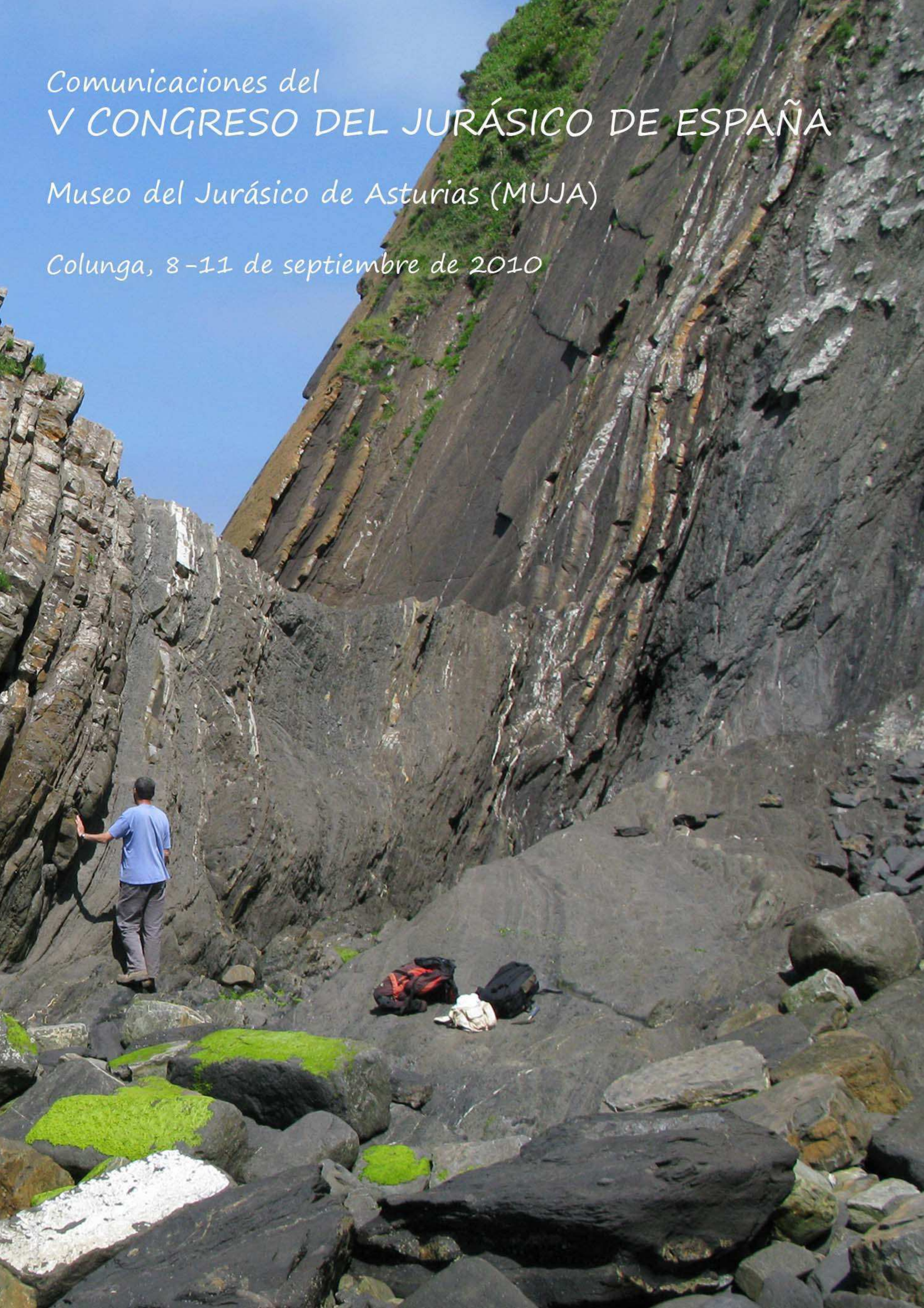
Comunicaciones del

V CONGRESO DEL JURÁSICO DE ESPAÑA

Museo del Jurásico de Asturias (MUJA)

Colunga, 8-11 de septiembre de 2010



Comunicaciones del

V Congreso del Jurásico de España.

Museo del Jurásico de Asturias (MUJA),

Colunga, 8-11 de septiembre de 2010.

Ficha catalográfica

Comunicaciones del V Congreso del Jurásico de España. Museo del Jurásico de Asturias (MUJA), Colunga, 8-11 de septiembre de 2010.

José Ignacio RUIZ-OMEÑACA, Laura PIÑUELA y José Carlos GARCÍA-RAMOS, Editores

Colunga: Museo del Jurásico de Asturias

xi + 210 pp.; 65 il.; 29,7 x 21 cm

ISBN-13: 978-84-693-3695-3

CDU: 56(063) Paleontología. Fósiles. (Congresos).

Maquetación: José Ignacio Ruiz-Omeñaca y Laura Piñuela

Imprime: Servitec, Oviedo

ISBN-13: 978-84-693-3695-3

Depósito legal: AS-3698-2010

Ejemplo de cita:

Aurell, M., Bádenas, B., Ipas, J. & Ramajo, J. (2010): El Jurásico de la Cordillera Ibérica central: organización secuencial y dinámica sedimentaria. En: *Comunicaciones del V Congreso del Jurásico de España. Museo del Jurásico de Asturias (MUJA), Colunga, 8-11 de septiembre de 2010* (J.I. Ruiz-Omeñaca, L. Piñuela & J.C. García-Ramos, Eds.). Museo del Jurásico de Asturias, Colunga, 3-9.

Comunicaciones del

V Congreso del Jurásico de España.

