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BIOSTRATIGRAPHY

## Paleobiogeographic Position of Oxfordian Ammonite Fauna of the Iberian Chain (Spain)

by

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**Summary.** Paleobiogeographic value of the studied ammonite fauna appears mainly related to the setting of the Iberian Chain area at or close to major migration routes between northern and southern Tethys and the Tethys and Atlantic. The fauna displays changes from more Mesogean to Submediterranean/Subboreal character and vice versa from one horizon to another. However, Mesogean elements are becoming generally scarce north of the area, and the Submediterranean/Subboreal—southwards. The recorded mixing speaks against any continuous barriers as the reason of the differences in composition of ammonite assemblages but rather in favour of control of some environmental factors, possibly of the type responsible for the origin of “perched faunas” [16].

In the last years a large collection of Oxfordian ammonites in the Iberian Chain has been gathered, which are the subject of D.Sc. thesis of G. Melendez. The studies on this fauna are in progress but the published results [2, 14, 20-22, 31] and some new ones cast some light on its paleobiogeographic position and relations to assemblages known from Mediterranean and other regions, and, therefore, on paleobiogeography of the Oxfordian. This makes it desirable to present some hitherto-drawn conclusions. Stratigraphy of the ammonite-bearing strata and the sections have been discussed elsewhere [2, 14, 21, 22, 31].

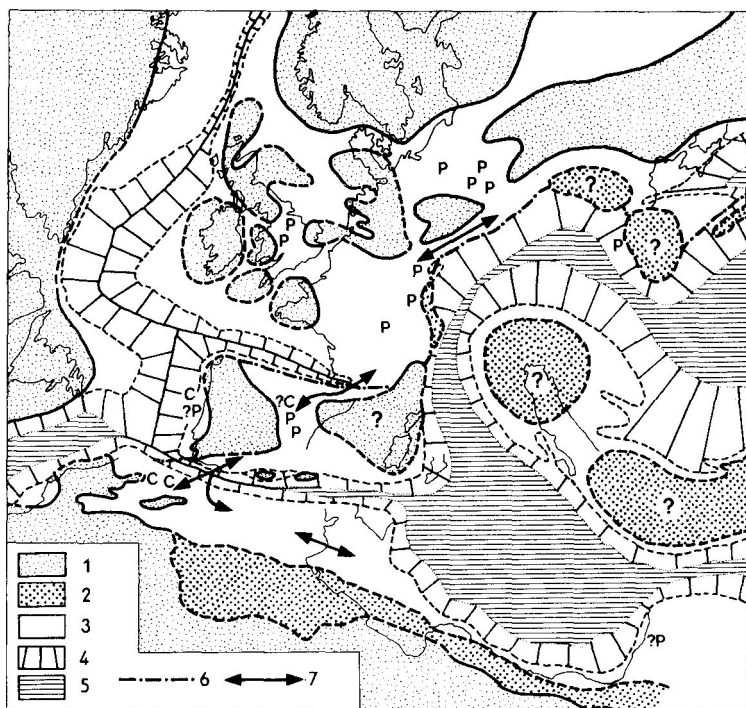
**Changes in ammonite fauna in the Iberian Chain in the Oxfordian.** The available data show that the changes in ammonite fauna during the Oxfordian, known from the times of J. Siemiradzki and V. Uhlig, are very clear here. The Lower Oxfordian assemblage is still very poorly known in the Iberian Chain [2, 22] as we may speak about inevitable failures in collecting—Lower Oxfordian fossils are found in either infillings

of corrosional pockets or Fe-oxide-bearing limestones with mixed fauna. Nevertheless it may be stated that the assemblage comprises peltoceratids referable to *Parawedekindia*, *Peltoceratoides* and possibly *Peltomorphites*, euaspidoceratids, *Campylites*, *Perisphinctes* (?) *bernensis* Arkell non de Loriol, *Passendorferia* (*Enayites*) *czenstochoviensis* (Siem.) and its allies and several species of *Prososphinctes*, including undoubtful *P. claromontanus* (Buk.) and *P. mairei* (de Loriol). There remains a question of specimens which would prove the effects of the Boreal Spread in this area. No representatives of Cardioceratidae were found in the available material. However, it should be noted that J. H. Callomon recently identified [22] a specimen coming from the mixed fauna horizon at Anquela del Pedregal as a kosmoceratid similar to *Keplerites* (*Toricellites*) *lahuseni* (Parona et Bonarelli) or *distans* Tintant, datable at the Koenigi Subzone, Calloviense Zone or (according to R. Enay and J. Thierry) forms of the Athleta Zone. This gives further support for the record (unfortunately not supported by figures) of *Kosmoceras* (*K.*) *spinosum*?, *Goliathiceras* sp. and other taxa by K. Benke ([2], Fig. 6), showing that further finds of similar specimens are possible.

The Middle Oxfordian is uncomparably better represented in the studied material. We are dealing here with a well represented (except for the early links) evolutionary series *Perisphinctes* (*Otosphinctes*) -- *P.* (*Dichotomosphinctes*) -- *P.* (*Dichotomoceras*) and we may even speak about very rich material in the case of *P.* (*Dichotomoceras*) and *P.* (*Dichotomosphinctes*) *wartae* Buk. The record of corresponding macroconchs is less satisfactory but it is worth noting that besides some *P.* (*Perisphinctes*) there was found an almost complete representative of the type species *P.* (*P.*) *variocostatus* (Buckl.) (here we are grateful to J. H. Callomon for verification of our identification). The record of that fauna is not continuous as such forms appear rare or even missing in certain horizons, characterized by predominance of elements referable to Mesogean perisphinctid groups sensu Enay and other authors [8, 9, 12, 3, 5, 30]: *Perisphinctes tenuis* Enay and its allies, *Kranaosphinctes cyrilli-methodii* group, *Passendorferia torcalense* Kilian and others as well as *P.* (*Enayites*), especially of the *P.* (*E.*) *birmensdorfensis* group.

