



Contributions of Federico Olóriz to the systematic paleontology of ammonites and taxa dedicated to him

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Abstract

Federico Olóriz is a renowned geologist-paleontologist scientist from the University of Granada, Spain, who throughout his academic career has contributed in an outstanding way to the study of the Jurassic and ammonites, mainly. Among his various contributions, one of the most important is the systematic paleontological revision of several taxa of the group, with the proposal of several new genera, subgenera, species and subspecies, as well as the amendment of several families. His successful career has been deserving of recognition, by several specialists, with the dedication of various taxa in honor of his name. The compilation of all those taxa proposed by the author and collaborators, as well as taxa dedicated to him, is presented. The presentation is chronological, taxonomic classification from family level, figures, holotype, original diagnosis, type locality and age data are given. Excluded are those contributions of the author and/or collaborators for variants, and taxa proposed informally (mentioned only as n. 1 or sp. A, etc.).

Keywords Cephalopoda · Radiolarian · Jurassic · Systematic paleontology

Resumen

Federico Olóriz es un reconocido científico geólogo-paleontólogo de la Universidad de Granada, España, quien a lo largo de su carrera académica ha contribuido de manera destacada al estudio del Jurásico y de los ammonites, principalmente. Entre sus diversas aportaciones, una de las más importantes es la revisión paleontológica sistemática de varios taxones del grupo, con la propuesta de varios géneros, subgéneros, especies y subespecies nuevos, así como la modificación de varias familias. Su exitosa trayectoria ha sido merecedora de reconocimientos, por parte de varios especialistas, con la dedicatoria de diversos taxones en honor a su nombre. Se presenta la recopilación de todos aquellos taxones propuestos por el autor y colaboradores, así como taxones dedicados a él. La presentación es cronológica, se da clasificación taxonómica a nivel familia, figuras, holotipo, diagnóstico original, localidad tipo y datos de edad. Se excluyen aquellas contribuciones del autor y/o colaboradores para variantes y taxones propuestos informalmente (mencionados sólo como n. 1 o sp. A, etc.).

Palabras clave Cefalópodos · Radiolarios · Jurásico · Paleontología sistemática

1 Introduction

Undoubtedly one of the most important contributions of Federico Olóriz (Fig. 1) to the paleontology of Jurassic ammonites is in the systematic paleontological aspect of the group. In his doctoral thesis (Olóriz, 1978) he proposed

as new seven genera, two subgenera, 42 species and four subspecies, in addition to thirteen amendments at the family, subfamily and 7 on generic level. The present work compiles these contributions, as well as other proposals published by him and other authors (Olóriz & Tavera, 1979a, b; Olóriz & Schairer, 1983; Olóriz et al., 1985; Olóriz & Westermann, 1998; Olóriz & Villaseñor, 1999; Villaseñor & Olóriz, 2009; Villaseñor et al., 2003; Olóriz & Villaseñor, 2006; López-Palomino et al., 2006; Moliner & Olóriz, 2010; Villaseñor et al., 2015; Villaseñor & Olóriz, 2018; Olóriz & Villaseñor 2018; Villaseñor & Olóriz, 2019, 2020), regarding the creation of different taxa.

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Fig. 1 Dr. Federico Olóriz sampling ammonites in two localities in Mexico. A. Mazatepec, Puebla State (year 2001). B. Las Choapas, Veracruz State (year 2008)



The impact of his extensive professional career is reflected in the dedication of several taxa in his honor (El Kadiri, 1992; Fözy, 1988; Mitta, 2011; Moliner & Olóriz, 2009; Sarti, 1993; Tavera, 1985), being worthy of the creation of genera and/or species.

The taxa proposed by the author and those dedicated to him are presented in chronological order of publication. Its taxonomic classification, figures, the original diagnosis of the genus and/or species translated when they are in other language than English, holotype, type locality and the assigned age are included. Also, when it was possible, comments on the official taxonomical status are given as well as webpage link.

1.1 Abbreviations

Abbreviations in some diagnoses

BCH	Body-chamber
Dm	Maximum diameter
ER	External ribs
EW	External whorls
H	Height of the whorl
IW	Internal whorls
L	Lobule
MW	Medium whorls
RES	Residual and simple external ribs
U	Umbilicus
UB	Umbilical border
UR	Umbilical ribs

UW	Umbilical wall
VR	Ventral region
W	Thickness of the whorl

The holotype acronym as referred by the different authors.

2 Contributions of Federico Olóriz in his doctoral thesis (Olóriz, 1978)

Family Haploceratidae Zittel, 1884 sensu Ziegler, 1974

Subfamily Streblitinae Spath, 1925 sensu Ziegler, 1974

Genus *Metastreblites* Olóriz, 1978

Type species *Metastreblites ellypticus* Olóriz, 1978

Original diagnosis: "*Streblites*" in which the ratio between the maximum diameter contemplated at the beginning of the VR flattening and its perpendicular exceeds the value 1.4: $W = 1.40-1.60$. In the phragmocone, the ornamentation is similar to that of *Streblites*; the BCH is marked by a sudden narrowing of the coiling, with the development of lateral folds that occupy the external half of the flank. Next, new widening of the whorl and flattening of VR, now with a weak middle carina. In the second half of the BCH, the VR can be smooth and convex or present a groove. The peristome is simple and sinuous and the suture line, although poorly preserved, develops 4 or 5 auxiliary lobes on the flank, where the depth of the lateral lobe 1 stands out. Due to their oval shape, these shells are reminiscent of those of

Semiformiceras semiforme (Opell) (translated from Olóriz, 1978, p. 55).

Metastrebrites ellypticus Olóriz, 1978 (pl. 2, fig. 1a, b and 2, scheme p. 54, 77)

Holotype: F.G15.7.13

Original diagnosis: Small elliptical shell, involute, oval section with wide and smooth VR. The ornamentation is like "*tenuilobatus*" in IW, but, after beginning the BCH, a narrowing of the whorl occurs that coincides with the development of lateral folds. Peristome simple and sinuous. The suture line poorly preserved, shows 4 or 5 accessory lobes and considerable development of the lateral lobe (translated from Olóriz, 1978, p. 55).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Kimmeridgian (Strombecki Zone—Lower part of Divisum Zone).

Metastrebrites praesemiformis Olóriz, 1978 (pl. 2, fig. 3, pl. 3, fig. 11, scheme p. 54)

Holotype: F.G22.9.8

Original diagnosis: Elliptical shell with a small umbilicus, oval section and unequally acute depending on the stage considered. The ornamentation is not preserved on the phragmocone; then narrowing of the whorl and development of lateral folds; later, new widening of the whorl, now with a ventral groove. Peristome simple and sinuous. The suture line has 4 or 5 auxiliary lobes and great development of the lateral L (translated from Olóriz, 1978, p. 56).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Kimmeridgian (Strombecki Zone).

Genus *Neochetoceras* Spath, 1925

Neochetoceras pseudodarwini Olóriz, 1978 (pl. 5, fig. 3 a, b, c y 4, scheme p. 58)

Holotype: Not indicated by the author, following the International Code of Zoological Nomenclature Art. 72.1.1, all specimens studied by the author are name bearing syntypes. Syntypes: F.G14.22.30(?), F.G14.22.31, F.G14.22.32(?), F.G15.22.1, F.G22.21.1, F.GA1.31.1, F.GA1.31.2, F.GA1.31.3, F.GA7.15.8, F.C3.26.3.

Original diagnosis: Small size, involute, oval section with VR carinated in the phragmocone and furrowed in BCH. The ornamentation, the suture, and the peristome remain unspecified (translated from Olóriz, 1978, p. 64).

Type locality: Not indicated, but geographic distribution, Sierra Gorda (Granada), Sierra de Gaena-Carcabuey (Córdoba), Sierra de Cabra (Cordoba), Spain.

Age: Lower Tithonian (Albertinum Zone-base of Verruciferum Zone).

Genus *Semiformiceras* Spath, 1925, amend. Olóriz, 1978
Semiformiceras semiforme tuberosum Olóriz, 1978 (pl. 3, fig. 1, 2, scheme p. 77, 78)

Holotype: F.G15.28.3

Original diagnosis: Oval shape of small shell size, involute. Oval section. VR convex, carination on phragmocone and beginning of BCH; later along a furrow. In BCH and on the flanks, tubercles instead of ribs. Peristome and suture line as described for the previous subspecies (translated from Olóriz, 1978, p. 70).

Type locality: Sierra de Cabra (Córdoba), Spain.

Age: Lower Tithonian (Verruciferum Zone).

Semiformiceras semiforme rotundus Olóriz, 1978 (pl. 3, fig. 3, 4, scheme p. 77, 78)

Holotype: F.G10.12.12

Original diagnosis: Rounded shell of small size, involute, with oval section. The VR undergoes the same ontogenetic evolution as in the previous subspecies. In BCH, ornamentation of lateral tubercles of different design and sometimes periumbilical ribs (?). The peristome is formed by a sinuoid and proverse line that has its origin in the UE. The suture line has 6 lobes on the flank (translated from Olóriz, 1978, p. 71).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Tithonian (Verruciferum Zone).

Superfamily Perisphinctacea Steinmann in Steinmann & Doderlein, 1890.

Family Simoceratidae Spath, 1924.

Subfamily Idoceratinae Spath, 1924

Genus *Virgatosimoceras* Spath, 1925

Virgatosimoceras micrum Olóriz, 1978 (pl. 17, fig. 3 y 4a, b, c, scheme p. 204)

Holotype: Not indicated by the author, following the International Code of Zoological Nomenclature Art. 72.1.1, all specimens studied by the author are name bearing syntypes. Syntypes: F.G15.20, F.A3.19.1, F.C2.20.5, F. Pal.

Original diagnosis: Small size, wide umbilicus, subrounded section sometimes somewhat oval. Ornamentation of bifurcated ribs in IW and MW; in EW, bifurcated, trifurcated, RES and even some simple ones. There are constrictions, without data on the peristome and suture line (translated from Olóriz, 1978, p. 208).

