithstanding these imperfections, the international Working Group reached consensus on the here presented Mediterranean Lower Cretaceous zonation.** This was only preceded 27 years ago by the results of the "COLLOQUE SUR LE CRETACE INFERIEUR" in 1963. New improvements should come out of the different papers in preparation for our 1992 volume.

#### **V. ACKNOWLEDGEMENTS**

We are very grateful to G. MARTINI (Réserve géologique de Haute-Provence), G. CSASZAR (Hungarian Geological Survey) and J. WIEDMANN (Tübingen University) for technical and financial support to the Digne Workshop of the Lower Cretaceous Cephalopod Working Group.

#### **VI. REFERENCES**

BUSNARDO R. (1984) - Crétacé inférieur: Echelles biostratigraphiques. *In Synthèse géologique du Sud-Est de la France. Mém. Bur. Rech. Géol. Min.*, Paris, 125, pp. 291-294.

COLLOQUE SUR LE CRETACE INFERIEUR (1965) - *Mém. Bur. Rech. Géol. Min.*, Paris, 34, 840 pp.

HOEDEMAEKER Ph. J. (1982) - Ammonite biostratigraphy of the uppermost Tithonian, Berriasian and Lower Valanginian along the Rio Argos (Caravaca, SE Spain). *Scripta geol.*, Leiden, 65, 81 pp.

KILIAN W. (1888) - Description géologique de la Montagne de Lure. Masson ed., Paris, 458 pp.

LE HEGARAT (1971) - Le Berriasien du Sud-Est de la France. *Docum. Lab. Géol. Fac. Sc. Lyon*, 43/1, 308 pp.

LORY P. (1898) - Sur le Crétacé inférieur du Dévoluy et des régions voisines. *Bull. Soc. géol. Fr.*, Paris, 3, 26, p. 132.

MOULLADE P. & THIEULOY J. P. (1967) - Les zones d'Ammonites du Valanginien supérieur et de l'Hauterivien vocontiens. *C. R. Somm. Soc. géol. Fr.* Paris, 6, p. 228.

THIEULOY J. P., FUHR M. & BULOT L. (sous-presse) - Biostratigraphie du Crétacé inférieur de l'Arc de Castellane (S-E de la France): 1. Faunes d'ammonites de la zone à Trinodosum (Valanginien supérieur) et Age de la Grande Lumachelle. *Géol. méditerranéenne*.