Representatives of *Perisphinctes* are also markedly scarce in strata characterized by the wealth of *Larcheria*. Specimens of the latter taxon are usually accompanied by small-sized *Trimarginites* of *T. stenorhynchus* group. Other classic Mesogean elements present here include fairly common *Gregoryceras*, *Euaspidoceras* and *Ochetoceras raixense-basseae* group. The latter are especially common in some levels in the upper Bifurcatus-lower Bimammatum interval. Early *Ochetoceras* (*O. hispidum-canaliculatum* group) are very rare and *Subdiscosphinctes* seems to be completely missing here. *Miroosphinctes* was found to be present throughout the Middle Oxfordian.

Upper Oxfordian fauna is also well represented. In the lower part



Distribution of ammonites of genera *Prososphinctes* Schindewolf, 1925 and *Cardioceras* s.l. (after J. Thierry, 1976) at the background of paleogeographic map for the Lower and Middle Oxfordian (after J. Thierry and N. Charpy, 1982) and paleobiogeographic position of the Oxfordian from the studied area.

1—land areas, 2—epicontinental seas, temporarily emerged areas, 3—epicontinental seas, 4—continental margin, 5—oceanic crust area, 6—southern extent of *Cardioceratidae*, 7— inferred routes of migration of ammonites; P—*Prososphinctes*, C—*Cardioceras* s.l. beyond the above line (6)

of the section mainly occur small-sized *Epipeltoceras* of the *E. semimammatum* group, *O. raixense-basseae* gr. and subsequently *O. marantianum-semifalcatum*. The two latter groups are here represented by large forms with smooth body chamber and possibly small ones, ornamented to the peristome. Moreover, there were found some specimens with essentially the same sculpture except for tricarinate keel (see also [7], p. 23) with makes it desirable to check the value of tricarinate keel as a diagnostic feature of generic rank. Here are also present some *Passendorferia* (*Enayites*) and early *Orthosphinctes*.

Middle and upper parts of the Bimammatum Zone yield *Epipeltoceras berrense*, *E. treptense* and (very common) *E. bimammatum*, ochetoceratids, *Orthosphinctes* and *Pseudorthosphinctes* as well as some perisphinctids which

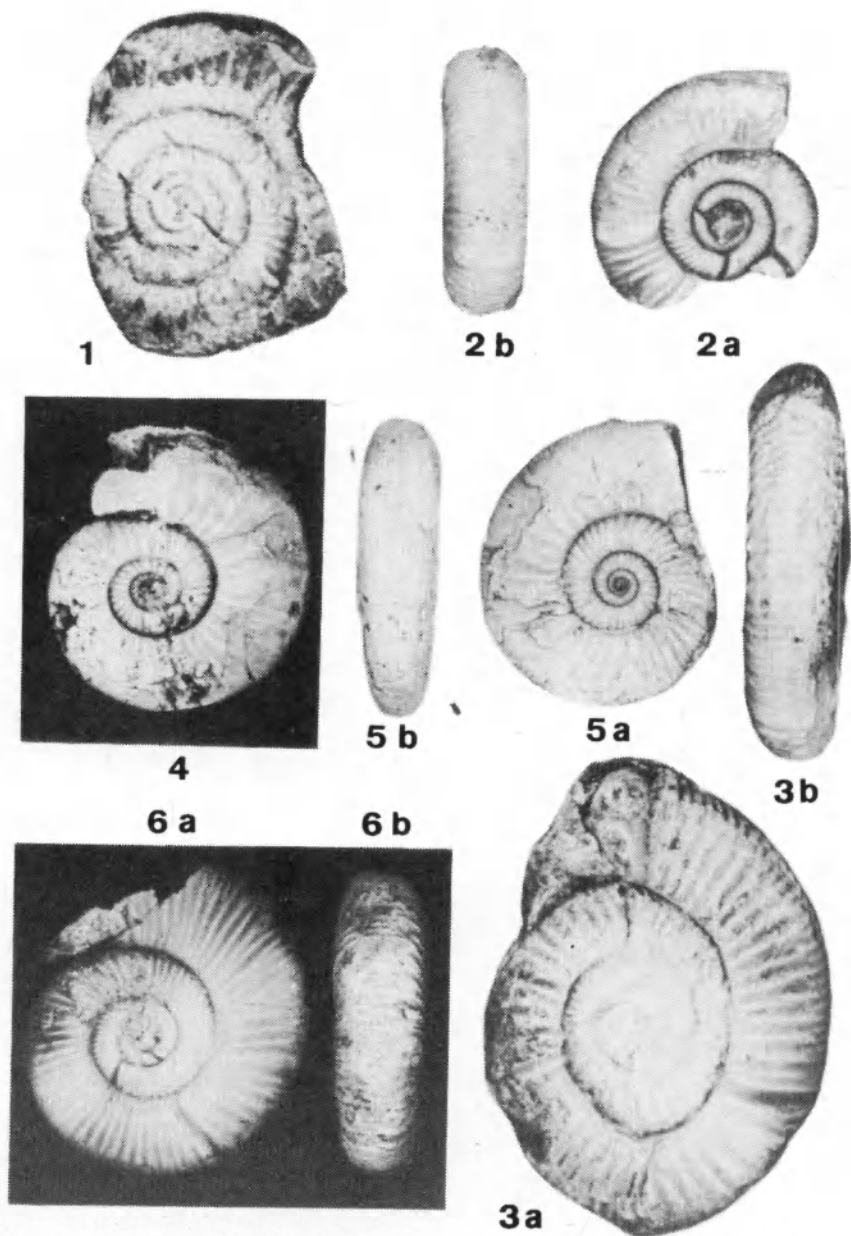
cannot be accommodated in any known species or genera. Some of the latter include forms with features transitional between those of *Passendorferia* (*Enayites*) and *Nebrodit* (*Nebrodit*). Moreover, there were recorded some undoubted medium-sized Mesogean perisphinctids with *Passendorferia*-*Nebrodit* sculpture but the available material is still insufficient for any unequivocal statements on their generic status. The strata also yield representatives of the genus *Cubaspidoceras*.