Type locality: Not indicated, but geographic distribution, Sierra Gorda (Granada), Sierra Arana (Granada), Sierra de Cabra (Córdoba), Spain.

Age: Lower Tithonian (Albertinum Zone).

Virgatosimoceras uniformis Olóriz, 1978 (pl. 18, fig. 4a, b, scheme p. 204)

Holotype: Not indicated by the author, following the International Code of Zoological Nomenclature Art. 72.1.1, all specimens studied by the author are name bearing syntypes. Syntypes: F.G17.20 (?), F.G117.20.9(?), F.G18.8.6.

Original diagnosis: Small size, evolute, oval section. Ornamentation of bifurcated, polygyrated and RES ribs. VR narrow, with groove in the phragmocone and crossed by the ribs in BCH. Lappeted peristome. No data on the suture line. There are constrictions (translated from Olóriz, 1978, p. 209).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Tithonian (Albertinum Zone).

Subfamily Simoceratinae Spath, 1924.

Genus *Simoceras* Zittel, 1870

Simoceras (Simoceras) volanense magnum Olóriz, 1978 (pl. 19, fig. 1, pl. 20, fig. 2, scheme p. 246, 248)

Syntypes: F.G23.42.29, F.PR.2.21, F.PR.2.23, F.PR.2.212, F.PR.2.242, F.PR.3.11, F.PR.3.14, F.A2a.9.42, F.A.C.I.156, A.12.18.11.4-1.

Original diagnosis: Large shells, wide umbilicus and high square to rectangular section. The ornamentation consists of two rows of tubercles. There are constrictions. The suture line does not present differences with respect to previous considerations. No data on the peristome (translated from Olóriz, 1978, p. 228).

Type locality: Not provided, but the geographic distribution is given. Sierra Gorda (Granada), Sierra Arana (Granada), Sierra de Alta Coloma (Granada-Jaén), Spain.

Age: Lower Tithonian (Verruciferum Zone–Burckhardticeratoceras Zone).

Subgenus *Lytogyroceras* Spath, 1925

Simoceras (Lytogyroceras) subbeticum Olóriz, 1978 (pl. 19, fig. 2a, b, 3, scheme p. 246).

Holotype: Not indicated by the author, following the International Code of Zoological Nomenclature Art. 72.1.1, all specimens studied by the author are name bearing syntypes. Syntypes F.G19.25.6?, F.G 23 0.42.30, F.A2c 0.5.7, F.T1.1, F.T1 0.12, F.T1.13, F.PR.A, F.PR.B, F.PR.II.43, F.PR.II.44, F.PR.II.45, F.PR.II.46, F.PR.II.153, F.PR.II.154, F.PR.II.159, F.PR.II.24, F.PR.II.220, F.PR.II.225, F.PR.II.244, F.PR.V.45, F.GA3.5.3, F.GA7.18.3, F.GA7 18.6?.

Original diagnosis: Small size, evolute. IW with perisphinctoid stage of fundamentally bifurcated ribs. EW smooth. There are constraints. The section evolves from

rounded to oval. No data on the opening. The suture line is similar to that of *Simoceras (Lytogyroceras) lytogyrum* (Zittel) in Zittel (1870, p. 33/1c) (translated from Olóriz, 1978, p. 232).

Type locality: Not provided, but the geographic distribution is given. Sierra Gorda (Granada), Sierra Arana (Granada), Sierra de Alta Coloma (Granada-Jaén), Sierra de Montillana (Granada), Sierra de Gaena-Carcabuey (Córdoba), Spain.

Age: Lower Tithonian (Burckhardticeratoceras Zone).

Subgenus *Simolytoceras* Olóriz, 1978.

Type species *Simoceras (Simolytoceras) andaluciense* Olóriz, 1978

Original diagnosis: Are grouped in this subgenus those "Simoceratines" whose ontogenetic development shows three evolutionary stages as stated: IW with bifurcated and simple costulation (perisphinctoid stage), MW with more or less marked simple ribs and a row of tubercles on the EB of the flank (simoceroid stage) and EW with weakened ornamentation that favors the development of a smooth whorl (lytoceroid stage). (translated from Olóriz, 1978, p. 237, see original discussion).

Simoceras (Simolytoceras) andaluciense Olóriz, 1978 (pl. 20, fig. 4, scheme p. 246, 247)

Holotype: F.PR.II.213

Original diagnosis: Small size, large umbilicus, the section evolves from square to oval. VR more or less wide and covered or not by ribs depending on the stage. The ornamentation, in increasing diameters, responds to three stages: "perisphinctoid", "simoceroid" and "lytoceroid". The most characteristic elements of the suture line are the external and lateral lobes (of different width) as well as a wide external saddle (translated from Olóriz, 1978, p. 238).

Type locality: In the vicinity of Cortijo de Puerto Rico (Jaén), Spain.

Age: Lower Tithonian (Burckhardticeratoceras Zone).

Family Perisphinctidae Steinmann in Steinmann & Doderlein, 1890

Subfamily Aspidoceratinae Zittel, 1895 amend. Olóriz, 1978

Genus *Aspidoceras* Zittel, 1868

Subgenus *Pseudowaagenia* Spath, 1931

Type species *Pseudowaagenia haynaldi* (Neumayr), 1873 *Aspidoceras (Pseudowaagenia) aeanthomphalum binodosum* Olóriz, 1978 (pl. 26, fig. 1a, b, 2 y 3, scheme p. 282, 324, 327)

Holotype: Not provided by the author, following the International Code of Zoological Nomenclature Art. 72.1.1, all specimens studied by the author are name bearing syntypes. F.G9.7.3, F.G12.13.2, F.G14.16.13, F.G16.6, F.G23.11.9, F.C2.15.5, A.12.17.7.0–1.

Original diagnosis: Medium size, oval section, one row of periumbilical tubercles and another external, discontinuous one. Medium to large umbilicus. No data of the peristome. The suture line is identical to that of *acanthophalum acanthophalum* (translated from Olóriz, 1978, p. 319).

Type locality: Sierra Gorda (Granada), Sierra de Gaena-Carcabuey, Sierra de Cabra (Córdoba), Spain.

Age: Upper Kimmeridgian (Carouvi Zone–Beckeri Zone).

Subfamily Hybonoceratinae Neumayr, 1878

Type genus: *Hybonoticerias* Breistroffer, 1947

Type species *Ammonites hybonotum* Oppel, 1863.

Hybonoticerias (Hybonoticerias) robustum Olóriz, 1978 (pl. 33, fig. 1., scheme p. 369)

Holotype: F.G.10.6.4

Original diagnosis: Medium to large size, evolute. Square section, slightly higher than wide. Two rows of tubercles that give rise to folds on the flanks. The VR presents a groove limited by two roughly crenulated carinae. No data of peristome and suture line (translated from Olóriz, 1978, p. 342).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Tithonian (Hybonotum Zone).

Hybonoticerias (Hybonoticerias) peltoceratoides Olóriz, 1978 (pl. 30, fig. 4, scheme p. 369, 370)

Holotype: F.G.15.15.9

Original diagnosis: Medium to large size, evolute, rectangular section with flattened VR with two grooves with smooth edges in its middle area. On the flanks two rows of tubercles (~ 18) in periumbilical and external marginal position, between which strong simple ribs develop unequally. No data on the peristome. The asymmetric suture line shows a wide external saddle divided into two branches of different sizes, the lateral lobe 1 deep and narrow and then still two saddle and two less developed lobes with few accessory lobulations (translated from Olóriz, 1978, p. 345).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Tithonian (Hybonotum Zone).

Subgenus *Hybopeltoceras* Olóriz, 1978

Type species *Hybonoticerias (Hybopeltoceras) linaresi* Olóriz, 1978

Diagnosis: “Formas de sutura simétrica y muy simple; morfología “peltoceroide”” (taken literally from Olóriz, 1978, p. 362).

Hybonoticerias (Hybopeltoceras) linaresi Olóriz, 1978 (pl. 29, fig. 2a, b. pl. 30, fig. 1a, b y 2, scheme p. 369, 370)

Holotype: F.G.17.19.2

Original diagnosis: Small to medium size, evolute, hexagonal section with groove over the VR. The carinae appear coarse and slightly crenulated in IW. In the last whorl of the phragmocone smooth and later they lose relief with a tendency to fade. The ornamentation is of simple and strong ribs with three tuberculiform points: in the UB or its vicinity, EB and VR. No data on the peristome. The suture line is extraordinarily simple with only two umbilical lobes; the saddles are wide, blunt, and not very deeply subdivided into two. The ventral lobe is symmetrical, wide and bifurcated; the lateral lobe trifid (translated from Olóriz, 1978, p. 363).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Tithonian (Hybonotum Zone).

Subfamily Lithacoceratinae Zeiss, 1968

Genus *Lithacosphinctes* Olóriz, 1978

Type species *Ammonites lictor evolutus* Quenstedt, 1887–88

Original diagnosis: The one provided by Schairer (1974, p. 77) can be considered valid. Shell of medium to large size, generally evolute, rounded to oval section. Simple peristome. IW with more or less dense, bifurcated and polygyrated ribs with RES. In EW the ribs are spaced, the primaries are reinforced, and the divisions are complicated, appearing diversipartite-fasciculated with RES. It never really develops virgatostoma ribbing. In IW, constrictions can be frequent (translated from Olóriz, 1978, p. 410).

Age: Lower Kimmeridgian (Platynota? Zone–Lower part of Strombecki Zone).

Genus *Katrolicerias* Spath, 1924

“Katrolicerias” geyeri Olóriz, 1978 (pl. 35, fig. 1a, b, scheme p. 422, 431)

Holotype: F.G.12.10.17

Original diagnosis: Small size, evolute, depressed to subrounded section. Ribbing predominantly bifurcated, with reinforced and distant primaries. There are some RES. No data on opening and suture line (translated from Olóriz, 1978, p. 419).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Kimmeridgian (Divisum Zone (Uhlandi Subzone)).