Museo del Jurásico de Asturias (MUJA),
Colunga, 8-11 de septiembre de 2010

Editores: José Ignacio RUIZ-OMEÑACA, Laura PIÑUELA &
José Carlos GARCÍA-RAMOS

Comité de honor

Excmo. Sr. D. Vicente Alberto ÁLVAREZ ARECES
Presidente del Gobierno del Principado de Asturias

D. Vicente Miguel GOTOR SANTAMARÍA
Rector Magnífico de la Universidad de Oviedo

D. José Rogelio PANDO VALLE
Alcalde-Presidente del Ayuntamiento de Colunga

Dña. Ana CRESPO BLANC
Presidenta de la Sociedad Geológica de España

Dña. Ana MÁRQUEZ-ALIAGA
Presidenta del Grupo Español del Mesozoico

Comité organizador

Presidente:
Dr. José Carlos GARCÍA-RAMOS (MUJA y Universidad de Oviedo)

Tesorera:
Dña. Laura PIÑUELA (MUJA y Universidad de Oviedo)

Secretario:
Dr. José Ignacio RUIZ-OMEÑACA (MUJA y Universidad de Oviedo)

Colaboradores:
Dr. Carlos ARAMBURU (Universidad de Oviedo)
D. David Didier BERMÚDEZ-ROCHAS (Universidad de Cantabria)
Dra. Graciela DELVENE (IGME, Madrid)

Coordinación de excursiones

Excursión A: ***Las sucesiones margo-calcáreas marinas del Jurásico Inferior y las series fluviales del Jurásico Superior. Acantilados de la playa de Vega (Ribadesella).***

Coordinador: Dr. José Carlos GARCÍA-RAMOS (MUJA y Universidad de Oviedo)

Guías:
Dr. Carlos ARAMBURU (Universidad de Oviedo)
Dra. Maider ARMENDÁRIZ (IGME, Madrid)
Dr. Marcos AURELL (Universidad de Zaragoza)
Dra. Beatriz BÁDENAS (Universidad de Zaragoza)
Dr. Eduardo BARRÓN (IGME, Madrid)
Dra. María José COMAS-RENGIFO (Universidad Complutense de Madrid)
Dr. Antonio GOY (Universidad Complutense de Madrid)
Dña. Laura PIÑUELA (MUJA y Universidad de Oviedo)
Dra. Idoia ROSALES (IGME, Madrid)
Dr. José Ignacio RUIZ-OMEÑACA (MUJA y Universidad de Oviedo)
Dr. Luis Carlos SUÁREZ-VEGA (Universidad Complutense de Madrid)

Excursión B: ***Las sucesiones litorales y marinas restringidas del Jurásico Superior. Acantilados de Tereñes (Ribadesella).***

Coordinadores:	Dr. José Carlos GARCÍA-RAMOS	(MUJA y Universidad de Oviedo)
	Dr. Carlos ARAMBURU	(Universidad de Oviedo)
Guías:	D. David Didier BERMÚDEZ-ROCHAS	(Universidad de Cantabria)
	Dra. Graciela DELVENE	(IGME, Madrid)
	Dr. Franz FÜRSICH	(Friedrich-Alexander Universität Erlangen-Nürnberg)
	Dña. Laura PIÑUELA	(MUJA y Universidad de Oviedo)
	Dr. José Ignacio RUIZ-OMEÑACA	(MUJA y Universidad de Oviedo)
	Dr. Winfried WERNER	(Palaeontologisches Museum München)

Comité científico (revisores del volumen)

Juan Luis ALONSO	(Universidad de Oviedo)
Marcos AURELL	(Universidad de Zaragoza)
Marco AVANZINI	(Museo Tridentino di Scienze Naturali, Trento)
Ana Cristina AZERÊDO	(Universidade de Lisboa)
Beatriz BÁDENAS	(Universidad de Zaragoza)
Nathalie BARDET	(Museum national d'Histoire naturelle, Paris)
Antonio BARNOLAS	(IGME, Madrid)
Eduardo BARRÓN	(IGME, Madrid)
José Ignacio CANUDO	(Universidad de Zaragoza)
María José COMAS-RENGIFO	(Universidad Complutense de Madrid)
Graciela DELVENE	(IGME, Madrid)
Luís Vitor DUARTE	(Universidade de Coimbra)
Sixto FERNÁNDEZ-LÓPEZ	(Universidad Complutense de Madrid)
Franz FÜRSICH	(Friedrich-Alexander Universität Erlangen-Nürnberg)
Antonio GOY	(Universidad Complutense de Madrid)
Martin LOCKLEY	(Dinosaur Tracks Museum, University of Colorado at Denver)
Guillermo MELÉNDEZ	(Universidad de Zaragoza)
Martin MUNT	(Natural History Museum, London)
Federico OLÓRIZ	(Universidad de Granada)
Kevin PAGE	(University of Plymouth)
Xabier PEREDA SUBERBIOLA	(Universidad del País Vasco, UPV/EHU)
Laura PIÑUELA	(MUJA y Universidad de Oviedo)
Josep POBLET	(Universidad de Oviedo)
Victoriano PUJALTE	(Universidad del País Vasco, UPV/EHU)
José Ignacio RUIZ-OMEÑACA	(MUJA y Universidad de Oviedo)
Miguel M. RAMALHO	(INETI-LNEG, Lisboa)
Pascual RIVAS	(Universidad de Granada)
Francisco J. RODRÍGUEZ-TOVAR	(Universidad de Granada)
Idoia ROSALES	(IGME, Madrid)
Ramón SALAS	(Universitat de Barcelona)
Jingeng SHA	(Nanjing Institute of Geology and Palaeontology)
Soledad URETA	(Universidad Complutense de Madrid)
Juan Antonio VERA	(Universidad de Granada)
Winfried WERNER	(Palaeontologisches Museum München)

Callovian to lower Kimmeridgian ammonite successions from West Sicily (Roccapalumba) and Northeast Iberian Range (Ariño, Teruel): A key for palaeogeographical reconstruction.

Las sucesiones de ammonites del Calloviense-Kimmeridgiense inferior en Sicilia occidental (seccion de Roccapalumba) y en la Cordillera Iberica nororiental: una clave para la reconstruccion paleogeografica.