The fauna of the Planula zone comprises *Orthosphinctes*, *Sutneria* (in the upper part), numerous *Glochiceras* (mainly of the *G. canale* group) (21), perisphinctids of troublesome systematic position, *Physodoceras circumspinosum-altenense* group, etc. Attention should be paid to failure in search for unquestionable representatives of the genus *Subnebrodit*.

**Relation to other assemblages.** As we stated above, Lower Oxfordian assemblage is still poorly known but it does not differ from those of northern margin of the Tethys and even inland seas stretching further to the north. All the forms hitherto found, when sufficiently preserved, may be easily placed in the known taxa and there is no indication of endemism. The only but striking difference in relation to the assemblages of northern Tethys and adjoining areas is the lack of cardioceratids, except for a single? *Goliathiceras* sp. from Hontoria [2]. This, along with the records of *Kosmoceras*, suggests that both the Iberian Chain and Portugal were situated within the extent of the Boreal Spread in the Callovian and, possibly, Early Oxfordian, or at least at the periphery of the area affected by this phenomenon. It may be concluded that the nature of Lower Oxfordian fauna of the Iberian Chain suggests fairly good marine connections between the Iberian Peninsula and other parts of northern shelf of the Tethys in Early Oxfordian (see also [22]).

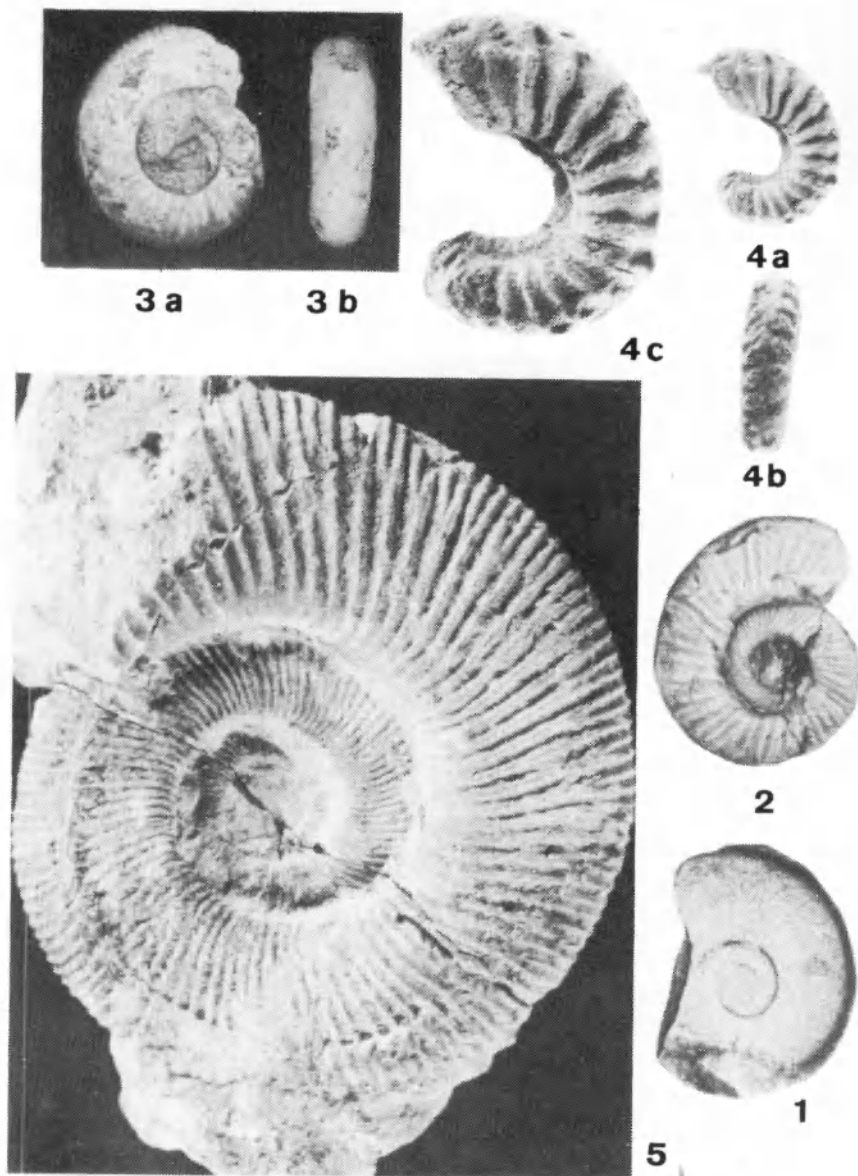
Middle Oxfordian faunas appear temporarily characterized by a surprisingly high share of perisphinctids of the evolutionary series *Perisphinctes* (*Otosphinctes*) - *P.* (*Dichotomosphinctes*) - *P.* (*Dichotomoceras*) and the corresponding macroconchs *P.* (*Perisphinctes*), known from areas north of the Tethys: from France and Switzerland to Poland, Moldavia, Bulgaria and further to the east. Changes well traceable in that fauna are easily correlable with those known from France [8] and even Poland and Bulgaria [5, 27, 28] so we may speak about very good marine connections with these parts of the Submediterranean province. There are also present some elements in common with England, i.e. Subboreal area, especially *P.* (*P.*) *variocostatus* (Buckl.). However, the latter are also known from Submediterranean areas, so the connections could be indirect.

