

HETEROCHRONY BETWEEN AMMONITE AND INOCERAMID BIOZONES AROUND THE CONIACIAN/SANTONIAN BOUNDARY

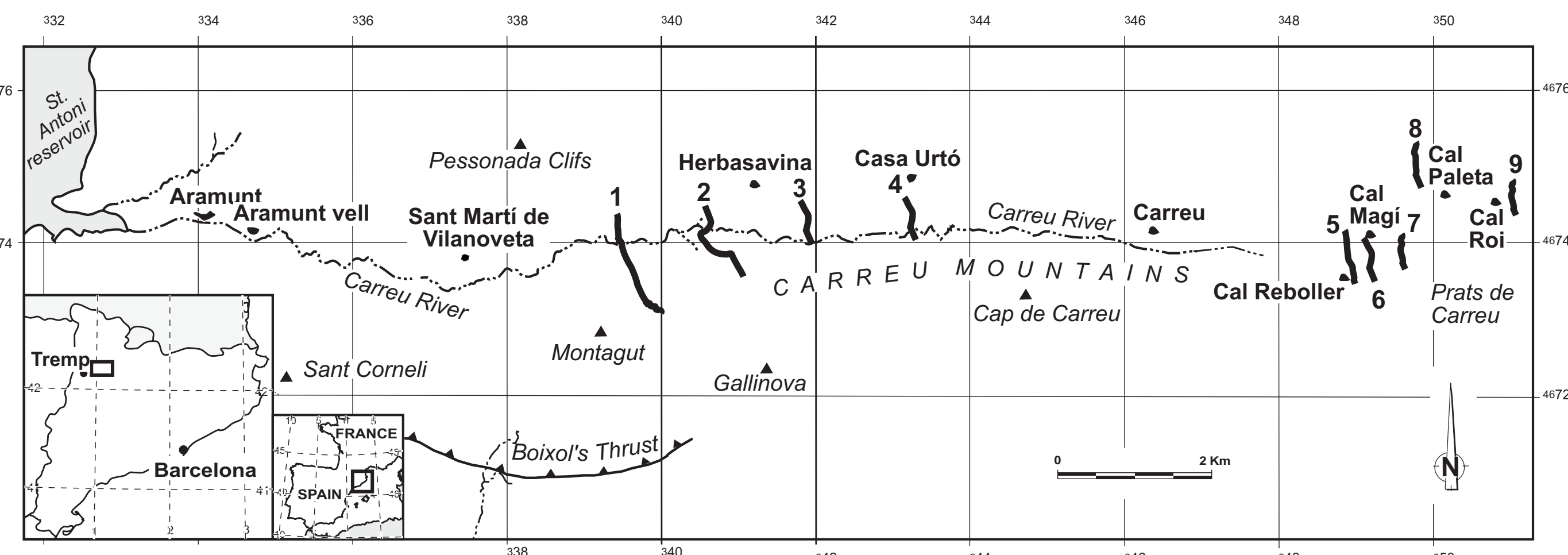
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STAGE AND SUBSTAGE BOUNDARIES

The lowest occurrence of the inoceramid bivalve *Platyceramus undulatoaplicatus* is the first selected marker for the Coniacian/Santonian boundary (Lamolda & Hancock, 1996; Ogg, J.G., 2004). Since there is no consistent definition of Coniacian substages and substage boundaries, it is recommended to use the FO of the inoceramid *Volviceras koeneni* and/or the FO of *Peroniceras tridorsatum* as the Lower/Middle Coniacian substage boundary and the FO of the cosmopolitan inoceramid *Magadiceramus subquadratus* as the Middle/Upper Coniacian boundary (Kauffman, E. G. comp. et al., 1996). Similarly, there are no formal proposals for the subdivision of the Santonian although a three-fold division is recommended (Lamolda & Hancock, 1996).