Meléndez, G.[1], D'Arpa, C.[2], Di Stefano, P.[3], Bello, J.[1] & Ramajo, J.[4]

1: Área de Paleontología, Departamento de Ciencias de la Tierra. Universidad de Zaragoza. c/ Pedro Cerbuna, 12. E-50009 Zaragoza. Spain. gmelende@unizar.es
2: Museo Geologico Gemmellaro, Dipartimento di Geologia e Geodesia, Università degli Studi di Palermo. Corso Tukory, 131. I-90134 Palermo. Italy. cdarpa@unipa.it
3: Dipartimento di Geologia e Geodesia, Università degli Studi di Palermo. Via Archirafi, 22. I-90123 Palermo. Italy. pietro.distefano@unipa.it
1: Área de Estratigrafía, Departamento de Ciencias de la Tierra. Universidad de Zaragoza. c/ Pedro Cerbuna, 12. E-50009 Zaragoza. Spain. ramajo@unizar.es

Resumen: *La comparacion de las sucesiones de ammonites en el intervalo comprendido entre el Calloviense y el Kimmeridgiense inferior en la region de Sicilia occidental (Roccapalumba-Sciacca) y la Cordillera Iberica nororiental (Sierra de Arcos) muestra una clara similitud y paralelismo en el desarrollo estratigrafico. Esto incluye el registro incompleto del Calloviense inferior, una amplia laguna estratigrafica (Calloviense inferior-Oxfordiense medio) y un registro mas completo del Oxfordiense medio-superior (biozonas Transversarium-Bifurcatus) y Kimmeridgiense inferior. Esto permite inferir una evolucion paleogeografica paralela en ambas regiones del Tethys. Las asociaciones registradas de ammonites muestran por el contrario claras diferencias de tipo taxonomico (mayor diversidad en la plataforma epicontinental) y tafonomico: poblaciones tafónicas de tipo 3 en la region de Ariño, con grandes concentraciones de ejemplares, y poblaciones tafónicas de tipo 2 en Sicilia occidental con mayor escasez. Estas diferentes propiedades permiten reconstruir detalladamente la evolucion paleogeográfica de ambas áreas.*

Palabras clave: *Ammonoidea, Jurásico Medio, Jurásico Superior, Paleobiogeografia, Bioestratigrafia.*

Introduction

Middle-Upper Jurassic sequences from western Sicily have been the subject of detailed stratigraphic studies in the last ten years. The Callovian-Oxfordian stratigraphy and ammonite successions from western Sicily were described and studied by D'Arpa (2003). The Oxfordian biostratigraphy and ammonite sequence from the section of Contrada Diesi, (Sciacca) has been described by D'Arpa and Meléndez (2006), including a discussion on the underlying Callovian beds and an analysis of the stratigraphic non-sequence at the Callovian-Oxfordian boundary. The Middle-Upper Jurassic sequence at Roccapalumba ("The Rock") in turn, was briefly revised by D'Arpa *et al*. (2006, 2009; Fig. 1).

The Callovian-Oxfordian sequences from Iberian Range (E Iberia, Spain) have been the subject of many studies during the last 40 years. A synthetic review has been recently presented by Meléndez *et al*. (2007b; see references therein). Bello (2005) and Ramajo (2006) have made significant contributions respectively to the Oxfordian ammonite biostratigraphy and palaeontology, and to facies analysis and sequence stratigraphy.

Meléndez *et al*. (2007a) interpreted the particular features of the Callovian-Oxfordian succession and the important discontinuity and non-sequence at the Callovian-Oxfordian boundary as the result of block fragmentation and general emersion of shallow areas across the Tethys, from Iberia to western Greece and Hungary during the Callovian.

A possible thermal updoming related to the interaction of the widespread magmatic activity and the drifting of the Alpine Tethys has been suggested by Zarcone and Di Stefano (2010) to explain the Mid-Jurassic stratigraphic anomalies recorded by the Sicilian successions. A general drowning process of epicontinental and epioceanic platforms followed from middle Oxfordian onwards. This general process of sinking would result, on one side, in a homogenization of marine environments across the Tethys and, on the other, in a clear faunal differentiation between Submediterranean (southern Europe, epicontinental) and Mediterranean (Tethyan; epioceanic) provinces.

More recently, Scherreiks *et al*. (in press) have shown the existence of a similar stratigraphic non-sequence at the Middle-Upper Jurassic boundary in the eastern Hellenids (Pelagonian platform) and in the western part of the main land (Ioannina) interpreting it within a general context of compressive regime.

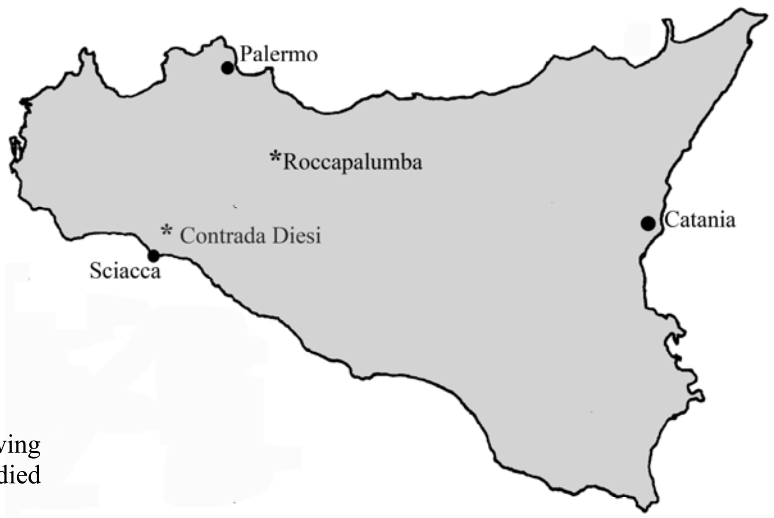


Figure 1. General map of Sicily, showing the approximate location of the studied sections.

Middle-Upper Jurassic sequence from Roccapalumba (Figs. 1, 2)

The Jurassic sequence at the village of Roccapalumba crops out along an overturned carbonate succession overthrusting clastic deposits of Neogene age.

The oldest deposits cropping out at this point are Middle Jurassic, (?) Bajocian to Bathonian in age (D'Arpa *et al*., 2009). Lower Callovian deposits are represented by a ca. 3 metre-thick interval of light grey, micritic and stromatolitic massive limestones (Fig. 2). The Bathonian-Callovian boundary is marked by an uneven discontinuity surface, above which, a remotion level contains a reworked ammonite recorded association including reelaborated specimens (mould fragments) of *Nannolytoceras*, and a disarticulated, truncated incomplete specimen of *"Choffatia"* cf. *recuperoi* (GEMMELLARO) from the basal Callovian. On top of this interval, a sharp irregular surface marks the Middle-Upper Jurassic boundary level. Above this surface, a centimetre-thick irregular limestone layer contains scarce Callovian ammonites, preserved as fragmented internal moulds showing evidence of taphonomic reelaboration (*Paralcidia*, *Hecticoceras*, *Grossouvria*).