Connections with southern and eastern France are proven by the wealth of *Larcheria* but it should be noted that *Subdiscosphinctes*, the other genus typical of northern Tethys and also known from neighbouring Portugal



# PLATE I

*Passendorferia* (*Enayites*) *czenstochoviensis* (Siem.): 1—specimen No. SMo2/15/12, Moneva section, Lower Oxfordian, D—44 mm, 2—WPo2/30–50(r), Pozuel del Campo, Lower Oxfordian, D—36 mm (refigured from [22], pl. I, fig. 2); *P. (E.) cf. czenstochoviensis* (Siem.): 3—SA1/107/244, Aguilon, Lower Oxfordian, D—62 mm, complete, with lappets; *?Volgaites* sp.: 4—SMo/106/9/12, Moneva, ?Upper Callovian, D—39 mm, 5—SMo(106?), locality and age as above D—40 mm; *Prososphinctes mairei* (de Loriol): 6—SAG1/107, Aguilon, Lower Oxfordian, D—42 mm.



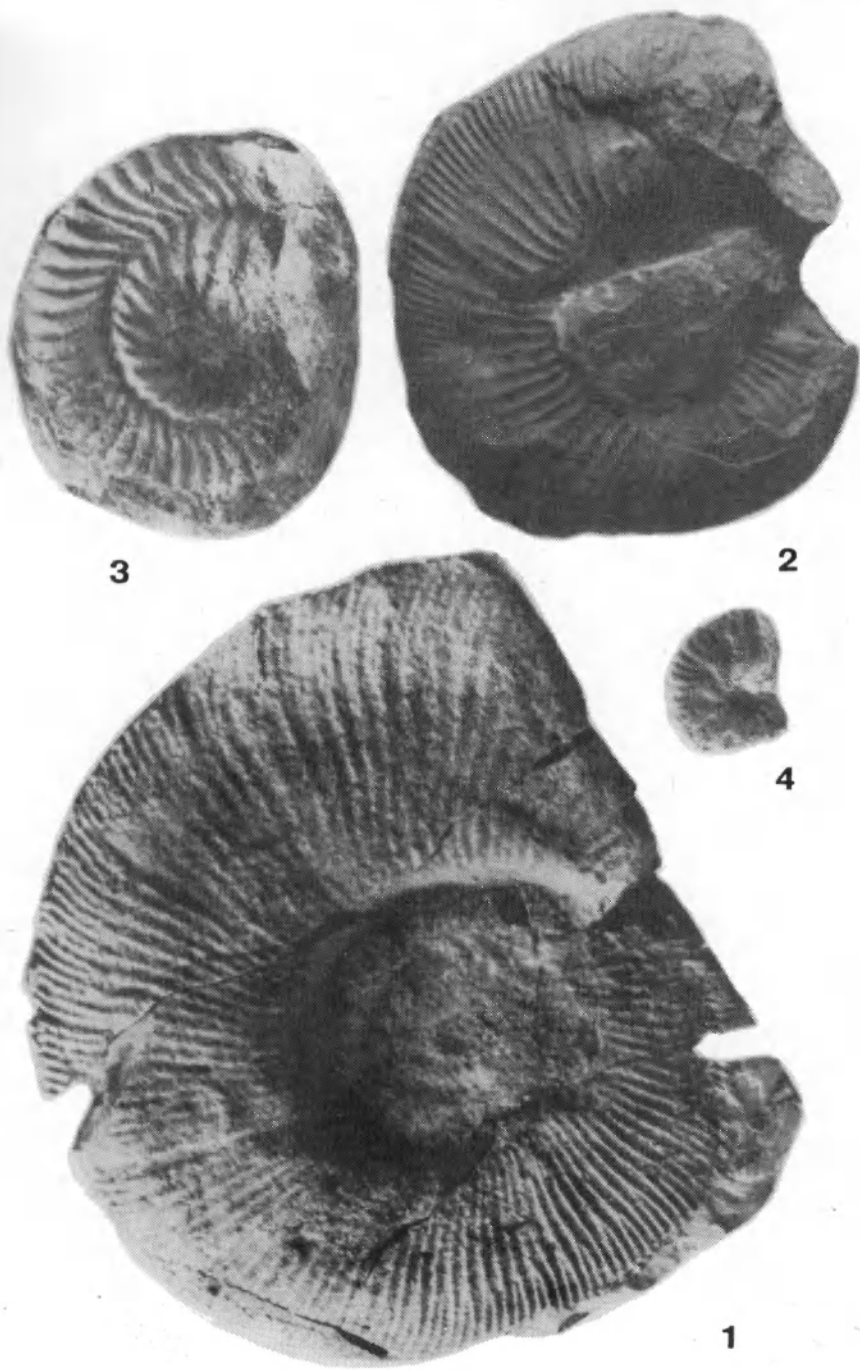