CONIACIAN-SANTONIAN IN PYRENEES



In the south-central Pyrenees and, specially around the Carreu area, the Coniacian and Santonian strata are well exposed and represent the transition from carbonate platform to upper talus and deep shelf. The first occurrence of *P. undulatoaplicatus* can be traced through all the area, showing that it is relatively facies-independent. Moreover, the abundance of macrofauna, mainly of ammonites, inoceramids and echinoids, allowed to obtain a biostratigraphic framework with as much detail as to make possible an high-resolution correlation that shows the precise relationships between the identified ammonite and inoceramid biozones (Gallemí et al. 2004).

AMMONITES

INOCERAMIDS

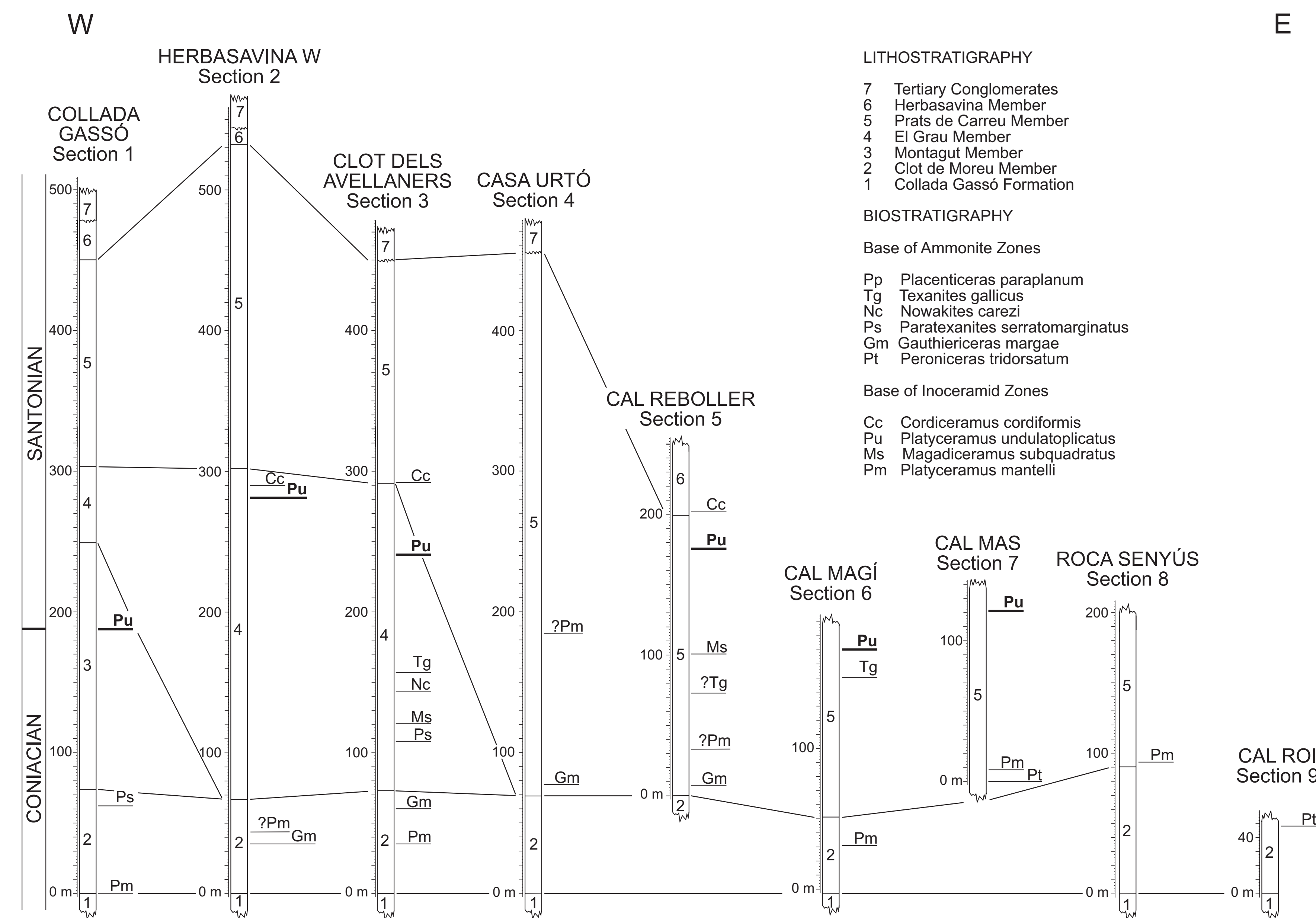
		SANTONIAN		CONIACIAN	
SANTONIAN	Platyceramus polyopsis	¿ <i>Platenticeras paraplanum</i> ?		MIDDLE CONIACIAN	
		<i>Texanites gallicus</i>		UPPER CONIACIAN	
		<i>Nowakites carezi</i>		MIDDLE CONIACIAN	
CONIACIAN	MID. UPPER	<i>Paratexanites serratomarginatus</i>		UPPER CONIACIAN	
		<i>Gauthiericeras margae</i>		MIDDLE CONIACIAN	
		<i>Peroniceras tridorsatum</i>		MIDDLE CONIACIAN	
		SANTONIAN		CONIACIAN	
		<i>Cordiceramus cordiformis</i>		MIDDLE CONIACIAN	
		<i>Platyceramus undulatoaplicatus</i>		UPPER CONIACIAN	
		<i>Magadiceramus subquadratus</i>		UPPER CONIACIAN	
		<i>Platyceramus mantelli</i>		MIDDLE CONIACIAN	