"*Katrolicerias*" *serra-opima* Olóriz, 1978 (pl. 35, fig. 2a, b, 3. scheme p.422, 431)

Holotype: F.G.7.1.2

Original diagnosis: Small (?), evolute, depressed section. Bifurcated and simple ribs in IW. EW with reinforced and laterally projected primaries, as well as numerous secondaries (?), virgatostomes (?), polygyrates (?) and RES. No data on the peristome. Not very complex suture line with 4 broad saddles and 3–4 lobes on the flank. Among the lobes, lateral 1, trifold, lateral 2 broad, bifid and shallow (translated from Olóriz, 1978, p. 421).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Kimmeridgian (Strombecki Zone—Divisum Zone (Uhlandi Subzone)).

Genus *Crussoliceras* Énay 1960 amend. Olóriz, 1978

Type species *Ammonites crussoliensis* Fontannes in Dumortier y Fontannes, 1876

Original diagnosis amend: *Crussoliceras* is considered as a form of small to large size, strongly spaced ribbing in EW (intercostal space = 3 ribs), with bifurcated divisions, generally high, more or less proverse, and some RES. Infrequent trifurcations. There are rims of strong relief and oblique and deep constrictions. The section ranges from subrounded to oval. In small forms—less typical—the peristome is pedunculated; has not been observed in large-sized forms (translated from Olóriz, 1978, p. 426).

"*Crussoliceras*" *postdivisum* Olóriz, 1978 (pl. 34, Fig. 4a, b, scheme p. 431)

Holotype: F.G.17.20.12

Original diagnosis: Small size, evolute, subrounded to oval section. Bifurcate ribbing with some simple intercalated (?). Zig-zags can be seen along the ventral course of the secondary ribs. There are deep constrictions bordered by prominent rims. Peristome with lateral expansions. No data on suture line (translated from Olóriz, 1978, p. 429).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Tithonian (Verruciferum Zone).

Genus *Biplisphinctes* Olóriz, 1978

Type species *Perisphinctes cimbricus* Neumayr, 1873

Original diagnosis: Small shells, very evolute, with a shallow umbilicus with vertical UW and rounded UB. The sections are more or less subrounded—depressed in IW, gradually high, in EW, subrounded—quadratic or oval, in which the W/H ratio is close to 1. The VR wide, slightly convex and covered by the ER. Throughout ontogeny, the growth of the whorls in W and H is very uniform, so that a

fairly pronounced tubular appearance is achieved. The ornamentation consists of bifurcated ribs at certainly external points, sometimes almost marginal, between which a variable, but never excessive, number of simple ribs. No RES or polygyrated divisions or other more complex types have been observed. In general, the ornamentation can be more or less proverse and the secondary ones, always short, are unevenly projected towards the aperture and sometimes almost radial. It is not strange to observe zig-zag ribbing on the VR, a product of the asymmetrical, very localized character of ER. There are wide and oblique constrictions that interest then ribbing to a different degree, depending on the case. Pedunculate peristome. The BCH can occupy almost a complete whorl (translated from Olóriz, 1978, p. 438).

Age: Upper Kimmeridgian ("compsum" Zone-Beckeri Zone boundary)-lower Tithonian (Verruciferum Zone).

Biplisphinctes spathi Olóriz, 1978 (pl. 40, fig. 2 and 8, scheme p. 446)

Holotype: F.G.15.14.17

Original diagnosis: Small size, evolute, somewhat depressed subsquare section. Bifurcated ribbing according to fairly external divisions; there are simple intercalated ribs in a small number. No data on suture line. Pedunculate peristome (translated from Olóriz, 1978, p. 441).

Type locality: Sierra Gorda (Granada), Spain.

Age: Upper Kimmeridgian ("Compsum" Zone-upper part (?) Beckeri Zone).

Biplisphinctes tithoni Olóriz, 1978 (pl. 40, fig. 1, scheme p. 446)

Holotype: F.G.3.28.1

Original diagnosis: Small size, evolute, somewhat depressed subsquare section. Costulation bifurcated according to fairly external divisions; There are simple ribs interspersed in a small number. No data on suture line. Pedunculate peristome (translated from Olóriz, 1978, p. 444).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Tithonian (Verruciferum Zone).

Genus *Torquatisphinctes* Spath, 1924 amend. Olóriz, 1978

Type species *Ammonites torquatus* Sowerby, 1840.

Original diagnosis amend: Small size, wide but variable umbilicus, medium depth, with vertical UW and rounded UB. The section is subrounded in IW, it grows in height towards the EW, and the flanks may be unequally flattened, so that in the EW the transverse section appears more or less subrounded-subovate or subsquare-subrectangular with wide VR. Designs of the *T. guembeliregularis* Zeiss type is not frequent. The ornamentation

is quite regular and consists of bifurcate and simple elements. The bifurcations are made between 1/2 and 2/3 H, and due to the arrangement of the secondary ribs, the division points are not highlighted; The frequency of simple ribs is not very great and their number, with exceptions (*ruber* Spath, *alterneplicatus* Waagen, sp.2), does not exceed one per interval. Sometimes in VR, it is possible to observe "zig-zag" devices due to sporadic asymmetry in the ER. I have not confirmed the existence of RES, but its presence can be admitted, isolated, in relation to the aforementioned asymmetry of the secondary ribs. There are oblique constrictions, of different development and that alter, to a different degree, the rhythm of the ornamentation. Trifurcations, polygyrated divisions or other more complex types do not develop. At least in some cases (?) the peristome is pedunculated. The BCH can reach a practically complete whorl (translated from Olóriz, 1978, p. 448).

Torquatisphinctes laxus Olóriz, 1978 (pl. 40, Fig. 4, scheme p. 460)

Holotype: F.G.12.20.3

Original diagnosis: Small size, very evolute, sub rectangular-oval section with maximum thickness in the UB. Bifurcate and simple ribs. No data on the peristome and suture line. There are constrictions (translated from Olóriz, 1978, p. 454).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Tithonian (Hybonotum Zone).

Torquatisphinctes transiens Olóriz, 1978 (pl. 40, fig. 3, scheme p. 460)

Holotype: F.G.9.9.9

Original diagnosis: Small size, evolute, rectangular-oval section with maximum thickness near the UB. Bifurcate ribs with a variable number of intercalated simple ribs. Inconspicuous constrictions. No data on opening and suture line (translated from Olóriz, 1978, p. 456).

Type locality: Sierra Gorda (Granada), Spain.

Age: Upper Kimmeridgian, (lower part) Beckeri Zone.

Genus *Discosphinctoides* Olóriz, 1978

Type species *Perisphinctes roubyanus* Fontannes, 1879

Original diagnosis: Small size, variable involution, oval section with flattened, or somewhat convex, flanks, and more or less converging towards VR. Simple ribs based on elements fundamentally bifurcated at 2/3 H, sometimes with slightly deeper divisions; a small number of simple ribs may also be intercalated and at the end of the BCH, polygyrated and perhaps RES. At least in some cases pedunculated peristoma, in others, unknown.

Constrictions are not very frequent (translated from Olóriz, 1978, p. 481).

Age: Upper Kimmeridgian (Cavouri Zone–Beckeri Zone).

Genus *Subplanites* Spath, 1925 amend. Olóriz, 1978

Type species *Perisphinctes (Virgatosphinctes) reisi* Schneid, 1914.

Original diagnosis: Small to medium size, evolute, subtrapezoidal-oval section, more or less tall, wide, and with the maximum thickness located in the periumbilical area; the UW is usually steep, the UB rounded, and the VR broad and not excessively convex. In phragmocone, the ribs are generally dense and thin, although there are forms in which the spacing is greater and the ribs somewhat stronger; in all cases, considering the morphology, the angle that separates the secondary ribs has a small or medium amplitude, the ribs are rigid, proverse, and the ER are arranged in continuation of the primary ones from which they come. In the BCH, quite rigid polygyrated divisions begin to be intercalated, until they end up being dominant; only towards the end of the shell can some sinuosity be observed, but the vigor of the ornamentation gives it an unmistakable style. Although with different development, there are RES and constrictions. The BCH occupies between 3/4 and 4/4 of the last whorl. Pedunculate peristome (translated from Olóriz, 1978, p. 499).

Subplanites rigidus Olóriz, 1978 (pl. 43, fig. 1, scheme p. 508)

Holotype: F.G.8.5.15

Original diagnosis: Small size, medium involution, oval section. Bifurcated ribs with a predominance of polygyrated ones in the BCH. Very rare simple ribs and scarce RES. No data on the peristome and suture line. The BCH occupies at least one practically complete whorl (translated from Olóriz, 1978, p. 502).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Tithonian (Hybonotum Zone).

Genus *Subplanitoides* Zeiss, 1968 amend. Olóriz, 1978

Type species *Usseliceras (Subplanitoides) waltheri* Zeiss, 1968

Original diagnosis amend: Small size, pedunculated peristome. IW with bifurcated costulation; polygyrated and ataxioceratoid divisions may appear in EW. Variable involution, superficial umbilicus with rounded UB and, together with the UW, unevenly developed. The section ranges from oval-narrow to sub-rectangular; on VR, a more or less pronounced discontinuity may or may not develop. In the ornamentation, the inflection at the level of the division points is

very characteristic, which are between 1/2 and 2/3 H. There are never complex divisions in IW. The angle that separates the secondary ribs, in the most typical forms, is no wider than the thickness of a rib. Simple ribs and constrictions are not excessively common. In general, the ornamentation is delicate compared to other lower Tithonian microconchs and the ER, at most, draw a gentle convexity on the VR. Ataxioceratoid divisions are exceptional (translated from Olóriz, 1978, p. 526).

Subplanitoides zeissi Olóriz, 1978 (pl. 50, fig. 5, scheme p. 541)

Holotype: F.G.10.12.19

Original diagnosis: Small size, evolute, rectangular-oval section. Ribs basically bifurcated, except for some simple ones in relation to the constrictions (7) or the opening. Possible strangulations are shallow and parallel to the ribs. Pedunculate peristome. No data on suture line (translated from Olóriz, 1978, p. 532).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Tithonian (Verruciferum Zone).