## PLATE II

*Lissoceratoides* sp.: 1—SA1/143/144, Aguilón, Lower Oxfordian, D—36 mm; *Prososphinctes claromontanus* (Buk.): 2—WPo/1/00/5, Pozuel del Campo, Lower Oxfordian, D—36 mm (refigured from [22], pl. I, fig. 1); *Mirosphinctes* sp.: 3—SA1/143/40, Aguilón, Lower Oxfordian, D—29 mm; ? *Epipeltoceras isabeli* sp. n.: 4—holotype, AR2/II-3/1, Ariño, Middle Oxfordian, upper part of Bifurcatus zone, D—c. 24 mm (4c— $\times 2$ ); ? *Subdiscosphinctes* cf. *aeneas* (Gemm.): 5—Br 05/21, Zawodzie near Częstochowa (Poland), Bifurcatus zone, phragmocone, D—100 mm, at D—85: H/D—0.32, U/D—0.40, at D—57: H/D—0.37, U/D—0.34, T/D—0.30, D:r—100:75, 85:78, 60:c. 79, 50:c. 79, 40:c. 69.



PLATE III

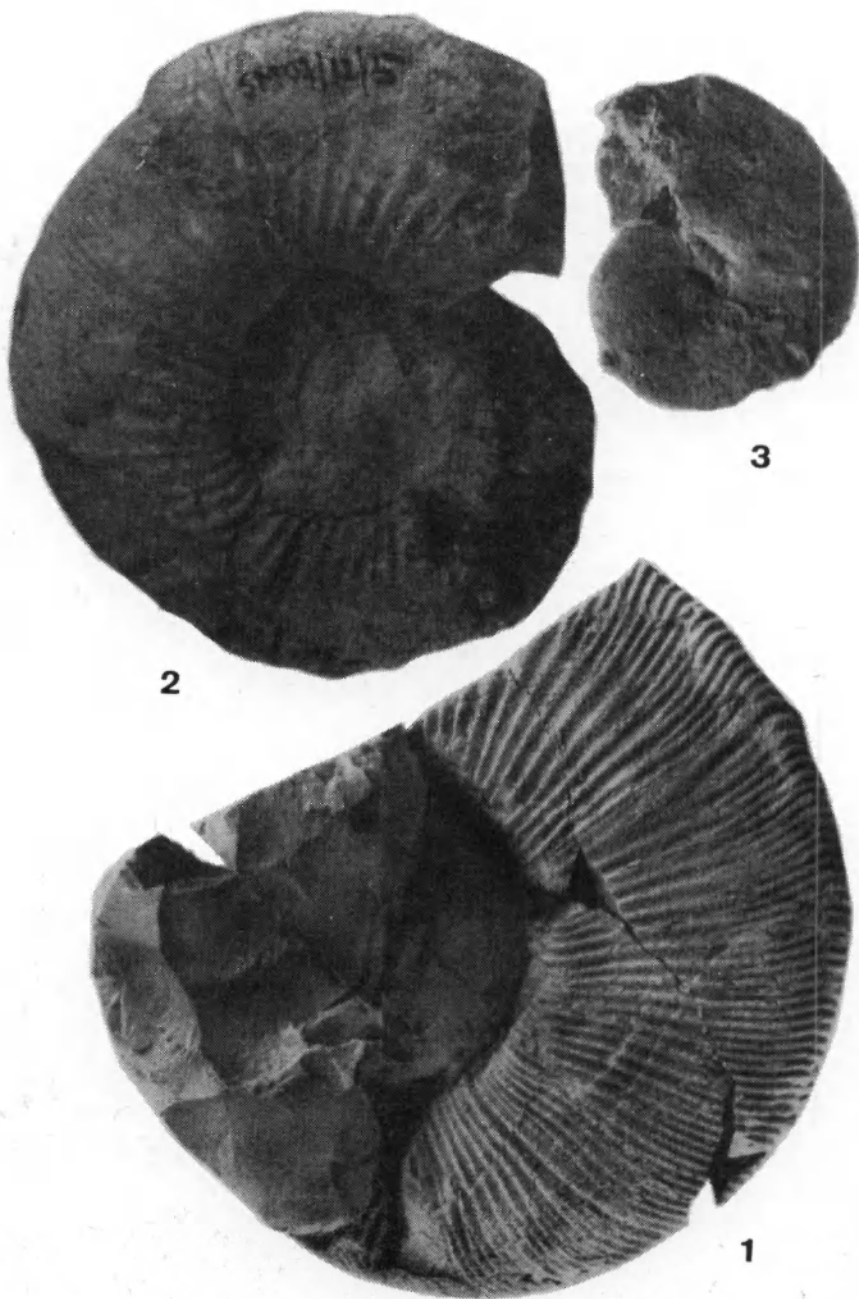
*Perisphinctes* (*Dichotomosphinctes*) *wartae* Buk., WAR1/r/117/9, Arino, Middle Oxfordian. Transversarium zone; nat. size