AMMONITE AND INOCERAMID STANDARD ZONES

The standard ammonite biozones for the Coniacian and Santonian of Western Europe are: *Forresteria petrocorientis* Zone (Lower Coniacian); *Peroniceras tridorsatum* Zone (Middle Coniacian); *Gauthiericeras margae* Zone (lower part of the Upper Coniacian); *Paratexanites serratomarginatus* Zone (upper part of the Upper Coniacian) and *Platenticeras polyopsis* Zone (Santonian), this last subdivided in three subzones: *Nowakites carezi* (lower), *Texanites gallicus* (middle) and *Platenticeras paraplanum* (upper).

The standard inoceramid biozones for the same interval are: *Cremnoceramus erectus* Zone (Lower Coniacian); *Platyceramus mantelli* Zone (Middle Coniacian); *Magadiceramus subquadratus* Zone (Upper Coniacian); *Platyceramus undulatoaplicatus* Zone (Lower Santonian); *Cordiceramus cordiformis* Zone (uppermost part of Lower Santonian and lower part of Middle Santonian); *Cordiceramus cordiinitialis riedeli* Zone (upper part of Middle Santonian) and *Cordiceramus branchoformis* Zone (Upper Santonian).

Any of these two macrofossils standard scales are used when working with Coniacian-Santonian sediments.



AMMONITE AND INOCERAMID STANDARD ZONES CORRELATION

Some facts can be inferred when correlating the ammonite and inoceramid biozones:

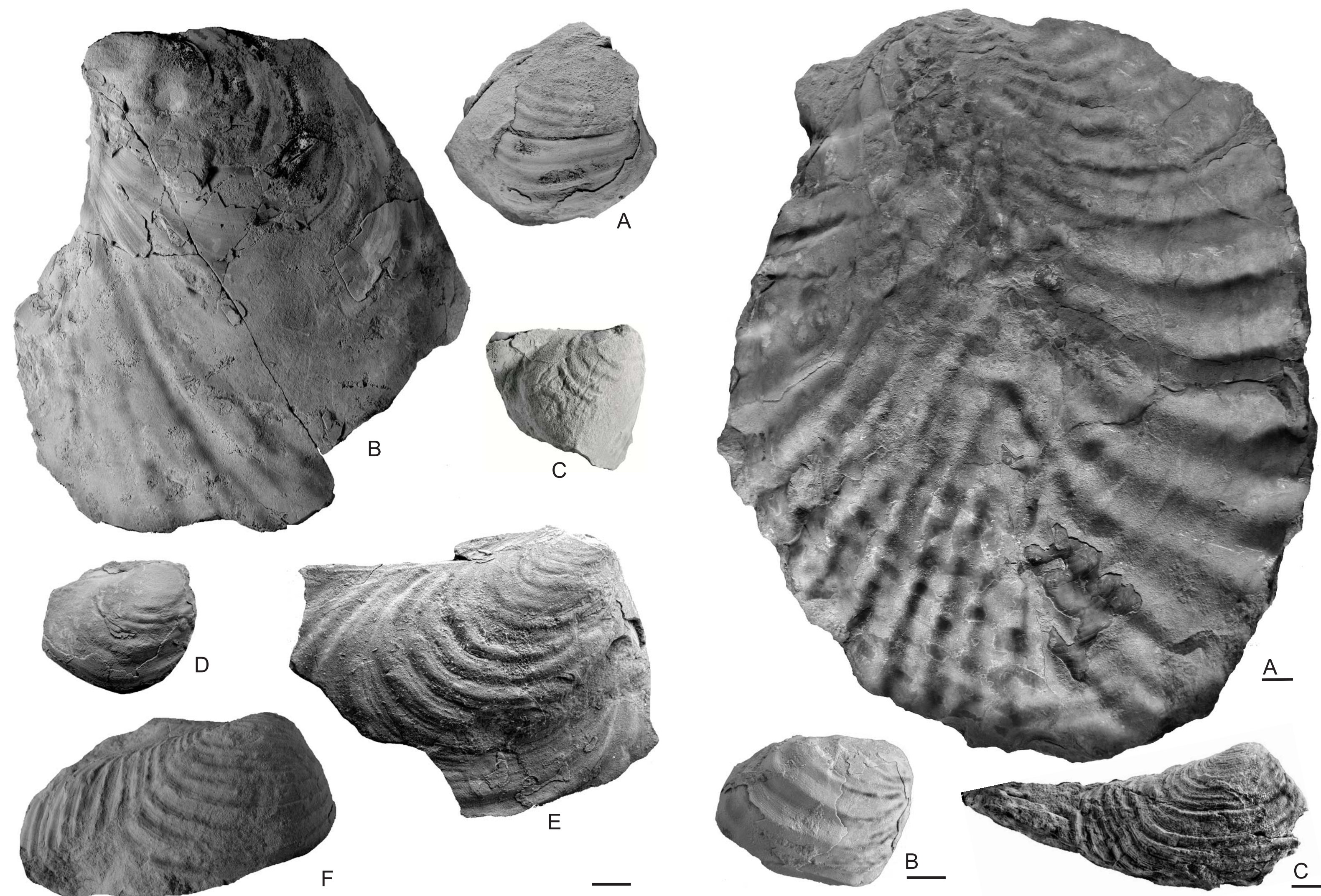
The C/S boundary taken at the base of the *Platyceramus undulatoaplicatus* inoceramid zone is not coincident with the base of the *Platenticeras polyopsis* ammonite zone, considered as the base of the Santonian in the ammonite standard scale. In fact, the FO of *P. undulatoaplicatus* is higher in the *Texanites gallicus* ammonite subzone.

The *Magadiceramus subquadratus* Zone, representing in the inoceramid scale the whole Upper Coniacian, corresponds to the *Paratexanites serratomarginatus* Zone plus the *Nowakites carezi* Subzone and plus part of the *Texanites gallicus* Subzone, representing in the ammonite scale from the upper part of the Upper Coniacian to the Santonian.

The *Platyceramus mantelli* Zone, representing in the inoceramid scale the whole Middle Coniacian, is coincident with both the *Peroniceras tridorsatum* Zone and the *Gauthiericeras margae* Zone attributed in the ammonite scale to the Middle Coniacian and to the lower part of the Upper Coniacian.