Subplanitoides radiatus Olóriz, 1978 (pl. 50, fig. 4, scheme p. 541)

Holotype: F.G.23.32.11

Original diagnosis: Small size, evolute, subrectangular-oval section. Bifurcated ribbing with some simple elements intercalated. No polygyrated ribs have been observed. Underdeveloped constrictions. No data on opening and suture line (translated from Olóriz, 1978, p. 534).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Tithonian (terminal Verruciferum Zone-basal Richteri Zone).

Genus *Parapallasiceras* Spath, 1925 amend. Olóriz, 1978
Type species *Berriasella (Aulacosphinctes ?) praecox* Schneid, 1915

Original diagnosis amend: Small-sized microconch, involute, with whorls of subrounded to subtrapezoidal section with a siphonal groove or discontinuity, more or less developed and durable. Ornamentation strong, rigid or somewhat flexuous, radial or slightly proverse, basically bifurcated in the phragmocone and spaced in the IW; in the BCH, RES and polygyrated divisions can be intercalated. No special reinforcement of the ribs is observed in the UB. There are strong, deep and unevenly constrictions parallel to the ribs. As the diameter increases, a notable decrease in density is not observed. In cases where it has been possible to verify, the peristome is pedunculated. A polyphyletic

character is admitted for this form (translated from Olóriz, 1978, p. 545).

Parapallasiceras recticosta Olóriz, 1978 (pl. 55, fig. 5, scheme p. 565)

Holotype: F.PR.2.202

Original diagnosis: Small size, evolute, subrectangular section. Costulation exclusively bifurcated in EW. No data on the peristome and suture line (translated from Olóriz, 1978, p. 553).

Type locality: Sierra Arana (Granada), Spain.

Age: Lower Tithonian (Burckhardtceras Zone).

Parapallasiceras pseudocolubrinoides Olóriz, 1978 (pl. 55, fig. 3, scheme p. 565)

Holotype: F.GA.27.15.1

Original diagnosis: Small size, evolute, low subtrapezoidal section. Bifurcate ribs with intercalations of simplex and RES; near the peristome it is possible that polygyrated divisions develop. There are constrictions and mid-ventral discontinuity. No data on the peristome and suture line (translated from Olóriz, 1978, p. 555).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Tithonian (Albertinum Zone).

Parapallasiceras paracolubrinus Olóriz, 1978 (pl. 55, fig. 6a, b, scheme p. 565)

Holotype: Not indicated by the author, following the International Code of Zoological Nomenclature Art. 72.1.1, all specimens studied by the author are name bearing syntypes F.PR.0.2, F.PR.2.194, F.C 1 0.20.29, F.C 1 0.30.5.

Original diagnosis: Small size, evolute, subrounded to oval section. Bifurcate ribs. No data on the peristome and suture line (translated from Olóriz, 1978, p. 557).

Type locality: Sierra Alta de Coloma (Granada-Jaén), Spain.

Age: Lower Tithonian (Richteri Zone-Burckhardtceras Zone).

Parapallasiceras katroliforme Olóriz, 1978 (pl. 55, fig. 4a, b, scheme p. 565)

Holotype: F.G.19.11.3

Original diagnosis: Small size, evolute, depressed section. Bifurcate ribs with some intercalations of simple ribs and RES. There are constrictions. No data on the peristome and suture line (translated from Olóriz, 1978, p. 558).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Tithonian (Albertinum Zone-Verruciferum Zone).

Parapallasiceras bifurcus Olóriz, 1978 (scheme p. 565)

Holotype: F.G.74

Original diagnosis: Small size, evolute, subrounded to oval section. Ornamentation of bifurcate ribs. Constrictions wide and somewhat oblique. No data on the peristome and suture line. A smooth discontinuity runs through the phragmocone and part of the BCH (translated from Olóriz, 1978, p. 560).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Tithonian.

Parapallasiceras sinus Olóriz, 1978 (pl. 51, fig. 11, scheme p. 565)

Holotype: F.G.3.28.16

Original diagnosis: Small size, evolute, rectangular-oval section. Bifurcate ribs, flexuous, and with polygyrated intercalations. There are underdeveloped constrictions. No data on the peristome and suture line (translated from Olóriz, 1978, p. 561).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Tithonian (Burckhardticerias Zone).

Genus *Danubisphinctes* Zeiss, 1968

Type species *Parapallasiceras (Danubisphinctes) palatinum* Zeiss, 1968.

Danubisphinctes bartheli Olóriz, 1978 (pl. 49, fig. 3, scheme p. 565)

Holotype: F.G.15.27.1

Original diagnosis: Small-tall size, medium involution, oval section. Spaced and strong ornamentation in IW; in WE basically bifurcated between 1/2 and 2/3 H and already, in BCH, polygyrated with the first division point slightly less than half the flank. At the end some intercalated RES. Little developed constrictions. No data on the peristome and suture line (translated from Olóriz, 1978, p. 568).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Tithonian (Verruciferum Zone).

Genus *Dorsoplanitoides* Zeiss, 1968

Type species *Dorsoplanitoides bavaricus* Zeiss, 1968.

Dorsoplanitoides pseudomirabilis Olóriz, 1978 (pl. 56, fig. 3, scheme p. 579)

Holotype: F.G.20.26.19

Original diagnosis: Small size, evolute, depressed section. Ornamentation of bifurcate ribs and RES that sometimes give the impression of forming polygyrated divisions. Occasional asymmetric secondaries. No data on opening and suture line (translated from Olóriz, 1978, p. 577).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Tithonian (upper part Verruciferum Zone).

Genus *Paraberriasella* Donze, 1948

Type species *Paraberriasella blondeti* Donze, 1948.

Paraberriasella provecta Olóriz, 1978 (pl. 51, fig. 1, scheme p.593).

Holotype: F.AC.1.200

Original diagnosis: Small size, involute, oval section. In the BCH, sinuous, bifurcated and ataxioceroid ribbing, with some simple ribs intercalated. No data on the peristome. The suture line is close to that of *P. blondeti* Donze, but perhaps with somewhat wider elements (translated from Olóriz, 1978, p. 589).

Type locality: Sierra Alta Coloma (Granada-Jaén), Spain.

Age: Lower Tithonian (condensed bed Verruciferum Zone-Richteri Zone).

Paraberriasella flexuosa Olóriz, 1978 (pl. 5., fig. 2a, b, scheme p. 593)

Holotype: F.JU.1.4.2

Original diagnosis: Involute species, small and with oval section. Bifurcate, sinuous costulation, with simple intercalated elements and possibly some polygyrated division. Ataxioceratoid ribs poorly developed. No data on the peristome and suture line (translated from Olóriz, 1978, p. 590).

Type locality: Sierra Alta Coloma (Granada-Jaén), Spain.

Age: Lower Tithonian (condensed bed Verruciferum Zone-Richteri Zone).

Genus *Richteria* Olóriz, 1978

Type species *Ammonites richteri* Oppel in Zittel, 1868

Original diagnosis: Small size, generally evolute, although there is no shortage of species in which $H > U$; the umbilicus is not deep and is limited by a UW with rounded edges, sometimes strongly inclined. The section ranges from subrectangular to oval, the flanks are gently convex or flattened and the maximum thickness is usually in relation to the vicinity of the UB. The W/H ratio is variable and decreases as the diameter increases. The ornamentation is rigid, proverse and bifurcated in IW, in BCH it can remain unchanged or evolve towards finer and sinuous ribs, with more complex divisions, and even develop a certain tendency to weaken. At all times, the ribs cross an unequally wide VR forming a fairly pronounced "chevron" ($\sim = 40^\circ - 62^\circ$). There may be some simple but not ataxioceratoid ribs; RES are rare. The peristome is unknown. The suture line, judging by the one provided in Zittel (1868, pl. 20/9d), is not very complex, presents broad, poorly carved elements, and bears a certain analogy with that of "*P.*" *calisto* and "*P.*" *lorioli* (cf.

Siedmiradzki, 1898, p. 203, fig. 36). The BCH occupies at least 3/4 of a whorl (translated from Olóriz, 1978, p. 594).

Comments: A new name for the type species *Ammonites richteri* Oppel in Zittel, 1868, was proposed previously by Avram (1974), as *Richterella*, following the ICZN (2000) Art. 33.2.3 the new genus proposed by Olóriz (1978) is an objective synonymy.

Age: Lower Tithonian (end of Verruciferum Zone ?-Rich-teri Zone).

Richteria striata Olóriz, 1978 (pl. 51, fig. 4, scheme p. 603)

Holotype: F.AC.1.201

Original diagnosis: Small size, involute, oval section. Basically bifurcated costulation. There are some simple ribs and a polygyrated division has certainly been observed. Rare and poorly developed constrictions. No data on the peristome and suture line (translated from Olóriz, 1978, p. 599).

Type locality: Sierra Alta Coloma (Granada-Jaén), Spain.

Age: Lower Tithonian (end of Verruciferum Zone ?-Rich-teri Zone).

Genus *Lemencia* Donze-Enay, 1961 amend. Olóriz, 1978.
Type species *Lemencia pseudorichteri* Donze-Enay, 1961

Diagnosis amend: Variable growth in height (not necessarily rapid), so its variation may be weak. The VR may not be as narrow as Donze-Enay suggests, and I certainly have not observed a single case of "pinched" VR (pincée). Most likely this type of VR is linked to "*L.*" *praerichteri* Donze-Enay, *Richteria* in this report. There are some species that keep their flanks practically parallel in the BCH and, therefore, the section does not appear pointed.—The statement of "a veritable sillón siphonal" may be too categorical, so that there are species, some referred to in Schneid, 1915, which instead develop a flattening or gentle weakening of the ER in an area that appears somewhat tabulated. Forms are excluded, such as *praerichteri*, in which the ER form a very pronounced "chevron", there is no trace of ventral continuity and, on the contrary, there are strong on phragmocone and part of BCH. The ribs do not necessarily appear more numerous and flexuous in the BCH and even in the vicinity of the peristome. Apart from the new species described here, this fact can be observed in certain forms of Schneid, 1914 and 1915. Of less importance is the reference to "fascieux virgatostomes". since these are actually polygyrated divisions, more or less flexuous. Polyphyletic origin since the hypothesis of Zeiss (1968, p.103) in which it is considered a *Sublithacoceras* microconch does not seem sufficiently proven either. (translated from Olóriz, 1978, p. 605).