#### PLATE IV

*Subdicosphinctes* sp.: 1—almost complete, Montejunto (Portugal), Middle Oxfordian D—c. 110 mm, at D—100 mm: H/D—0.41, U/D—0.34; *Larcheria schilli*: 2—WAG 2/30/1, Aguilón, Middle Oxfordian, upper part of Transversarium zone; *Ochetoceras* ex gr. *raixense-basseae*: 3—W3M/86/1, Moscardon, upper Bifurcatus zone—lower part of Bimammatum zone, D—c. 49 mm; *Tarmelliceras* sp.: 4—locality as above, Bimammatum zone; all figures nat. size





#### PLATE V

*Subdiscosphinctes* sp. (other side of specimen shown in Pl. IV, Fig. 1): 1—note well-marked transitional peristome; *Larcheria schilli* (Oppel): 2—SMo7/12/5, Moneva, Middle Oxfordian, upper part of Transversarium zone; *Lissoceratoides* sp.: 3—WRi(82), Ricla, Bimammatum Zone, Bimammatum Subzone, D—44 mm; all figures nat. size



PLATE VI

*Perisphinctes* (*Perisphinctes*) *variocostatus* (Buckland), WOM-1/60-70(r), Olmeda, Bifurcatus zone, D—over 232 mm, DPh—c. 230 (see X), U/D—0.50, H—0.28.

([8], see also pl. II, fig. 1, pl. III, fig. 1), is still not represented even by a single fragment in the whole material studied. The lack of the latter is somewhat surprising as representatives of possibly closely related? *Subdiscosphinctes aeneas* group are known from more southerly, Mesogean regions and seem to be present in the studied material from the Iberian Chain.

Attention should be paid to the wealth of Mesogean perisphinctids: *Passendorferia*, Mediterranean "*Arisphinctes*" of the *tenuis* group, *Krausosphinctes cyrilli-methodii* group, more common here than in France or Poland. On the other hand, the elements appear in common with the Betic Ranges [30, 32], Sicily [12], North Africa [1] and Turkey [9], i.e. Mediterranean province.

Oppeliids recorded here are identical as those known from Submediterranean and Mediterranean areas of Europe and North Africa. Similar is the case of *Gregoryceras*, euaspidoceratids and *Mirosphinctes*. It should be noted here that our studies on Chilean material [37] showed that it comprises several individuals of *Ochetoceras*, *Gregoryceras*, *Euaspidoceras*, *Mirosphinctes*, hardly separable even at specific level from those known from this and other Submediterranean and Mediterranean areas in Europe as well as ?*Subdiscosphinctes aeneas* group and possible representatives of *Perisphinctes* (*Dichotomosphinctes*) and *P.* (*Dichotomoceras*). This suggests good connections with South America.

Upper Oxfordian faunas initially display marked similarity to those of lower parts of the Bimammatum zone in southern and eastern France, southern FRG, Czechoslovakia, Poland and Bulgaria. The similarity is connected with sudden replacement of dwarfish fauna of the perisphinctids proper by also dwarfish but completely different and in all probability unrelated assemblage. The latter comprises individuals somewhat "primitive" in appearance (rather highly evolute and with a trend to radial or subradial ribbing), some of which may be more or less easily placed in *Passendorferia* (*Enayites*) and others--in early *Orthosphinctes*. The assemblage is still poorly known. At present it may be only stated that here are represented both somewhat involute forms, treated by some authors as ancestral for the type species of the genus *Orthosphinctes* (*A. tiziani* Oppel) from the Bimammatum Subzone, and more evolute and at the same time more Mesogean in nature, regarded by us as more plausible ancestors of that species. Some representatives of this genus seem to be in common with the classic Portugal fauna but the latter differs from ours in subordinate share of more clearly Mesogean (i.e. "orthosphinctoid") elements and they may be younger (here thanks are due to F. Atrops for helpful comments).

The similarity of the above assemblage to those known from northern shelf of the Tethys is also connected with the presence of numerous

small-sized representatives of *E. semimammatum* group, heavily costated and tuberculated euaspidoceratids referable to *Euaspidoceras hypselum* group, and oppeliids. Submediterranean *Microbiplices* proper of the *M. microbiplex* group was not recorded here but the available material comprises some forms close or referable to *M. abeli* (Oppenh.) or *M. vanae* (Oppenh.). The differences are primarily connected with the lack of Boreal cardio-ceratids (*Amoeboceras*) and even "Submediterranean" *Ringsteadia*.

In the case of upper parts of the Bimammatum zone, similarities in relation to assemblages of northern shelf of the Tethys somewhat decrease. They are mainly connected with the presence of *Orthosphinctes* and *Pseudorthosphinctes*, oppeliids and euaspidoceratids but a large part of perisphinctids can hardly be assigned to species or even genera known from these areas (see above). This is especially the case of transitional forms between *Passendorferia* (*Enayites*) and *Nebrodit* proper and *P.* (*Passendorferia*) and *N.* (*Mesosimoceras*?) but also some less Mesogean in nature, for which new names seem also necessary. Similar is the case of fauna dated at the Galar Subzone, Planula zone, comprising oppeliids and aspidoceratids, especially of *Physodoceras altenense-circumspinosum* group common with those of northern shelf of the Tethys, and perisphinctids. The perisphinctids include some forms of the classic *Orthosphinctes polygyratus* assemblage and others, closer to those of the Mediterranean province which, unfortunately, remain poorly known still.