REFERENCES

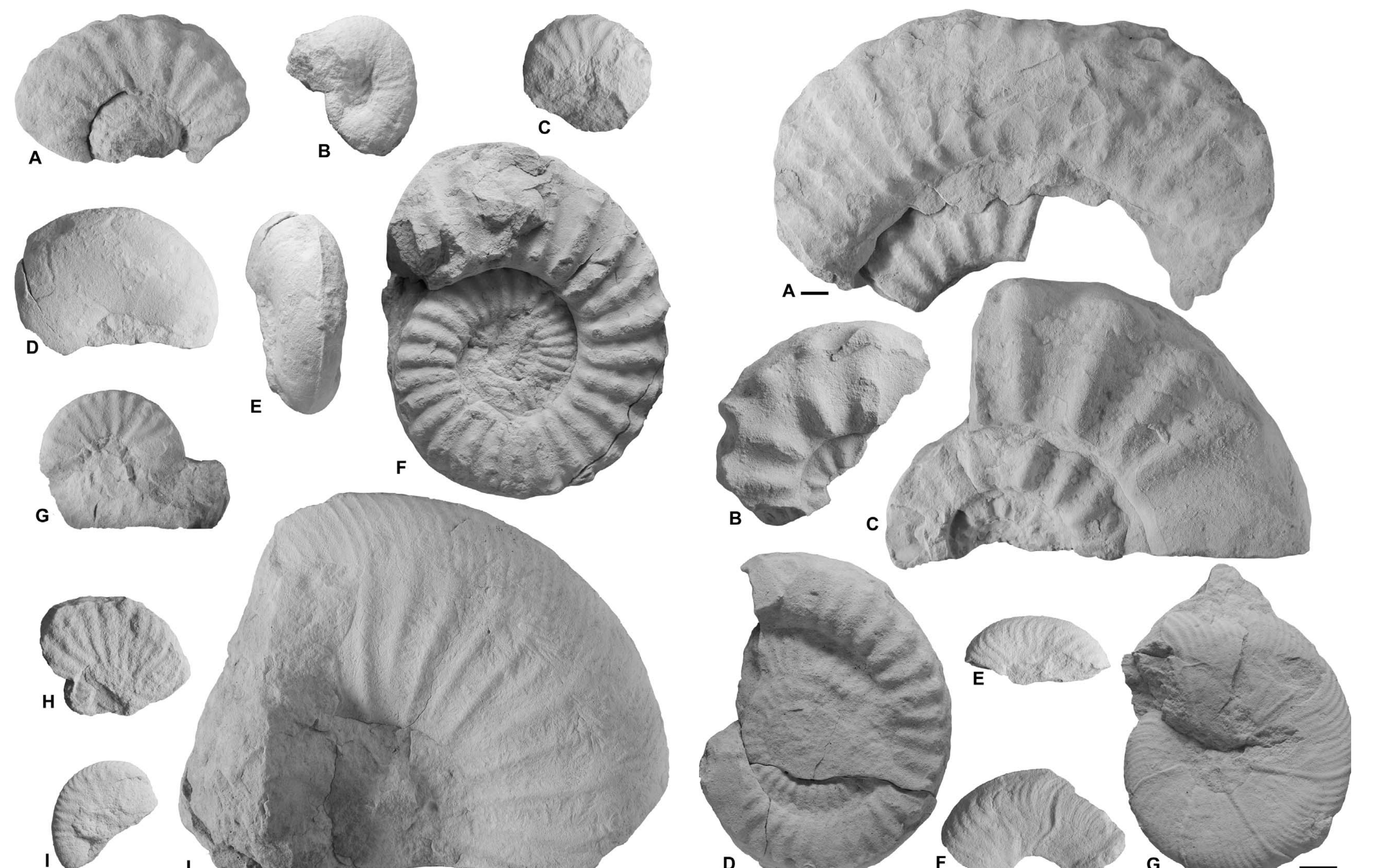
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A. *Cremnoceramus crassus* (Petrascheck, 1903), PUAB73026, *Platyceramus mantelli* Zone, Cal Reboiler section 5.
B. *Platyceramus mantelli mantelli* (Barrois, 1872), PUAB61826, *Platyceramus mantelli* Zone, Collada Gassó section 1.
C. *Inoceramus cf. frechi* (Flegel, 1904), PUAB73024, *Platyceramus mantelli* Zone, Cal Reboiler section 5.
D. *Inoceramus dolosonensis* (McLearn, 1943), PUAB73017, *Platyceramus mantelli* Zone, Cal Reboiler section 5.
E. *Platyceramus mantelli subrhenumus* (Seitz, 1962), PUAB61826, *Platyceramus mantelli* Zone, Herbasavina W section 2.
F. *Magadiceramus soukupii* (Macká, 1967), PUAB61753, *Magadiceramus subquadratus* Zone, Herbasavina W section 2.
All figures are at the same scale. Bar = 1cm.