Lemencia pseudopergrata Olóriz, 1978 (pl. 52, fig. 5)

Holotype: F.A.2a.7.19

Original diagnosis: Small size, involute, rectangular section with convex VR. Costulation bifurcated at 2/3 H. Constrictions poorly developed. No data on suture line. The BCH occupies between 3/4 and 4/4 of a whorl. Pedunculate peristome (translated from Olóriz, 1978, p. 616).

Type locality: Sierra Arana (Granada) Spain.

Age: Lower Tithonian (Burckhardtceras Zone).

Lemencia pseudociliata Olóriz, 1978 (pl. 52, fig. 11, scheme p. 623)

Holotype: F.PR.2. 195

Original diagnosis: Small but variable size, evolute, oval section. bifurcated ribbing with few polygyrated divisions near the end of the BCH. Underdeveloped constrictions. The BCH occupies 3/4 of a whorl. Pedunculate peristome. No data on suture line (translated from Olóriz, 1978, p. 618).

Type locality: Near Cortijo de Puerto Rico (Jaén), Spain.

Age: Lower Tithonian (upper part Admirandum/Biruncinatum Zone—Burckhardtceras Zone).

Lemencia strangulata Olóriz, 1978 (pl. 52, fig. 15, scheme p. 623)

Holotype: F.A.2a.9.77.

Original diagnosis: Small size, evolute, rectangular section with gently convex VR. In the phragmocone, bifurcate ribs; in the BCH some polygyrated divisions are intercalated and strong constrictions develop. No data on the peristome and suture line. The BCH occupies at least 3/4 of the whorl (translated from Olóriz, 1978, p. 619).

Type locality: Sierra Arana (Granada), Spain.

Age: Lower Tithonian (upper part Admirandum/Biruncinatum Zone—Burckhardtceras Zone)

Lemencia interposita Olóriz, 1978 (pl. 52, fig. 9, scheme p. 623)

Holotype: F.PR.5.30

Original diagnosis: Small size, evolute, oval section. In the phragmocone the costulation is bifurcated; in BCH, frequent RES appear. Underdeveloped constrictions. No data on suture line and peristome (translated from Olóriz, 1978, p. 620).

Type locality: Sierra Alta de Coloma (Jaén), Spain.

Age: Lower Tithonian (Burckhardtceras Zone).

Genus *Burckhardtceras* Olóriz, 1978

Type species *Himalayites (Micracanthoceras) peroni* Roman, 1936

Original diagnosis: Small size (55 mm?), evolute, more or less depressed subrounded section and pedunculated peristome. Ornamentation of bifurcate and acute ribs with excavated intercostal spaces. There are some simple elements and, in certain varieties, trifurcated, polygyrated and RES divisions. The density usually remains uniform, although there are varieties that have comparatively higher density in the nucleus. The coating is weak but variable, so that the bifurcations of the innermost whorls may or may not be observed. The constrictions do not reach considerable development and linked to them are simple ribs or false polygyrated divisions. The VR is flattened and wide in the most typical forms so that in its midline it presents, to varying degrees, a tendency towards siphonal discontinuity, rather weakening or notching, but never a well-excavated groove that interrupts the ribbing. In some forms, facilitated by the acute nature of the costulation, a certain inclination towards “lamelliform tuberculation” is observed in VR on the primary ribs. At no time are tubercles *s. str.* The suture line, although preserved, does not facilitate its study due to the deterioration of its elements (translated from Olóriz, 1978, p. 624).

Holotype: Román (1936, p. 24, pl. 4/21–13)

Age: Lower Tithonian (Burckhardticerias Zone). Some records in the lowermost part of upper Tithonian.

Comments: The same name of *Burckhardticerias* was proposed previously by Flores-López (1967), for an ammonitid ammonite, a wide discussion for the status on *Burckhardticerias* was given by (Villaseñor & Olóriz, 2024). Zoobank officially considers an accepted genus <https://zoobank.org/NomenclaturalActs/1de6e2cc-7c2a-4cc6-bcff-49896743e329>.

Family Berriasellidae Spath, 1922.

Subfamily Himalayitinae Spath, 1925.

Genus *Aulacosphinctes* Uhlig, 1910 amend. Olóriz, 1978

Type species *Ammonites moerickeanus* Oppel, 1863

Diagnosis amend: Small size, evolute with subrounded, oval or subquadrate whorls that support a well-developed groove in the VR. The ornamentation is variable, so that types with a more or less perisphinctoid appearance can develop, while in other cases it results in a marked himalayan aspect. There are constrictions. The ribs are basically bifurcated with simple intercalated elements, and sometimes a smaller proportion of polygyrated divisions. Pedunculate peristome. The BCH occupies approximately one complete whorl. Tubercles do not develop (translated from Olóriz, 1978, p. 631).

Aulacosphinctes quadri Olóriz, 1978 (pl. 53, fig. 15a, b, scheme p. 630)

Holotype: F.PR.2.274

Original diagnosis: Small size, evolute, quadratic, depressed section, with a wide sulcus on VR. Bifurcated, rigid, radial ribs. Rare simple ribs. No data on the suture line and peristome. The BCH occupies a practically complete whorl (translated from Olóriz, 1978, p. 638).

Type locality: Sierra de Alta Coloma (Granada-Jaén) Spain.

Age: Lower Tithonian (Burckhardticerias Zone).

Aulacosphinctes trifidus Olóriz, 1978 (pl. 53, fig. 14a, b, scheme p.630)

Holotype: F.GA.7.18.7

Original diagnosis: Small size, evolute, oval section with narrow VR and run through a groove. bifurcated ribbing; rare simple ribs and, at the end, development of polygyrated divisions. No data of peristome and suture line” (translated from Olóriz, 1978, p. 640).

Type locality: Sierra Gorda (Granada), Spain.

Age: Lower Tithonian—upper Tithonian boundary.

Aulacosphinctes berriaselliformis Olóriz, 1978 (pl. 53, fig. 16a, b, scheme p. 630)

Holotype: F.PR.2.55

Original diagnosis: Small size, evolute, oval section with VR tabulated and traversed by a groove that weakens towards the end of the last whorl. Ribs bifurcated, few simple, and in the second half of the CH intercalated polygyrated divisions. No data on aperture and peristome. The BCH occupies a practically complete whorl (translated from Olóriz, 1978, p. 641).

Type locality: Sierra de Alta Coloma (Granada-Jaén) Spain.

Age: Lower Tithonian (lower part of Burckhardticerias Zone).

Genus *Djurjuricerias* Roman, 1936 amend. Olóriz, 1978

Type species *Djurjuricerias djurjurensis* Roman, 1936

Diagnosis amend: Small to medium size, evolute, sub-square-subrounded and more or less depressed section. The VR is wide, flattened, and sometimes tends to develop a slightly depressed middle area, or even a narrow and not very pronounced discontinuity. In the phragmocone, the ornamentation consists of regularly bifurcate ribs (perhaps there may be some simple element); in the second half of the BCH and with different development, a change in ornamentation occurs so that the intercostal spaces become very wide (“wide annular constrictions” of Fallot-Thermier) and are limited by simple ribs arranged in pairs. It is not unusual to find some RES related to these wide intercostal spaces or in the final part of the phragmocone, due to the asymmetry that

can sporadically be observed in the ribbing. Constrictions are poorly developed; the BCH occupies approximately one whorl, and the suture line does not present any particularly prominent features. No data on the type of peristome. Without tubercles (translated from Olóriz, 1978, p. 646).

Djurjuriceras armonicus Olóriz, 1978 (pl. 53, fig. 4, scheme p. 630)

Holotype: F.PR.5.1

Original diagnosis: Small size, evolute, subrounded-depressed section. Ribbing basically bifurcated at the phragmocone; at the end of the BCH, the UR are spaced, and wide intercostal spaces develop, separated by simple ribs of sharp relief. No data on the peristome. The suture line appears to develop broad, bifid saddle and a trifold L1" (translated from Olóriz, 1978, p. 648).

Type locality: Sierra de Alta Coloma (Granada-Jaén), Spain.

Age: Lower Tithonian (Burckhardtceras Zone).

Djurjuriceras anularius Olóriz, 1978 (pl. 53, fig. 5, scheme p. 630)

Holotype: F.PR.2.36

Original diagnosis: Small size, evolute, depressed section, irregular ribbing in the BCH with great development of the "djurjuriceras stage." No data on the peristome and suture line (translated from Olóriz, 1978, p. 649).

Type locality: Sierra de Alta Coloma (Granada-Jaén), Spain.

Age: Lower Tithonian (Burckhardtceras Zone).

3 Taxonomic contribution by Olóriz and other authors

In the next section are presented the taxonomic contributions of Federico Olóriz and other authors, in chronological order.

3.1 Contribution from Olóriz & Tavera (1979a)

Family Simoceratidae Spath, 1924

Subfamily Simoceratinae Spath, 1924

Genus *Simospiticeras* Olóriz & Tavera, 1979a

Original diagnosis: The most outstanding distinctive character is the development of bulliform periumbilical tuberculation while the ventral tuberculation is acute or crestiform and occupies the mid-siphonal line. They are small-medium sized shells (80–90 mm), with a wide and slightly depressed umbilicus. The spiral has a subrounded-oval section in IW and an ogival section in EW (especially

in BCH). There are apparent, wide, curved and proverse constrictions. The ribbing is thin and with little relief in the VR, especially in the IW of the phragmocone. No data on the peristome. The suture line is quite simple and its broad elements present superficial accessory lobulations. Derivatio nominis: alludes to its morphology intermediate between Simoceratinos and Spiticeratinos (translated from Olóriz & Tavera, 1979a, p. 183)

Simospiticeras lojense Olóriz & Tavera, 1979a (pl. 1, fig. 1)

Holotype: Y.G. 77. X.2, by monotype

Original diagnosis: The same of the genus.