In the case of South American assemblages, similarities remain clear in the case of lower parts of the Bimammatum zone as the Chilean fauna was found to comprise *Ochetoceras* of the *O. basseae-raixense* and *O. semifalcatum-marantianum* groups and a perisphinctid almost undistinguishable from *Passendorferia* (*Enayites*) *birmensdorfensis* sensu Dorn, 1930, as well as comparable euaspidoceratids. Comparisons with upper parts of the Oxfordian are impeded by insufficient ammonite record in the latter region. Some authors (e.g. [15]) reported the presence of *Idoceras* (recte *Subnebrodit*) whilst we have identified only single *Subnebrodit*, surprisingly close to or even conspecific with *S. proteron* (Nitz.), also unknown in the Iberian region.

Up to the present, there have been recorded no forms which would evidence or even suggest close connections with the Indo-Ethiopian province.

**On paleobiogeographic value of the Iberian fauna.** The ammonite assemblages recently collected in the Iberian Chain are of marked paleobiogeographic value mainly because of a specific setting of this area in the Jurassic time. It was situated at that time between vast epicontinental seas of western and central Europe, inhabited by Submediterranean/Subboreal fauna, and epicontinental seas and open oceanic areas

of the Mediterranean province. Therefore, it was situated at or in close proximity of the major migration routes of ammonite fauna between northern and southern Tethys as well as the Tethys and Atlantic.

Ammonite fauna hitherto recorded in the Iberian Chain displays mixing of influences of the Submediterranean and Mediterranean provinces. Elements of the former are more common or even form the bulk of ammonite fauna in certain horizon, e.g. in some parts of the Transversarium (*Perisphinctes* (*Dichotomosphinctes*) *wartae* Buk. and its allies) or Bifurcatus zone (*Perisphinctes* (*Dichotomoceras*) *bifurcatoides-stenocycloides* group), whilst those of the latter—in other horizons. The records of *P.* (*Dichotomoceras*) *bifurcatus* (Qu.) and other Submediterranean taxa in the Betic Ranges [32], not to say about Algeria [26], make it possible to assume migration across the Iberian Chain or adjoining areas. This is supported by the wealth of other Submediterranean elements in the Iberian Chain, especially *Larcheria* which evidences good to very good marine connections with southern and eastern France and, therefore, other parts of northern shelf of the Tethys.

From the above-discussed overlap of Submediterranean/Subboreal and Mediterranean assemblages there arises a question of the nature of boundaries between the provinces, repeatedly revisited in the literature (see e.g. [10, 11, 13, 24]). In the light of data obtained for the Oxfordian in the Iberian Chain it appears rather difficult to speak about any continuous barrier as the reason of the recorded differences and changes in ammonite faunas. The present case seems to be just the opposite one as we are dealing with more or less continuous mixing of faunas of the above provinces. The areas such as that of the Iberian Chain may be best treated as intermediate. The above data do not support hypotheses according to which we may expect numerous records of elements typical of the Submediterranean/Subboreal provinces further to the south and south-east, i.e. in areas of the Mediterranean province. Similarly, elements typical of the Mediterranean province are becoming extremely scarce as we move further to the north of the intermediate areas. This suggests that we are dealing here with some controlling factors which preclude or impede northward migration of Mediterranean elements and the southward of the Submediterranean-Subboreal ones. The nature of these factors still remains debatable. However, there is growing evidence that we are dealing here with the action of certain environmental factors which could lead to the origin of "perched faunas" sensu Johnson [24, 20]. In analysis of extinctions of epicontinental-sea faunas Johnson [16] came to the conclusion that animals which migrated and adapted themselves to that environment are stenotopic to a varying degree and, therefore, their existence begins to depend on persistence of the environment. Hence, it follows that the better are animals adapted, the lower are possibilities to leave epicontinental sea to come back

to deeper water zones. In turn, ecological differences between individual epicontinental basins may be sometimes of minor importance. The latter would well explain both oscillations of boundary of the Submediterranean/Subboreal province (as well as between the latter and Boreal one) and migrations along the Atlantic route as far as Chile.

The above model makes it necessary to assume some extinctions, followed or accompanied by recruitment of new fauna from an oceanic basin, in this case the Tethys. This brings us close to the scheme of ammonoid evolution and its dependence on changes of sea level ([36], fig. 11, [35]): adaptation of ammonoids to conditions of outer and inner shelf mainly through development of increasingly complex ornamentation and form. It would follow that new invaders from the Tethys are characterized by rather small size, simple form and simple ornamentation. In that point our views are becoming close to those of Spath ([33], p. 464), especially his idea of a conservative root-stock of perisphinctids (see also [20]). The above problems and related question whether or not the above changes are reversible, undoubtedly deserve some attention and further studies.

**Paleontological comments.** The detailed paleontological analysis of the ammonite fauna is the subject of D.Sc. thesis of one of the authors (GM) so here only some specimens are figured and described. In the comments and explanations to figures the following abbreviations are used: D—shell diameter, DPh—phragmocone diameter, U—umbilical diameter, H—whorl height, T—whorl thickness,  $r:D$ —number of ribs per whorl at a given diameter.

*?Volgaites* sp.