A. *Platyceramus undulatoaplicatus* (Roemer, 1852), PUAB19012, *Platyceramus undulatoaplicatus* Zone, Barranc de Montsor section.
B. *Cordiceramus cordiformis boehmi* (Müller, 1867), PUAB35562, *Cordiceramus cordiformis* Zone, Cal Reboiler section 5.
C. *Magadiceramus subquadratus* (Schlüter, 1867), PUAB35071, *Magadiceramus subquadratus* Zone, Herbasavina W section 2.
All figures except A are at the same scale. Bar = 1cm.

A. *Protexanites bourgeoi* (d'Orbigny, 1850), PUAB5810, *Paratexanites serratomarginatus* Zone, Clot dels Avellaners section 3.
B. *Nowakites carezi* (de Grossouvre, 1894), PUAB5700, *Nowakites carezi* Subzone, Clot dels Avellaners section 3.
C. *Texania rivierae* (Collignon, 1983), PUAB68285, *Texanites gallicus* Subzone, Cal Magi section 6.



D-E. *Damesites sugata* (Forbes, 1846), PUAB70053, *Paratexanites serratomarginatus* Zone, Clot dels Avellaners section 3.
F. *Texanites gallicus* Collignon, 1948, *Paratexanites serratomarginatus* Zone, Clot dels Avellaners section 3.
G. *Gauthiericeras nouellianum* (d'Orbigny, 1850), PUAB70060, *Peroniceras tridorsatum* Zone, Cal Mas section 7.
H. *Texanites hispanicus* Collignon, 1948, PUAB68300, *Paratexanites serratomarginatus* Zone, Cal Magi section 6.
I. *Scaphites (S.) meslei* de Grossouvre, 1894, PUAB12564, *Peroniceras tridorsatum* Zone, Clot dels Avellaners section 3.
J. *Parapuzosia daubreii*, PUAB70061, *Gauthiericeras margae* Zone, Cal Reboiler section 5.
All figures are at the same scale. Bar = 1cm.

A. *Texanites gr americanus* (Lasswitz, 1904)-*rarecostatus* Collignon, 1966, PUAB70066, *Platenticeras paraplanum* Subzone, C. d. Avellaners section 3.
B. *Gauthiericeras margae* (Schlüter, 1867), PUAB70065, *Gauthiericeras margae* Zone, Cal Reboiler section 5.
C. *Gauthiericeras margae* (Schlüter, 1867), PUAB68288, *Gauthiericeras margae* Zone, Clot dels Avellaners section 3.
D. *Peroniceras tridorsatum* (Schlüter, 1867), PUAB68290, *Peroniceras tridorsatum* Zone, Cal Roi section 9.
E. *Pseudoschloenbachia inconstans* (de Grossouvre, 1894), PUAB70055, *Nowakites carezi* Subzone, Clot dels Avellaners section 3.
F. *Pseudoschloenbachia inconstans* (de Grossouvre, 1894), PUAB68294, *Texanites gallicus* Subzone, Cal Magi section 6.
G. *Parapuzosia corbarica* (de Grossouvre, 1894), PUAB68289, *Gauthiericeras margae* Zone, Roca Senyús section 8.
All figures except A are at the same scale. Bar = 1cm.