Type locality: Sierra Gorda, Sierra de Gaena—Carcabuey (Granada, Spain)

Age: Lower part of upper Tithonian.

Simospiticeras cristatus Olóriz & Tavera, 1979a (pl. 1, fig. 2)

Holotype: W.Ga.20.18 by monotype

Original diagnosis: Not original diagnosis provided by the authors.

Type locality: Sierra de Gaena—Carcabuey (Granada, Spain)

Age: Lower part of upper Tithonian.

3.2 Contribution from Olóriz & Tavera (1979b)

Family Simoceratidae Spath, 1924

Subfamily Simoceratinae Spath, 1924

Genus *Simoceras* Zittel, 1870

Subgenus *Cordubiceras* Olóriz & Tavera, 1979b

Type species *Simoceras (Cordubiceras) geminatum* Olóriz & Tavera, 1979b

Original diagnosis: Shells of small-medium size (maximum observed 100 mm) with a wide and shallow umbilicus. Spiral taller than wide, with maximum thickness close to the umbilical edge. In the ornamentation there is always a final stage of geminate ribs (last whorl) that serves to establish the subgenus. This characteristic development will be preceded, depending on the case, by phragmoconus of the "*Simoceras*" type or close to "*Lytogyroceras*". The suture line responds to the Simoceratin model with wide and not excessively lobed elements. Perhaps it is worth noting that the siphonal lobe may have a significantly lower depth in the type species. (translated Olóriz & Tavera, 1979b, p. 3–4).

Comments: It is word to mention that Enay & Geysant (1975) and later Geysant (1979) propose the genus *Baeticoceras*, for specimens collected in Spain, later Tavera (1985)

considered this genus as a junior synonym of *Cordubiceras* and elevated the subgenus as a genus.

Simoceras (Cordubiceras) geminatun Olóriz & Tavera, 1979b (pl. 1/1, 2, fig. 1)

Holotype: T.GA.6b.1.1

Original diagnosis: The same as the subgenus.

Type locality: Sierra de Gaena-Carcabuey (Córdoba), Spain.

Age: Upper Tithonian (Simplisphinctes Subzone).

Simoceras (Cordubiceras) cordubae Olóriz & Tavera, 1979b (pl. 1/3–5, fig. 1)

Holotype: W.GA.10.3.10

Original diagnosis: Not provided by the authors.

Type locality: Sierra de Gaena-Carcabuey (Córdoba), Spain.

Age: Upper Tithonian (Simplisphinctes Subzone).

3.3 Contribution from Olóriz and Schairer (1983)

Family Haploceratidae Zittel, 1884

Subfamily Taramelliceratinae Spath, 1928

Genus *Barthelia* Olóriz & Schairer, 1983

Original diagnosis: A genus of Taramelliceratinae of small size, keeled, with a narrow umbilicus. The ribbed surface shows variations from recti- to rursiradiate ribs, which are mostly simple with long intercalatories and some biplicate. The last whorl is excentrically coiled and has numerous kinks. The aperture is narrow with a hook-shaped process in the umbilicus area, and small projections on the flanks and ventral region. The suture, as far as it is identifiable, shows similarities to those of *Taramelliceras flexispinatum* (Oppel) and *Popanites paturatensis* (Greppin) (translated from Olóriz & Schairer, 1983, p. 577).

Barthelia subbetica Olóriz & Schairer, 1983 (fig. 1, 2, 3a)

Holotype: Specimen in fig. 1, 1–4.

Original diagnosis: Not provided by the authors but should be the same for the genus.

Type locality: Sierra Quipar (Murcia), Betic Cordilleras, Subbetic Zone, Spain.

Age: Upper Oxfordian, (Bimammatum Zone).

3.4 Contribution from Olóriz et al. (1985)

Family Perisphinctidae Steinmann in Steinmann & Doderlein, 1890

Subfamiiie Ataxioceratinae Buckman, 1921

Genus *Crussoliceras* Énay, 1960

Crussoliceras almolaense Olóriz et al., 1985 (pl. 1, figs. 1–3; pl. 2, figs. 1, 2)

Holotype: Specimen in pl. 1, figs. 1–3; pl. 2, figs. 1, 2

Original diagnosis: Medium-sized, moderately evolute species of the genus *Crussoliceras* Enay with numerous polygyrate ribs starting from a relatively small diameter. The anterior ribs of each rib unit are usually clearly prorsiradiate. The whorl section is initially wider than high and later becomes subtrapezoidal to subsquare. The flanks of the outer whorl are flattened (translated from Olóriz et al., 1985).

Type locality: La Almola, Serranía de Ronda, (Malaga), Spain.

Age: Kimmeridgian (Divisum Zone).

3.5 Contributions from Leanza and Olóriz (1987) and Villaseñor et al. (2003).

Because both subspecific proposals are related to same genus they are included together.

Family Perisphinctidae Steinmann in Steinmann & Doderlein, 1890.

Subfamily Aulacostephaninae Spath, 1924 or

Family Aspidoceratidae Zittel, 1895

Subfamily Aspidoceratinae Zittel, 1895 (= Physodoceratinae Schindewolf, 1925).

Genus *Simocsmoceras* Spath, 1925

Type species *Ammonites adversus* Oppel, 1865 (= *Cosmoceras adversum* Oppel in Zittel, 1870).

Simocsmoceras adversum andinum Leanza & Olóriz, 1987 (fig. 2 a-d)

Holotype: P 1671/1 M. O. Z.

Original diagnosis: Large shell in the spectrum of the genus. Moderate involution. Polygonal section with three rows of tubercles. Primary ribs unequally sinuous and secondary ribs configuring zig-zag structures. Peristome with expansions in lateral and ventral position. No data on the suture line. “It is probably a microchonch.” (translated from Leanza & Olóriz, 1987, p. 204).

Type locality: 1.5 km to the south of Cerro Lotena (39° 2'lat. S, 69° 40'long. W), Neuquén, Argentina.

Age: Lower Tithonian (upper part of Zitteli Zone).

Simocsmoceras pszczolkowskii apulcoensis Villaseñor et al., 2003 (fig. 4 c y 4d)

Holotype: IGM6114

Original diagnosis: “Tightly coiled *Simocsmoceras* with tubercles on the mid-flank and shell periphery. Fine

ribs strongly prorsiradiate in the outer part of the flanks. Lappets narrow and elongated” (taken literally from Villaseñor et al., 2003, p. 51).

Type locality: Río Apulco, Sierra Norte de Puebla (Mazatepec, Puebla), México.

Age: Middle part of lower Tithonian.

Comments: Officially accepted genus in zoobank, <https://zoobank.org/NomenclaturalActs/b7013b58-968a-453f-bf1a-d08cf908f617>.

3.6 Contribution from Olóriz and Westermann (1998)

Family Perisphinctidae Steinmann in Steinmann & Doderlein, 1890

Subfamily Perisphinctinae Steinmann in Steinmann & Doderlein, 1890

Sulaites Olóriz & Westermann, 1998 (fig. 1c)

Type species *Perisphinctes sularus* Böhm, 1907

Neotype: ROM57213

Original diagnosis: “Small perisphinctids, evolute and serpentic planorbicones; whorl section developing from depressed rounded juveniles) to compressed ovate (adult); costae mainly dichotomous, ventrally projected forming chevrons (adults and external mould) or narrowly interrupted (juveniles and internal mould); tendency for parabolic ribs and constrictions on inner whorls and incipient to variable ventral parabola on outer whorls” (taken literally from Olóriz & Westermann, 1998, p. 232).

Type locality: Sula Islands, Indonesia.

Age: Middle Oxfordian.

3.7 Contributions from Olóriz and Villaseñor (1999)

Family Aspidoceratidae Zittel, 1895, amend. Checa, 1985

Subfamily Hybonoticeratinae Olóriz, 1978

Genus *Hybonoticer* Breistroffer, 1947

Type-species *Ammonites hybonotus* Oppel, 1863

Hybonoticer *cuencamensis* Olóriz & Villaseñor, 1999 (figs. 2a, 3a–d, 4a, 8.1)

Holotype: IGM 6017

Original diagnosis: Not original diagnose provided by the authors.

Type locality: Sierra de Palotes, near Cuencamé (Durango), Mexico.

Age: Upper Kimmeridgian (upper Beckeri Zone).

Comments: Officially accepted species in zoobank, <https://zoobank.org/NomenclaturalActs/933dce98-f352-4794-a16f-bcf7f5514cf3>

Hybonoticer *gonzalezi* Olóriz & Villaseñor, 1999 (figs. 4b, c, 5a–d, 8.6–9)

Holotype: IGM6028

Original diagnosis: “Microconchiate, spiny *Hybonoticer*, with persistent ribbing and lappeted peristome” (taken literally from Olóriz & Villaseñor, 1999, p. 566).

Type locality: Cañón de San Matias, Sierra de Santa Rosa (Zacatecas), Mexico.

Age: Upper Kimmeridgian (upper Beckeri Zone).

Comments: Officially accepted species in zoobank, <https://zoobank.org/NomenclaturalActs/5e592c5a-ce9c-4ed7-be7b-238144210a27>.

Hybonoticer *gerninatum* Olóriz & Villaseñor, 1999 (figs. 4b, c, 5a–d, 8.2–5)

Holotype: IGM6190

Original diagnosis: “Microconchiate *Hybonoticer* with variable development of near-geminate to geminate ribs and spines. Lappeted peristome” (taken literally from Olóriz & Villaseñor, 1999, p. 568).

Type locality: Sierra de Palotes, Cuencamé (Durango), Mexico.