(Plate I, Figs 4,5)

The two figured specimens, small-sized ( $D$ —c. 40 mm), are characterized by whorls quickly growing in height, ribs markedly prorsiradial, with a trend to disappearance at the outer whorl and, at least in the case of the specimen from Pl. I, Fig. 5a, b—subdivision into three or even four secondaries close to ventral margin. They appear very similar to the representatives of Middle-Upper Callovian genus *Volgaites* Sazonov ([29], p. 14), especially its type, *V. elatmaensis* Sazonov ([29], p. 15, pl. 3, fig. 1, pl. 4, fig. 1 and others) in mode of coiling and ornamentation, somewhat differing in still slower growth of outer whorls in height. The trend to obliteration of sculpture in the mid-height of whorls brings them close to some Lower Oxfordian *Prososphinctes* Schindewolf, 1925, from which they differ in markedly less densicostate inner whorls and higher point of furcation. Stratigraphic position of these specimens remains unclear as they have been found in a horizon with mixed fauna in the Moneva section (Callovian–Oxfordian passage beds).

*?Epipeltoceras isabeli* sp. n.  
(Plate II, Fig. 4a–c)

The only available specimen (AR2 II-3/1), coming from the upper part of the Bifurcatus zone in the Ariño section (see [22] and references therein), is slightly over 24 mm in size. The phragmocone is crushed (DPH = ? 14.5 mm) and the available body chamber, possibly final, displays specific ornamentation. The ornamentation comprises ribs broken at the venter and prominent ventral and ventrolateral tubercles. Moreover, the ribs also display some tubercle-like thickening and projection at umbilical margin. In analysis of generic status of this form we noted its similarity to small-sized representatives of the genus *Epipeltoceras* Spath, 1924, from somewhat younger strata: basal horizons of the Bimammatum zone. A review of the figured representatives of the latter as well as those gathered in the collections from the Iberian Chain showed that some of them also display relic bi- or trituberculation. This is especially the case of classic Quenstedt's forms: lectotype of *E. sermiarmatum* (Qu.) ([23], pl. 95, fig. 19) with relics of ventral and ventrolateral tubercles, and holotype of *E. semimammatum* (Qu.) (l.c., pl. 95, fig. 20), with well marked ventrolateral tubercles (especially in the last half of the final body chamber) and ventral ones discernible in front view (l.c., pl. 95, fig. 20p). Our specimen differs from the above ones and other coeval forms in markedly heavier and sharper-crested and less numerous ribs and better propounded tuberculation. However, the similarity and difference in age suggest that we may be dealing with ancestral form of this genus. Further material is needed for unequivocal statement whether or not this specimen falls within the limits of variability of this genus so assignation is made with reservation. A new specific name is proposed as the specimen does not fall within the limits of variability of the known species.

Occurrence. Ariño (see [22] and references therein), upper (but not top) part of the Bifurcatus zone, Oxfordian.

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Г. Мелендез, Л. Секвейрос, В. Брочвич-Левиньски, **Палеобиогеографическая позиция оксфордской аммонитовой фауны из зоны иберийской полосы**

Палеобиогеографическая ценность исследований аммонитовой фауны связана в основном с положением зоны иберийской полосы вблизи или на главных трактах миграции этой фауны между северным и южным берегом океана Тетиды, а также этим океаном и Атлантическим океаном. Исследованная фауна проявляет изменения характера от медитерранского до субмедитерранско-суббореального и в обратном направлении от одного горизонта до иного. Однако, медитерранские элементы становятся вообще редкими на севере от исследованной зоны, а субмедитерранские-суббореальные — на юге. Эта константированная смесь этих элементов в зоне иберийской полосы противоречит существованию каких-нибудь непрерывных барьеров как причины разниц в составе аммонитовых комплексов. Она одновременно показывает, что можем здесь иметь дело с влиянием каких-то факторов окружающей среды, очевидно такого типа как фактор ответственный за образование фаун, которые вынуждены вымереть при изменении условий окружающей среды (модель Джонсона).

**G. Meléndez, L. Sequeiros, W. Brochwicz-Lewiński. La posición paleobiogeográfica de la fauna de Ammonites del Oxfordiense de la Cordillera Ibérica (España)**

**Resumen:** El significado paleobiogeográfico de la fauna de Ammonites objeto de este estudio se encuentra relacionado fundamentalmente con la posición de la Cordillera Ibérica dentro de, o en posición próxima a las principales rutas de migración entre el Tethys septentrional y meridional, y entre el Tethys y el Atlántico (i.e. la "vía Atlántica", hacia S. America). Las faunas de Ammonites presentan cambios en su composición, desde más típicamente mesogeas, a submesogeas/subboreales en carácter, y viceversa, de un horizonte a otro. Por otra parte, los elementos típicamente mesogeos se van haciendo progresivamente más escasos al norte de la región estudiada, al igual que ocurre con los de carácter submesogeo hacia el sur. Este registro de elementos faunísticos, relativamente continuo a lo largo del Oxfordiense, no parece apoyar en principio la existencia de una barrera continua como un factor condicionante de las diferencias en la composición de los sucesivos conjuntos de Ammonites, sino más bien el control de los mismos por parte de determinados factores ambientales comunes, por ejemplo, los causantes de las denominadas faunas "atrapadas", o stenotópicas, en el sentido de Johnson (1974). A este respecto, la dependencia de las faunas, o el grado de "fijación" a una región determinada parece en contrarse ligada en mayor medida a factores dependientes de la batimetría que a diferencias de tipo ecológico entre las diferentes cuencas epicontinentales. Estas últimas podrían explicar mejor las oscilaciones de los límites entre las provincias Submediterránea y Subboreal, y entre ésta última y la Boreal, así como las migraciones a lo largo de la "Vía Atlántica".

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