The Upper Jurassic sequence above this level comprises a first carbonate sequence, including a lower, 13 m thick grey-brownish, *Protoglobigerina* bioclastic wackestone, somewhat nodular limestone interval (Oxfordian) and an upper, 4 m thick wackestone to packstone bioclastic limestone containing common specimens of *Saccocoma* (Kimmeridgian).

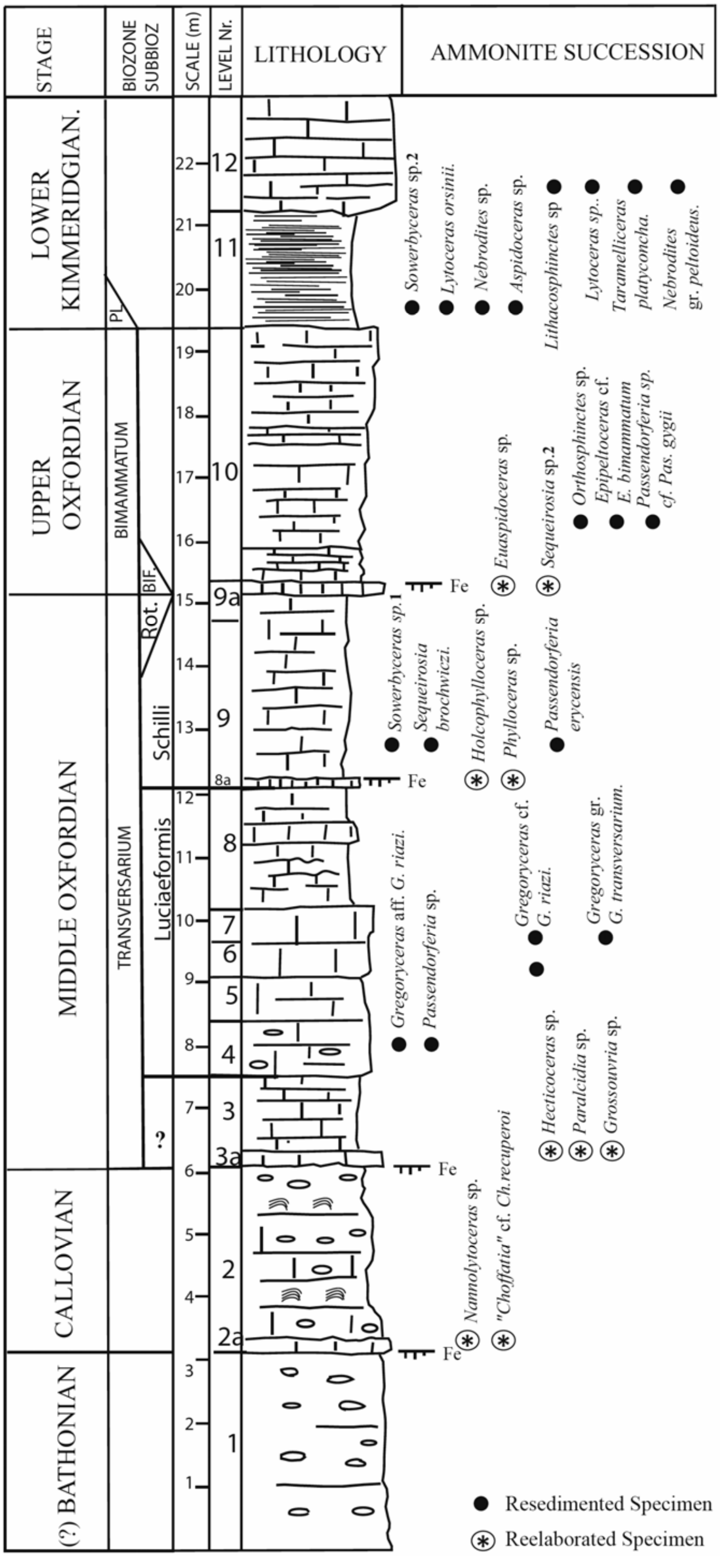


Figure 2. Middle-Upper Jurassic (Callovian-lower Kimmeridgian) lithologic and biostratigraphic succession at the section of Roccapalumba (Central-West Sicily).

This bioclastic-stromatolitic interval is overlain by grey micritic limestones of presumably Tithonian age. They are truncated on top by a sharp discontinuity surface, which is in turn covered by a 20 m thick *Globotruncana* calcilutites ("Scaglia" type) of Late Cretaceous age.

The ammonite succession (mainly Passendorferiinae; and Peltoceratinae) has allowed characterising the successive biostratigraphic units of the middle and upper Oxfordian, from Transversarium Biozone Luciaeformis Subbiozone to Bimammatum Biozone. The lower Kimmeridgian (?) Platynota Biozone is characterized by the record of few specimens of *Lithacosphinctes* sp., *Nebrodites* cf. *peltoideus* GEMMELLARO, and *Nebrodites* sp. ind.

Attention should be paid to the minor stratigraphic nonsequences recorded at the Luciaeformis-Schilli Subbiozone boundary and at the Bifurcatus-Bimammatum boundary, which involve small stratigraphic gaps: At the Transversarium-Bimammatum Biozone boundary, the recorded ammonite succession seems to evidence a gap involving the Rotoides Subbiozone and the whole Bifurcatus Biozone. However, the record of a reelaborated specimen of *Sequeirosia* sp. together with non-reelaborated specimens of *Epipeltoceras* and *Orthosphinctes* suggests that the corresponding registratic unit; i.e. the Bifurcatus Taxorrecord (cf. Fernández-López, 1986) might be at least partly represented in the sequence.

The Callovian-Oxfordian stratigraphy and ammonite succession from Contrada Diesi (Fig. 3)

The Callovian to lower Kimmeridgian ammonite succession and biostratigraphy of Contrada Diesi near Sciacca (West Sicily; Fig.1) have been recently revised by D'Arpa & Meléndez (2006; see references therein).

In the quarry of Contrada Diesi the section exposes about 11 m of peritidal bioclastic limestones (Inici Formation) (early-middle Lias). They are overlain unconformably by a 12 m thick massive calcilutites (Buccheri Fm).

The lower 6.75 m form a hard, pelagic limestone interval (the "*Bositra* limestones") ranging in age from Bathonian to middle Oxfordian. The upper part, 5.25 m thick, comprises a lower, 2.5 m thick interval formed by silty limestones (middle-upper Oxfordian) and an upper, 2,75 m thick sequence formed by stromatolitic limestones (Kimmeridgian).