Age: Upper Kimmeridgian (upper Beckeri Zone).

Comments: Officially accepted species in zoobank, <https://zoobank.org/NomenclaturalActs/e81138cb-032a-45b4-9349-83cc7325e847>.

Hybonoticer *evanidum* Olóriz & Villaseñor, 1999 (figs. 6a–d, 7, 8.12)

Holotype: IGM6027

Original diagnosis: “Small, evolute and lappeted *Hybonoticer* with extreme fading of the sculpture” (taken literally from Olóriz & Villaseñor, 1999, p. 570).

Type locality: Cañón de San Matias, Sierra de Santa Rosa (Zacatecas), Mexico.

Age: Upper Kimmeridgian (upper Beckeri Zone).

Comments: Officially accepted species in zoobank, <https://zoobank.org/NomenclaturalActs/11a8fe6e-8768-4bd0-a9be-bd71a966910d>.

3.8 Contribution from Olóriz and Villaseñor (2006)

Family Perisphinctidae Steinmann in Steinmann & Doderlein, 1890

Subfamily Idoceratinae Spath, 1924

Genus *Ceratosphinctes* Ziegler, 1959

Type-species *Ammonites septenarius* Quenstedt, 1858

Ceratosphinctes rachistrophus amatitlaensis Olóriz & Villaseñor, 2006 (figs. 2 (1, 6), 3 and 4i)

Holotype: IGM6118

Original diagnosis: Not provided by the authors.

Type locality: 21°13.735'N–98°51.987'W (Garmin GPS12XL), in the surroundings of Amatitla (San Luis Potosí), Mexico.

Age: Late-early to early-late Kimmeridgian.

3.9 Contributions from López-Palomino et al. (2006)

Family Perisphinctidae Steinmann in Steinmann & Doderlein, 1890

Subfamily Perisphinctinae Steinmann in Steinmann & Doderlein, 1890

Genus *Vinalesphinctes* Spath, 1931

Type species *Vinalesphinctes roigi* Spath, 1931

Vinalesphinctes tamanensis López-Palomino et al., 2006 (figs. 5a–d, figs. 6a–e, figs. 7a–f)

Holotype: IGM6170.

Original diagnosis: Not provided by the authors.

Type locality: Outcrop on the riviera of Río Moctezuma, Tamán 1 (TAM-1) section, (San Luis Potosí), Mexico.

Age: Upper Oxfordian (Bifurcatus Zone).

Vinalesphinctes tenangensis López-Palomino et al., 2006 (fig. 9a–d, fig. 10a–c)

Holotype: IGM6175

Original diagnosis: Not provided by the authors.

Type locality: Road to Tenango, Tenango (TEN-1), section (Hidalgo), Mexico.

Age: Upper oxfordian (Bifurcatus Zone).

3.10 Contribution from Villaseñor and Olóriz (2009)

Family Ataxioceratidae Buckman, 1921

Subfamily Lithacoceratinae Zeiss, 1968

Genus *Housaites* Villaseñor & Olóriz, 2009

Type species *Paradontoceras butti* Imlay, 1942

Holotype: U.S. National Museum 103417

Original diagnosis: “*Housaites* includes moderately coiled ammonites, with subovate whorl section, flattened flanks, and less than 130 mm in shell size. Dense ribbing in preadults shows bifurcations below the middle flank. Variably crowded, simple ribs are typical of adult stages. Throughout ontogeny, rib division points rise to close the mid-flank and ribs cross the venter without modification. No constrictions. Peristomal structures and suture lines unknown” (taken literally from Villaseñor & Olóriz, 2009, p. 122).

Type locality: Viñales limestone, western Cuba, Pinar del Rio province.

Age: Mid-lower Tithonian to lower upper Tithonian.

3.11 Contributions from Moliner & Olóriz (2010)

Family Ataxioceratidae Buckman, 1921

Subfamily Ataxioceratinae Buckman, 1921

Genus *Geyericeras* Moliner & Olóriz, 2010

Type species *Geyericeras aragoniense* Moliner & Olóriz, 2010

Original diagnosis: “Micro- and macroconchiate ataxioceratids of small size showing moderate to loose coiling. Whorl section subrectangular, narrower in microconchs than in macroconchs. Ribbing dense and delicate on the inner whorls. On the phragmocone ribs are mainly bifurcate, some polygyrate and less frequently subpolyplocoid, which also occur on the inner whorls in macroconchs. Intercalatory ribs scarce. On the body-chamber ribs are stronger, rib interspace slightly wider and subpolyplocoid ribs exist. Ribbing index commonly lower than 4. Rib-curve decreasing from shell size less than 50 mm. No parabolic structures are present. Constrictions common. Lappeted peristome in microconchs” (taken literally from Moliner & Olóriz, 2010, p. 102).

Geyericeras aragoniense Moliner & Olóriz, 2010 (figs. 2–5, 7, 8)

Holotype: UGR MLG.23.20

Original diagnosis: “Microconch: maximum adult diameter about 60 mm, moderate-to-low coiling degree ($U/Dm = 33–42\%$), and subrectangular whorl-section. Constrictions common, indistinct, limited by an adoral, incipiently reinforced edge. Ribs fine, mainly bifurcate in low angle; some polygyrates, intercalatory and less commonly subpolyplocoid ribs close to the peristome. Body-chamber about three quarters to a complete whorl long. Generally, the rib curve per half-a-whorl decreases for shell sizes less than 50 mm, but cases in which it slightly increases are known. Peristomal structures unknown, but adoral convexity of ribs occurs close to the end of the body-chamber. Macroconch: maximum adult size about 160 mm, evolute to very evolute (37–52%) with subrectangular whorl section. Constrictions common, narrow and shallow. Scarce subpolyplocoid ribs on the phragmocone and more frequent on the body-chamber. Rib curves per complete whorl and per half-a-whorl decrease in shells smaller than 40 mm. The body-chamber is about a whorl long; peristome simple” (taken literally from Moliner & Olóriz, 2010, p. 103).

Type locality: Reservoir of Calanda, Calanda (Teruel), Spain.

Age: Uppermost part of the *Ataxioceras lothari* Zone to youngest part of the *Ataxioceras hypselocyclum* Zone.

Comments: Accepted genus and species by Zoobank. <https://zoobank.org/NomenclaturalActs/224f177d-bc6d-4c59-bf58-d73321526686>

3.12 Contribution from Villaseñor et al. (2015)

Family Perisphinctidae Steinmann in Steinmann and Döderlein 1890 or

Family Ataxioceratidae Buckman, 1921

Subfamily Ataxioceratinae Buckman, 1921

Genus *Schneidia* Atrops, 1982 amend. Moliner, 2009

Type species *Schneidia collignoni* Atrops, 1982

Schneidia zacatense Villaseñor, Moliner & Olóriz, 2015 (fig. 4a)

Holotype: IGM9621

Original diagnosis: “Small to mid-size, discocone to platycone shells. Coiling degree moderate. Whorl section suboval with slightly flattened flanks. Crowded ribbing on the inner whorls, progressively less accentuated on the outer whorls in a variable degree. Simple, bifurcate, polygyrate and subpolyplocoid ribs. No parabolic structures. Constrictions more or less oblique, rather narrow and indistinct. Wide, short lappets in microconchs. Macroconchs show greater shell size and periumbilical bullae. No complete, external suture lines preserved” (taken literally from Villaseñor et al., 2015, p. 227).

Type locality: Las Bocas section, Sierra de Santa Rosa, Mazapil (Zacatecas), Mexico.

Age: Lowermost Kimmeridgian (upper-to-uppermost Platynota Zone).

Comments: Officially accepted species in zoobank, <https://zoobank.org/NomenclaturalActs/4a68b8cb-106c-4b41-9733-12473d225cd1>.

3.13 Contribution from Olóriz & Villaseñor (2018)

Family Aspidoceratidae Zittel, 1895

Subfamily Hybonoticeratinae Olóriz, 1978

Genus *Hybonoticer* Breistroffer, 1947

Type species *Ammonites hybonotus* Oppel, 1863

Hybonoticer *authariformis* Olóriz & Villaseñor, 2018 (figs. 3.1–3.3, 4.1–4.4, 5.1, 5.6, 5.9)

Holotype: IGM4698

Original diagnosis: “Shell large, evolute. Whorl section rectangular. Two rows of well-developed tubercles on the outer whorl. Coarse ribs on the outer whorl. Wide, shallow ventral groove outlined by nodate keels. Peristome and suture line unknown” (taken literally from Olóriz & Villaseñor, 2018, p. 11).

Type locality: Alamitos 5 (AL-5) section, Sierra de Catorce, San Luis Potosí (23°39'1.6" N, 100°50'54.7" W), Mexico.

Age: Lowermost Tithonian.

Comments: Record in zoobank. urn:lsid:zoobank.org:pub:78C89620-FA2E-4DE5-985D-819421A858F9.

Zoobank accepted species, <https://zoobank.org/NomenclaturalActs/69aede63-3d0c-4361-a984-16125b5f6132>.

