Meeting of the Kimmeridgian Working Group
18-21 May 2015, Warsaw, Poland

Book of Abstracts and Field Trip Guidebook

ISJS International Subcommission on Jurassic Stratigraphy

IUGS

Middle and Upper Jurassic record in the Western Sicily successions

D'Arpa C.[1], Cusumano A.[2] & Meléndez G.[3]

[1] Museo Geologico "G.G. Gemmellaro" - Di.S.T.e.M., Università degli Studi di Palermo, Corso Tukory 131, 90133, Palermo;

[2] Dipartimento di Scienze della Terra e del Mare (Di.S.T.e.M.), Università degli Studi di Palermo, via Archirafi, 20, 90123, Palermo;

[3] Departamento de Ciencias de la Tierra, Universidad de Zaragoza, C/ Pedro Cerbuna, 12 – 50009 Zaragoza, Spain.

Middle-Upper Jurassic successions cropping out in western Sicily have been the subject of detailed sedimentological, stratigraphic and palaeontological studies over the last 15 years based on the analysis of ammonite associations. Studies are preferentially focused on the Bathonian-Tithonian chronostratigraphic interval. Some studied successions represent the type-locality of many ammonite species defined by G.G. Gemmellaro, while others have been known only in Sicilian geological literature.

The examined sequences were sedimented in different depositional environments (moderately deep external carbonate platform) called Domains, more precisely, the Trapanese and Saccense Domains (TP, Trapanese Domain and SD, Saccense Domain), which during the Middle-Upper Jurassic were located in the western sector of the Tethys. The Sicilian studied sequences may be regarded as highly condensed, Ammonitico Rosso facies, developed on epioceanic environments similarly as Betic Chains (Sequeiros, 1974), Transdanubian Central Range in Hungary (Fözy & Meléndez, 1996; Fözy *et al.*, 1997) and Western Greece.

The compared study of Callovian-early Tithonian ammonite successions in pelagic carbonate sequences across West Sicily show clear palaeobiogeographical differences not only between the Trapanese and Saccense domains, but also within the latter.

All the successions of the TD (Rocce del Calderaro, Sant'Anna and Erice Ter at Mt. Erice) and the SD (C.da Diesi, Cava ex-Capraria, Stretta Arancio and Vallone San Vincenzo) show a Mediterranean-type fauna. It includes common representatives of suborder Phylloceratina and, among Ammonitina, the bulk of recorded associations is formed by representatives of Mediterranean subfamilies such as Passendorferiinae, Euaspidoceratinae and Peltoceratinae with a minor representation of family Oppeliidae.

The ammonite recorded associations from the C.da Diesi succession, belonging to the Saccense Domain, show a typical assemblage, ranging from lower to early middle Oxfordian (Antecedens Sub-Biozone, Plicatilis Biozone), composed by a reduced number of specimens

but showing a clear predominance of representatives of subfamily Perisphinctinae over Passendorferiinae. Especially noteworthy are representatives of genus *Platysphinctes* and, in the last association of this assemblage, of *Tornquistes* spp. The low share of representatives of the typical tethyan group Phylloceratina marks a clear difference with similar associations from other near areas belonging to the Trapanese Realm where these typical tethyan groups are dominant. The upper assemblages instead show a typical mediterranean fauna, even if there are some dubious specimens of Perisphinctinae and, for the first time in the Sicilian faunas, a representative of genus *Clambites* has been found.

In all the studied sections the Middle Jurassic, recorded from the Upper Bajocian (Contrada Monzealese) throughout the Callovian (Vallone San Vincenzo), is characterized by the same Bositra limestone facies and reaches its maximum thickness at Vallone San Vincenzo and Cava ex-Capraria sections, whilst in the sections of Contrada Diesi and Stretta Arancio, instead, the sequences show a remarkeble reduction in thickness.

The Callovian-Oxfordian transition in Sicily was marked by a wide stratigraphic gap ranging presumably from Upper Callovian to Middle Oxfordian (upper Plicatilis Zone, Antecedens Subzone). However, this gap is not homogeneous and sometimes is more expanded and involves the entire Callovian (Stretta Arancio section) (Cusumano *et al.*, 2013).

The Oxfordian, represented always by *Protoglobigerina* limestones, is almost always poorly expanded in SD (approximately, 3 m at Cava ex-Capraria to about 40 cm at Stretta Arancio) and often indistinct due to the lack of markers. Only at Vallone San Vincenzo the Upper Oxfordian is clearly reported (Bifurcatus and Bimammatum Biozones). On the contrary in C.da Diesi and in all the successions of TD the ammonite record of Middle and Upper Oxfordian was more or less complete, whilst the sedimentary record shows the presence of frequent small stratigraphic gaps (D'Arpa, 2003; D'Arpa & Meléndez, 2006).

Based on the taphonomic study of the ammonites, a major discontinuity at the Oxfordian-Kimmeridgian boundary at Cava ex-Capraria has been recognized. It revealed the presence of a stratigraphic gap affecting the Platynota, Strombecki and the lower part of Divisum Biozones.