The early to early-middle Callovian age of the upper beds of the *Bositra* limestone unit, below the Callovian-Oxfordian boundary bed, is confirmed by the record in these levels of few specimens of "*Reineckeia*" sp., Hecticoceratinae ind., and *Homoeoplanulites* sp.

According to D'Arpa & Meléndez (2006) the Callovian-Oxfordian boundary must be located at the stratigraphic boundary between beds 3a and 3b. This bed plane is a discontinuity surface, which involves a huge stratigraphic gap ranging from middle Callovian, Anceps Biozone to middle Oxfordian, Plicatilis Biozone, most probably, Antecedens Subbiozone.

Similarly, level 3b would constitute a reworking level including reelaborated ammonites corresponding to former, missing sedimentary episodes. These include a reelaborated specimen (truncated internal mould) of *Passendorferia* (m) *nodicostata* MELÉNDEZ as well as few specimens (fragmented moulds) of *Neocampylites* and *Platysphinctes*. This means that the Cordatum and Vertebrale taxorrecords are, at least, partly represented in the ammonite recorded succession (i.e. the registratic succession).

Middle Oxfordian (Fig. 3)

Above the level 3b, the recorded ammonite succession has allowed characterizing the Plicatilis Biozone, Antecedens Subbiozone (levels 4-5) the Transversarium Biozone, Parandieri Subbiozone (level 6) and the Luciaeformis and Schilli (p.p.) subzones (level 7). A clear discontinuity on top of bed 7 marks a stratigraphic gap affecting the Schilli (p.p.) and Rotoides subbiozones.

The Bifurcatus Biozone is represented in the overlying levels 8-9 (from 7.25 to 7.65 m). Bed nr. 8 is assigned to the Stenocycloides Subbiozone by the record of non-reelaborated (i.e. resedimented) specimens of *Passendorferia torcalense* (KILIAN) and *Gregoryceras aff. fouquei* (KILIAN). This bed has also yielded some few reelaborated specimens of *Passendorferia erycensis* MELÉNDEZ, which is usually found at Schilli Subbiozone, as well as *Subdiscosphinctes kreutzi* (SIEMIRADZKI), *Gregoryceras aff. fouquei* (KILIAN) and *Passendorferia aff. erycensis* MELÉNDEZ, which characterize the uppermost Transversarium, Rotoides Subbiozone (cf. Bello, 2005). The specimens are preserved as phragmented or disarticulated internal moulds showing clear lithologic and structural discontinuity with the surrounding matrix. This means that the Schilli and Rotoides *taxorrecords* (cf. Fernández-López, 1986) are represented within bed 8 as reelaborated entities. Therefore, the stratigraphic gap in this case does not involve a *registratic* gap (Fernández-López, 1986), i.e. the absence of the corresponding recorded associations.

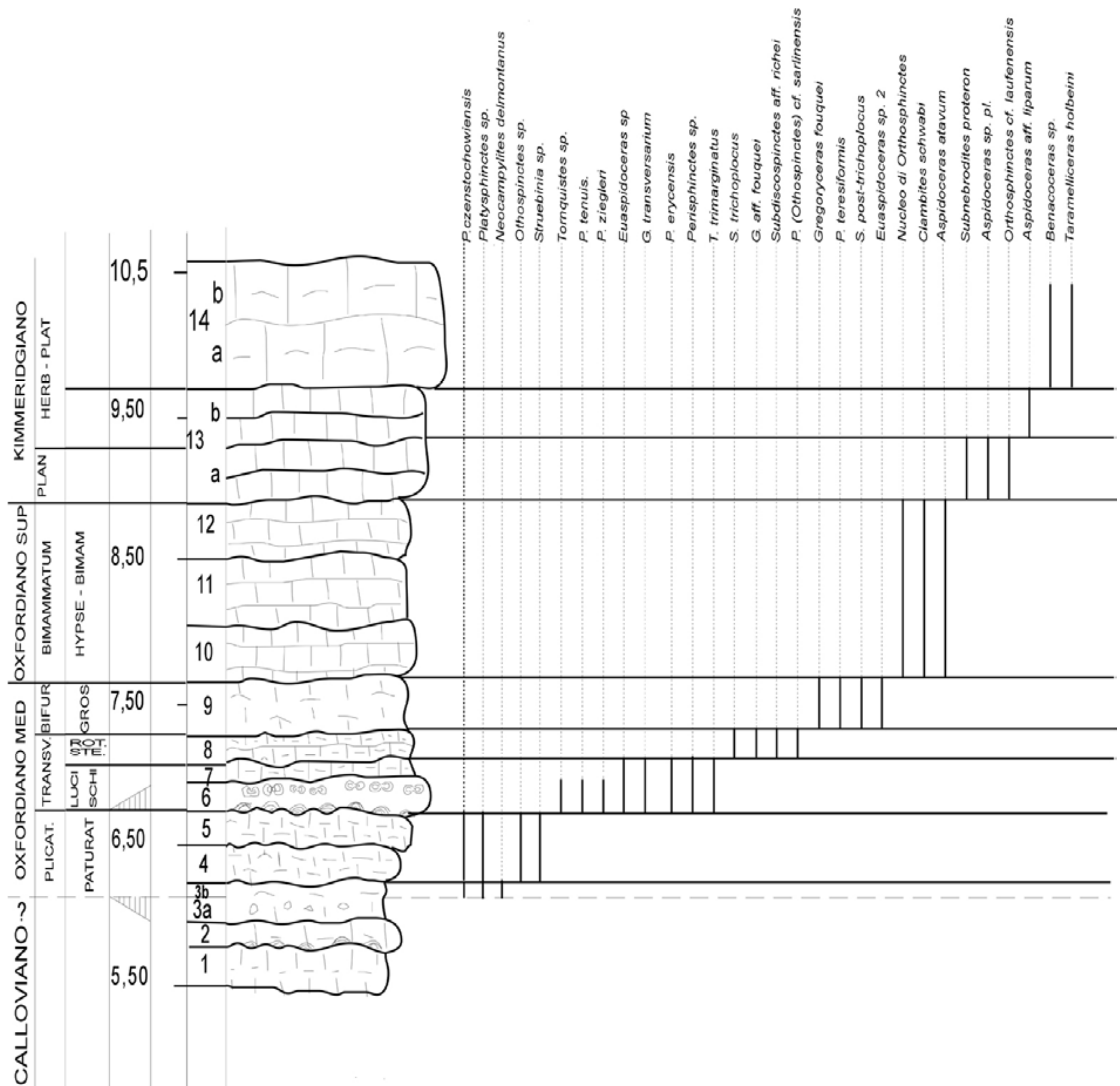


Figure 3. Middle-Upper Jurassic (Callovian to lower Kimmeridgian) at the section of Contrada Diesi, near Sciacca (Western Sicily). Ammonite succession, modified, as presented by D'Arpa & Meléndez (2006).

The upper Stenocycloides Subbiozone and Grosssouvrei Subbiozone are represented in bed nr. 9 by successive ammonite recorded associations, containing respectively non-reelaborated specimens of *Passendorferia* close to the *Pass. torcalense* (KILLIAN)-*teresiformis* (Br.-Lewinski) groups, *Passendorferia uptonioides* (ENAY), *Sequeirosia aff. trichoplocus* (GEMMELLARO), *Gregoryceras fouquei* (KILIAN) and *Taramelliceras callicerum*, DORN (non OPPEL).

The upper Oxfordian, Hypselum Subbiozone is represented in levels 10-12 (from 7.65 m to 8.85 m) containing respectively few specimens of *Orthosphinctes ariniensis* (MELÉNDEZ)-*kirkdalensis*, (ENAY; non ARKELL), as well as some scarce specimens of *Clambites schwabi* (OPPEL) and *Aspidoceras atavum//binodum* (OPPEL). Above a sharp discontinuity, levels 13 and 14 (from 8.90 m to 10.60 m) show a clear facies change towards laminated (stromatolitic) packstone becoming somewhat more bioclastic, densely packed towards the top.

The recorded associations from these levels successively characterise the late Bimammatum-Hauffianum Biozone, by the presence of *Orthosphinctes (Praeataxioceras) aff. laufenensis* (SIEMIRADZKI) and the early Planula Biozone, Proteron Subbiozone, by a specimen close to *Subnebrodites proteron* NITZOPOULOS-*tonnerrense* DE LORIOL, and numerous specimens of *Aspidoceras-Physodoceras*.

Callovian-Oxfordian stratigraphy and ammonite succession from NE Iberian Chain, Spain (Figs. 4, 5)

In the NE Iberian chain (E Spain) across the area of *Sierra de Arcos*, the Jurassic units crop out widely (Fig. 4). In the classical section of Ariño, by the riverbed of River Martín (Fig. 5) as well as in the near section of Barranco de las Estacas, the Callovian-Oxfordian interval is represented by a stratigraphic sequence showing a similar development in the stratigraphic record and extent of gaps as in the described sections from Sicily. Main differences, besides the different lithofacies, concern mostly the comparatively minor diversity and abundance of typically Mediterranean elements, such as representatives of orders Phylloceratida and Lytoceratida, which are virtually absent except for some particular intervals, and subfamily Passendorferiinae. In turn, representatives of Submediterranean taxa, such as Oppeliidae, Aspidoceratidae and Perisphinctinae appear more common and diversified, the representatives of Perisphinctinae being the dominant faunal components.

The lower Callovian is represented by a 1.5 m thick bioclastic, wackestone interval forming a shallowing upwards sequence (levels 100-107) corresponding to the Domeño Fm. The last bank (107), 0.7 m thick, contains a taphonomically reworked ammonite recorded association of lower Callovian, Bullatus Biozone on top, including many reelaborated elements such as verticalized, imbricated, truncated, fragmented and/or disarticulated internal moulds, and is crowned by a sharp iron-encrusted, truncational surface. Above this discontinuity, a first band of iron ooid micritic, bioclastic, highly fossiliferous limestone (Bed 108) forms the lower part of the so-called "*Arroyofrío Bed*". The Middle-Upper Jurassic boundary is located between bed 108 and 109, i.e. between the two main iron ooid layers that form the Arroyofrío Bed.

The boundary is underlined by a sharp discontinuity marked by an iron crust and a truncational surface. Biostratigraphic analysis reveals the presence of a huge stratigraphic and registratic gap (cf. Fernández-López, 1986) ranging from upper lower Callovian Gracilis Biozone, to Middle Oxfordian Transversarium Biozone (p.p.). Some particular taphonomic features displayed by the reelaborated internal moulds of ammonites, such as annular furrows or ellipsoidal facets, indicate extremely shallow to emerged conditions in the platform during this stratigraphic interval (Fernández-López, 1985).