Even the Kimmeridgian, represented in all the Saccense Domain sequences by *Saccocoma* limestones, shows some variability in relation to the measured thickness, from, approximately, 9 m at Vallone San Vincenzo to about 55 cm at Stretta Arancio, and a (relatively) greater abundance of specimens. It has been also possible to identify the Lower and the Upper Kimmeridgian at Contrada Diesi and at Cava ex-Capraria. In particular, in the

latter location the recorded ammonite associations have allowed recognizing the top of the Divisum Biozone (upper part of the Lower Kimmeridgian) and the Acanthicum Biozone (basal part of the Upper Kimmeridgian).

The Tithonian, finally, is represented by more expanded deposits than those beneath, with abundant cephalopods but characterized by a considerable lateral variability. The maximum thickness is reached at Vallone San Vincenzo (23 m) and at Cava ex-Capraria (8.5 m) while at Stretta Arancio, the measured thickness of the unit does not overpass 40 cm. In these sequences the first appearance of calpionellids (*Calpionella alpina*, *Crassicollaria* sp.) marks the Lower-Upper Tithonian limit (Crassicollaria Zone).

The wide vertical variations and the rapid lateral thinning of the layers, which are recorded in the studied localities, may be linked to a different palaeotopographic position within the Saccense Platform, confirming the suggestion by Marino et al. (2002) based on a distribution of the pelagic sediments known as "panettone" model (Santantonio et al., 1996).

The data set out above, combined with the presence of angular unconformities or paraconformities present in corrispondence of the contact with the Inici Fm. deposits (and, thus, at the beginning of the drowning of the platform), suggest a fairly articulated structure of the Jurassic plateau composed of distinct sub-environments (Cusumano, 2012).

As it is known the western area of the Tethys, interested by carbonate sedimentation, was the subject of a general regression during the Callovian-Oxfordian transition and during the lower Oxfordian (Callomon, 1964). The presence of a sedimentary and paleontological record at the C.da Diesi section indicates that the Sciacca area was located in the outer area of the platform, only marginally affected by the regression.

The Mt. Erice succession has been instead interpreted as the expression of a distal sector of a ramp adjacent to the Trapanese carbonate platform, where subsequent changes in the sedimentary dynamic of the inner part of the ramp (a deepening or an emersion) would have enabled a pelagic sedimentation and where topographical differences, which occurred after the lower part of the Middle Oxfordian, would have caused lithological and taphonomic variations on a local scale (Martire & Pavia, 2002).

References:

Callomon J.H., 1964 – Notes on the Callovian and Oxfordian stages. Coll. Juras. Luxembourg, 1962; C.R. et Mem. Inst. Gd. Duc, Sect. Sci. Nat. Phys. et Math.: 269-291.

Cusumano A., 2012 - Sistematica, tafonomia e paleobigeografia delle associazioni ad ammoniti del Giurassico Medio e Superiore della Sicilia Occidentale, con particolare riferimento all'intervallo Calloviano-Kimmeridgiano. Tesi di Dottorato. Dipartimento di Scienze della Terra e del Mare (Di.S.T.e.M.), Università degli Studi di Palermo: 1-281.

Cusumano A., D'Arpa C., Di Stefano P., 2013 - Biostratigraphical study of the Middle-Upper Jurassic ammonite association of Stretta Arancio's section (Southern Sicily, Italy). Progressive Palaeontology. Leeds 22nd-24th may 2013. Programme & abstracts.

Cusumano A., D'Arpa C., Di Stefano P., Melèndez G., 2012 - Jurassic ammonite associations from a section near Sambuca di Sicilia (Sciacca, Sicily). Giornate di Paleontologia XII edizione, Catania 24-26 maggio 2012. Volume dei riassunti.

D'Arpa C., 2003 – Studio delle associazioni ad ammoniti dell'Oxfordiano della Sicilia Occidentale. Tesi di Dottorato. Dipartimento di Geologia e Geodesia, Università degli Studi di Palermo: 1-258.

D'Arpa C., Meléndez G., 2006 – Oxfordian ammonites from Contrada Diesi (Sciacca, Sicily) a historical locality studied by Gemmellaro. Quad. Mus. G.G. Gemmellaro, 9: 63-74.

Fözy I., Meléndez G., 1996 - Oxfordian ammonite from Hungary. , 1-2: 187-194.

Fözy I., Peréz-Urresti I., Meléndez G., 1997 – Middle and Upper Oxfordian ammonite successions from the Transdanubian Central Range and from the Mecsek mountains (Hungary). Biostratigraphy and Palaeobiogeographic affinities. Comunicatión 4° Congreso de Jurásico de España. Alcaniz (Abstract volume): 69-72.

Marino M.C., Baldanza A., D'Arpa C., Nicosia U., Pallini G., Parisi G., Petti F.M., 2002 – Middle Jurassic/Lower Cretacicous pelagic sediments from the Sciacca area (Monte Magaggiaro, western Sicily). Abstract of the VI International Symposium on the Jurassic System, 12-22 September 2002, p. 117.

Santantonio M., Galluzzo F., Gill G., 1996 – Anatomy and palaeobathymetry of a Jurassic pelagic carbonate platform/basin system. Rossa Mts, Central Appenines Italy). Geological implications. *Palaeopelagos*, 6:123-169.

Sequeiros L., 1974 – Paleobiogeofrafia del Calloviense y Oxfordiense en el sector central de la Zona Subbetica (II): Estudio paleontologico de los ammonites del Calloviense y Oxfordiense en el sector central de la Zona Subbetica. PhD Thesis, Univ. Granada: 1-359.