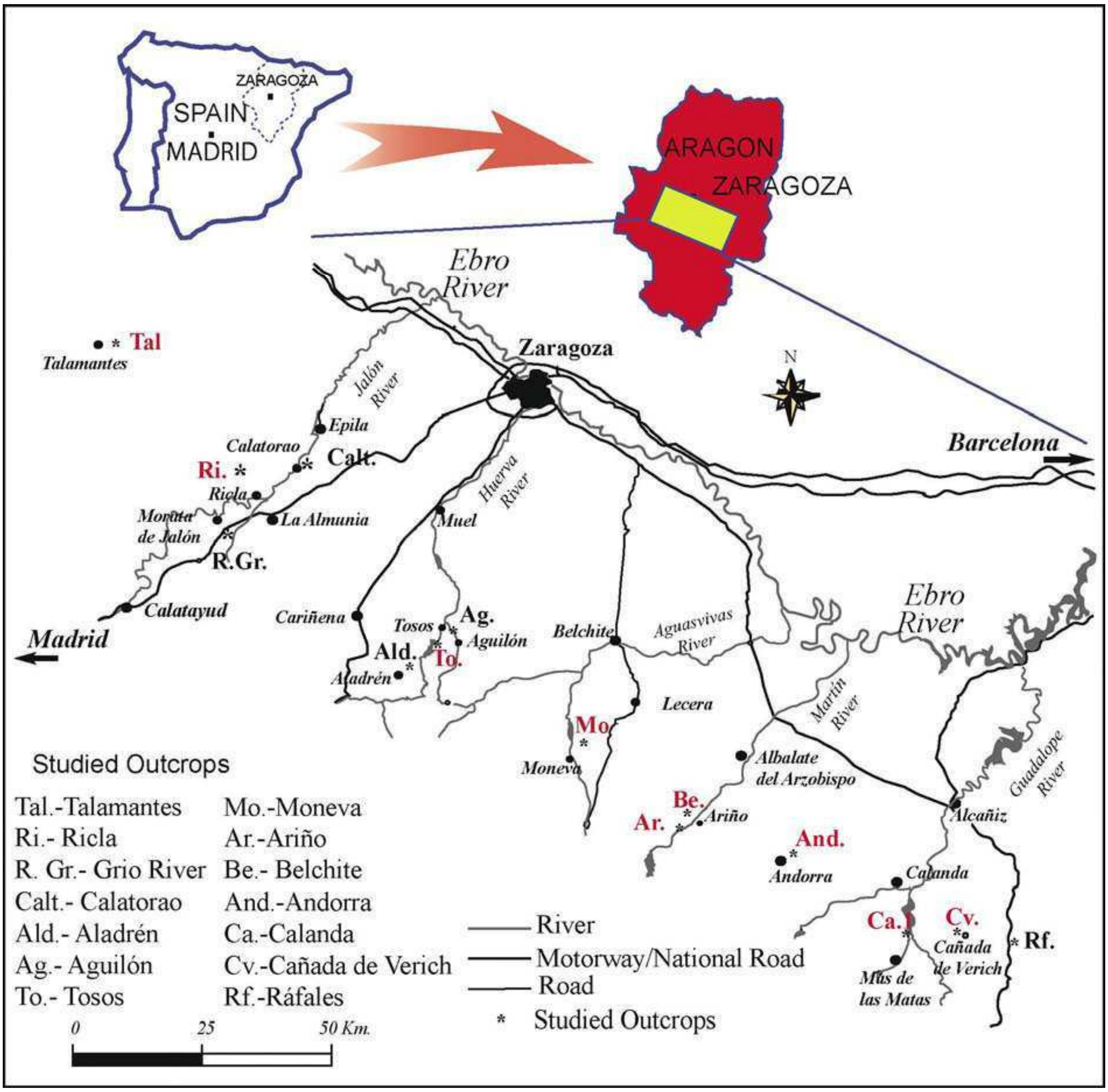


Figure 4. **G**eneral location of the main Callovian-Oxfordian sections in the NE Iberian Chain, E. Spain (modified from Bello, 2005).

The middle-upper Oxfordian is represented in a well-bedded, ca. 12 m thick glauconitic carbonate sequence (Yátova Formation) from middle Transversarium to lower Planula Biozone (Fig. 5). Biostratigraphic units are mostly established on the base of representatives of subfamilies Perisphinctinae and Ataxioceratinae. Attention should be paid to the important discontinuity located at the Transversarium-Bifurcatus Biozone boundary, which involves a stratigraphic gap of Schilli (p.p.), Rotoides and Stenocycloides (p.p.) subbiozones.

Discussion and conclusions

The described stratigraphic successions from distant areas of the Tethys show a remarkable similarity, despite obvious differences of facies, in stratigraphic intervals recorded and extent of gaps. It may be noted that so far until middle Callovian, faunal differences between both areas are practically reduced to the common occurrence of representatives of Liostraca (suborders Phylloceratina and Lytoceratina) in Sicily, which are in turn exceptional in the

Iberian platforms. Differences in ammonite spectra become more obvious from middle Oxfordian onwards. At this point the Sicilian platforms appear dominated, besides representatives of Liostraca, characteristic definers of true Tethyan province, by representatives of Perisphinctids of the subfamily Passendorferiinae, whilst representatives of Perisphinctinae are more clearly developed and diversified in epicontinental areas. A similar case applies for families Oppeliidae and Aspidoceratidae.

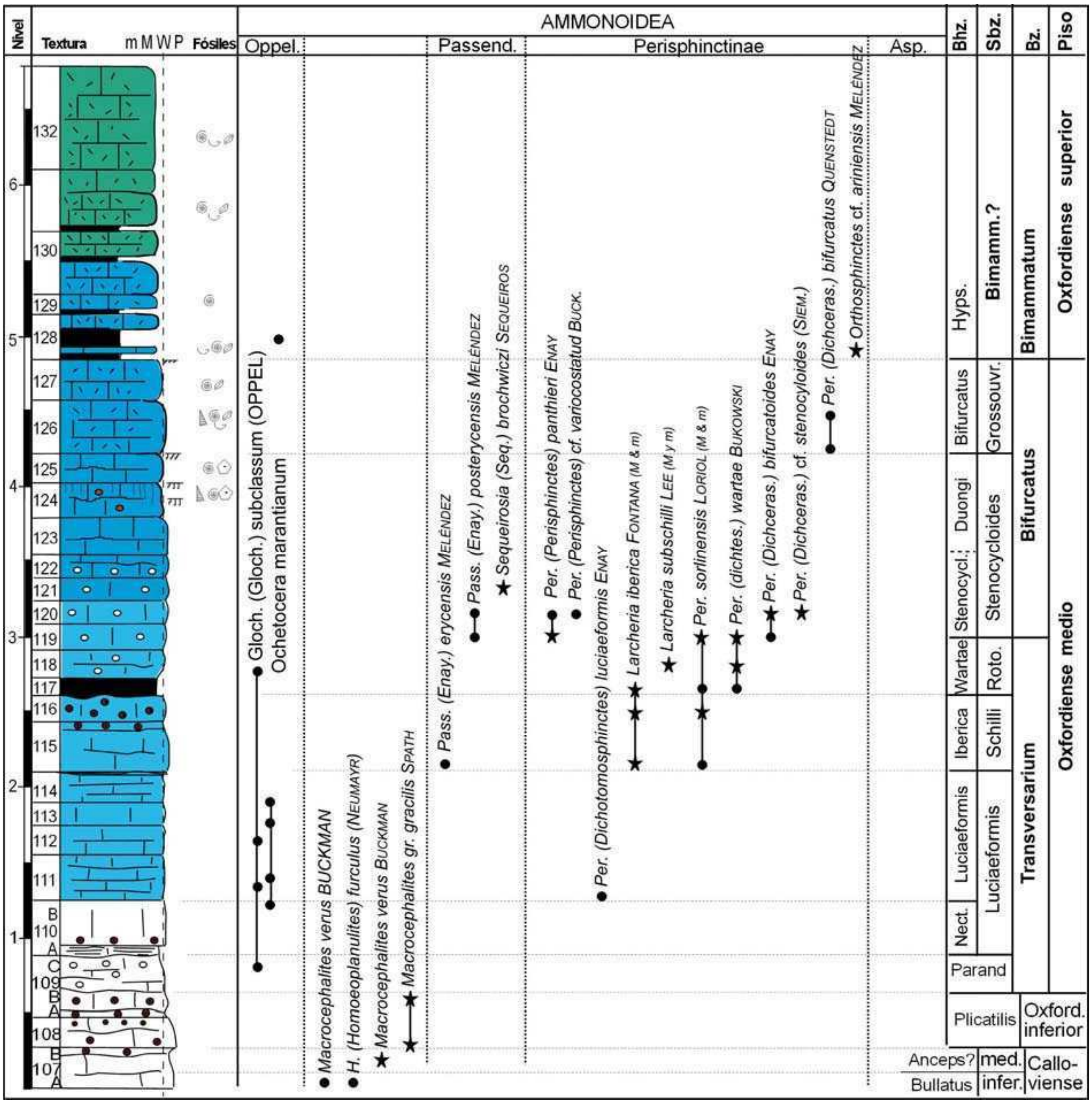


Figure 5. Detail stratigraphic and ammonite succession of the Callovian-Oxfordian at Ariño (composite of outcrops AR.1 and AR.2), as presented by Bello (2005). Planula Biozone levels are not represented.

The similarities of the stratigraphic gap at the Middle-Upper Jurassic in such distant areas as those studied here, but even at farther eastern areas of the Tethys (Greece, Hungary; see Meléndez et al., 2007a) would call for similarly general factors. The compressional regime recently proposed for this interval by Scherreiks *et al*. (in press) would supply a consistent explanation for the generalised uplifting and emersion of platform blocks in such distant areas as described here. A subsequent stage of extension and sea level rise during the middle-upper Oxfordian (Upper Jurassic) would easily explain, on one side, the drowning and homogenization of marine environments across the Tethyan Realm and, on the other, the faunal differenciation between Submediterranean (epicontinental) and Mediterranean (epioceanic) provinces, as the biogeographic distance and disconnection between epicontinental and epioceanic platforms would increase.

Acknowledgements

This work is a part of the research project CGL2008-01273/BTE (MICINN). Warm thanks are due to Drs Kevin N. Page and Rudy Scherreiks for fruitful comments and discussions on the problems treated here and to Dr. Federico Olóriz for detailed and positive refereeing of the manuscript.

References

Bello, J. (2005): *El Oxfordiense medio al Sur de Zaragoza (Cordillera Ibérica nororiental). Estudio paleontológico de la familia Perisphinctidae* STEINMAN *(Ammonoidea)*. Tesis doctoral, Departamento de Ciencias de la Tierra, Universidad de Zaragoza, 505 pp. (inédita).

D'Arpa C. (2003): *Studio delle associazioni ad ammoniti dell'Oxfordiano della Sicilia Occidentale*. Tesi Dottorale, Dipartimento di Geologia e Geodesia; Università Palermo, 258 pp. (inédita).

D'Arpa, C. & Meléndez, (2006): Oxfordian ammonites from Contrada Diesi (Sciacca, Sicily) a historical locality studied by Gemmellaro. *Quaderni del Museo Geológico "G.G. Gemmellaro"*, 9: 63-74.

D'Arpa, C., Meléndez, G. & Di Stefano, P. (2006): New biostratigraphic data on the Oxfordian from Roccapalumba (Western Sicily). In: *Abstracts of Talks and Posters presented during the 7th International Congress on the Jurassic System. September 6-18, 2006, Kraków, Poland. Volumina Jurassica*, 4: 144.

D'Arpa C., Di Stefano P., Meléndez, G., Farinella A. & Franzitta E. (2009): Facies sequences and ammonite biostratigraphy of Middle-Upper Jurassic pelagic limestones from Roccapalumba (Sicily). In*: Geoitalia 2009. VII Forum Italiano di Scienze della Terra. Rimini, 9-11 Settembre 2009. Epitome*, 3: 392.

Fernández-López, S. (1985): Criterios elementales de reelaboración en ammonites de la Cordillera Ibérica. *Acta Geológica Hispánica*, 19: 105-116.

Fernández-López, S. (1986): Sucesiones paleobiológicas y sucesiones registráticas (nuevos conceptos paleontológicos). *Revista Española de Paleontología*, 1: 29-45.

Meléndez, G., Ramajo, J., Bello, J., D'arpa, C., Di Stefano, P., Fermeli, G., Karakhitsios, V., Scherreiks, R. & Zarcone, G. (2007a): Palaeogeographic and palaeontologic event across the Tethys, in the Submediterranean and Mediterranean platforms at the Callovian-Oxfordian transition. En: *XXIII Jornadas de la Sociedad Española de Paleontología. Caravaca de la Cruz, 3-6 de octubre de 2007. Libro de Resúmenes.* (J.C. Braga, A. Checa & M. Company, Eds.) Instituto Geológico y Minero de España y Universidad de Granada, Granada, 139-140.

Meléndez, G., Ramajo, J., Bello, J. & Page K.N. (2007b): Callovian and the Callovian-Oxfordian transition sedimentary record in NE Iberian Chain: Taphonomic analysis and palaeogeography. *Journal of Iberian Geology*, 33: 156-178.

Ramajo, J. (2006): *Evolución sedimentaria del Calloviense-Oxfordiense en el sector central de la Cordillera Ibérica (Rama Aragonesa)*. Tesis Doctoral, Departamento de Ciencias de la Tierra, Universidad de Zaragoza, 405 pp. (inédita).

Scherreiks, R., Bosence, D, BouDagher-Fadel, M., Meléndez, G. & Baumgartner, P.O. (in press): Evolution of the Pelagonian carbonate platform complex and the adjacent oceanic realm in response to plate tectonic forcing (Late Triassic and Jurassic), Evvoia, Greece. *International Journal of Earth Sciences*, published online 19 June 2009.

Zarcone, G. & Di Stefano, P. (2010): La Piattaforma Carbonatica Panormide: un caso anomalo nell'evoluzione dei bacini della Tetide giurassica. *Italian Journal of Geosciences (Bollettino della Società Geologica Italiana e del Servizio Geologico d'Italia)*, 129: 188-194.