3.14 Contributions from Villaseñor & Olóriz (2019, 2020)

Burckhardtia Villaseñor & Olóriz, 2019, 2020

Type species *Hoplites mexicanus* Aguilera, 1895 (in Del Castillo & Aguilera, 1895)

Holotype: IGM5

Original diagnosis: “Planulate to discoid shells. Coiling degree changing progressively from colubri-noid nuclei to moderately and, lesser common, widely umbilicate adults. Coiling degree stability higher in shells greater than 60 mm. Whorl-section progressively higher during growth, with an early, comparatively accelerated change to rather flattened flanks, and slightly rounded to tabulate venter. Occasional occurrence of small, local protuberances on the innermost whorls, just after a short initial stage of smooth-shell nuclei, and before development of the regular ribbing, as well as on the points of furcations short after the first apparition of ribs, but their occurrence is brief and belongs to an early phase of growth showing instability of phenotype traits. Typical sculpture is made of mainly bifurcate ribs on the inner and intermediate whorls, with possible addition of polygyrate to subpolycloid ribs in outer whorls; variable occurrence of simple ribs and intercalatories. Occurrence of complex ribbing on the inner whorls is a rarity, except for shells with high-crowded ribbing showing even subpolyplocoids, and some particular case with slightly lesser than normal crowding of ribs and the inclusion of polygyrates. Primary ribs number more variable at less than 50–60 mm, showing a persistent but variable increase at greater shell-size. When present, peripheral ribs number-secondaries plus intercalatories—commonly increasing throughout growth. Ventral ribs projected forwards, with variable occurrence of weakening of the mid-venter line, but without development of a true smooth band. Constrictions slightly oblique to ribs and better developed on planulate, loose-coiled shells. Dimorphic, with wide and very short lappets in accordance with the pre-apertural pattern of ribbing, gently concave-to-flexuous at the middle of the flank, and ventral rostrum (Fig. 7). The latter is assumed to be more or less projected in accordance with the lower or wider angle of

the ventral chevron, respectively-colubrinoid to planulate microconchs versus planulate to discoid specimens, macroconchiates included. Macroconch: maximum adult size about 160 mm, evolute to very evolute (37–52%) with subrectangular whorl section. Constrictions common, narrow and shallow. Scarce subpolyplocoid ribs on the phragmocone and more frequent on the body-chamber. Rib curves per complete whorl and per half-a-whorl decrease in shells smaller than 40 mm. The body-chamber is about a whorl long; peristome simple” (taken literally from Villaseñor & Olóriz, 2019, p. 34).

Type locality: Rancho Los Alamitos, Sierra de Catorce, San Luis Potosí, Mexico.

Age: Lower not lowermost Tithonian (two-fold division) to the Lower-Middle Berriasian.

Burckhardtia westermanni Villaseñor & Olóriz, 2019 (fig. 8.1)

Holotype: IGM9727

Original diagnosis: “Specimens typically showing a very low and irregular crowding of ribs” (taken literally from Villaseñor & Olóriz, 2019, p. 25).

Type locality: Rancho Los Alamitos section (Al-1), Sierra de Catorce (San Luis Potosí), Mexico.

Age: Lower upper Tithonian.

Genus *Aguilerites* Villaseñor & Olóriz, 2019 (pl. 7, fig. 7)

Type species *Perisphinctes lenki* Aguilera, 1895 (in Del Castillo & Aguilera, 1895)

Holotype: IGM25

Original diagnosis: “Small-to mid-size shells with planulate outer whorls. Loose coiling degree changing from colubrinoid nuclei to moderate-to widely umbilicate phragmocones. The whorl section after the colubrinoid stage is progressively higher during growth, with slightly convex to flattened and convergent flanks, and tabulate and wide venter with variable mid-venter depression. Sculpture made of mainly bifurcate, stiff ribs with some simples and rarer intercalatories. The occurrence of a rare case of possible polygyrate rib is doubtful in the original types (forced by adjacent constriction in adoral position?). Ventral ribs projected forwards, with variable occurrence of weakening on the more or less depressed mid-venter line, but without development of true smooth band. Constrictions parallel to slightly oblique to ribs” (taken literally from Villaseñor & Olóriz, 2019, p. 35).

Type locality: Rancho Los Alamitos, Sierra de Catorce, San Luis Potosí, Mexico.

Age: Upper Lower Tithonian.

4 Genus and species dedicated to Federico Olóriz

In this section are presented the taxonomic contributions of genera and species in honor to Federico Olóriz, the proposals mainly belong to ammonites but a radiolarian species is also dedicated.

4.1 Tavera (1985)

Subfamily Lithacoceratinae Zeiss, 1968 amend. Tavera, 1985

Genus *Oloriziceras* Tavera, 1985

Type species *Oloriziceras salarensis* Tavera, 1985 (pl. 6, fig. 1)

Holotype: T.G2.1.1

Original diagnosis: Dimorphic genus of small and medium size, with a wide, superficial or shallow umbilicus. The section is oval or subrectangular with flattened flanks and convex ventral region. The ornamentation is of unevenly strong and dense ribs, predominantly bifurcate, and some simple and polygyrate ones may be present at the end of the shell. In the macroconch there is a change in ornamentation consisting of finer and denser ribbing. All ribs pass through the ventral region without interruption. There may be soft constrictions parallel to the costulation. The suture line is simple, with few superficial lobulations, with the lateral saddle 1 and 2 unequally wide and divided into 2 by shallow invaginations, the lateral lobe trifid and the suspensory lobe with some or all of its oblique lobulations. The peristome is pedunculated in the microconchs and presumably simple in the macroconchs (translated from Tavera, 1985, p. 63).

Type locality: Sierra de Gaena-Carcabuey (Córdoba) and Sierra Gorda (Granada), Spain.

Age: Upper Tithonian (Simplisphinctes Zone).

4.2 Fözy (1988)

Family Haploceratidae Zittel, 1884

Genus *Pseudolissoceras* Spath, 1925

Type species *Neumayria zitteli* Burckhardt, 1903

Pseudolissoceras olorizi Fözy, 1988 (pl. 4, figs. 1 and 2, text-fig. 15)

Holotype: J-10941

Original diagnosis: “Medium-sized, rather evolute form. Ventral part in middle whorls is characteristically fastigate. Suture-line is *Pseudolissoceras*-type, but conspicuously reduced” (taken literally from Fözy, 1988, p. 66).

Type locality: Hárskút, Közöskút ravine, profile II, Bakony Mountains, Transdanubian Central Range.

Age: Middle Tithonian.

4.3 Sarti (1993)

Genus *Metastreblites* Olóriz, 1978

Metastreblites olorizi Sarti, 1993 (pl. 5, fig. 1a, b, 2; fig. 17)

Holotype: ME484

Original diagnosis: Shell of elliptical shape, medium-small size, strongly involuted. Umbilicus almost point-like. Whorl section high rectangular, with a siphonal groove in the body-chamber. Ornamentation given by a series of small tubercles located half flank, about 4–5 mm apart from each other. In the upper half of the whorl there are weak ribs, low and wide, straight, one or two in number for each tubercle. Numerous and very weak constrictions present on the last whorl (translated from Sarti, 1993, p. 70).

Type locality: Lavarone (Trento), Italy.

Age: Kimmeridgian (Herbichi Zone, Stenonis Subzone)

4.4 Moliner (2009)

Subfamily Ataxioceratine Buckman, 1921

Genus *Olorizia* Moliner (in Moliner & Olóriz, 2009)

Type species *Olorizia olorizi* Moliner (in Moliner & Olóriz, 2009)

Olorizia olorizi Moliner (in Moliner & Olóriz, 2009) (Fig. 5)

Holotype: MTG1.12.4

Original diagnosis: The authors gave a combined diagnosis from the genus and species. “Micro- and macroconch ataxioceratins; microconchs (Fig. 5) moderate to low-coiled, reaching 165 mm diameter, with variable constrictions, rare parabolic structures and wide, well developed lappets. Ribbing typically includes complete or incomplete subpolyplocoid, and less common polyplocoid ribs towards end of phragmocone and body chamber. Macroconchs are, 250 mm in diameter, with an ovate whorl section, constrictions and rare parabolic structures on the phragmocone and a simple peristome. Ribbing in macroconchs is similar to microconchs, but with less frequent polyplocoid ribs and sparse development of peripheral, intercalatory, bifurcate ribs” (taken literally from Moliner & Olóriz, 2009, p. 212).

Type locality: Las Umbrías—Gallipuéñ, Alcorisa (Teruel), Spain.

Age: lower Kimmeridgian (upper part of the Platynota Zone, uppermost part of the Desmoides Subzone to the lower part of the Guilhaerandense Subzone)

Comments: Officially accepted genus in zoobank, <https://zoobank.org/NomenclaturalActs/4a8d5ee7-8236-4f59-ae66-9bca12b119dc>.

4.5 Mitta (2011)

Family Himalayitidae Spath, 1923

Genus *Riasanella* Mitta, 2011

Type species *Riasanella rausingi* Mitta, 2011

Riasanella olorizi Mitta, 2011 (fig. 1 a, b)

Holotype: PIN RAN, No. 3990/396

Original diagnosis: “Phragmocone of macroconchs reaches 70 mm in diameter, shell with a complete body chamber up to 80–85 mm. Phragmocone of microconchs reaches 45 mm, and the complete shell 55 mm in diameter. The whorls are flattened, with an oval cross-section, narrowing towards the slightly flattened venter. The umbilicus is wide and (on the body chamber) very wide. The umbilical wall is narrow, with a rounded umbilical shoulder. The body chamber of macroconchs is up to 0.7 whorls; specimens with a preserved aperture are unknown. In the only specimen of a microconch with a partly preserved lateral auricle (Dm ca. 55 mm) the beginning of the body chamber is missing, hence its total length is unknown. The ornamentation is represented by bifurcating, simple, and intercalating ribs. At Dm = 30–40 mm some ribs dichotomize in the umbilical region, and some near the mid-flank. The branches of the ribs are usually bent backward. Lateral bulges are frequently observed in the mid-flank. In microconchs, the ribs are crest-like and raised in the umbilical region. At the end of the phragmocone and on the body chamber, primary ribs are subradial, usually weakly bent, with distinct bulges in the umbilical regions and in the bifurcation point in the midflank. The branches are weakly crescent-like, bent outward. The ventrolateral shoulder possesses a nodalike inflation, smoothening in macroconchs toward the end of the body chamber” (taken literally from Mitta, 2011, p. 20).

Type locality: Moscow Region, Lopalinskii phosphorite mine, quarry no. 12–2.

Age: Lowermost Cretaceous (Ryazanian lower part of the *Riasanites tjasanensis* Zone).

4.6 El Kadiri (1992)

Subclasse Radiolaria Müller, 1858

Order Polycistina Ehrenberg, 1838

Suborder Nassellariina Ehrenberg, 1875

Genus *Hsuum* Pessagno, 1977

Type species *Hsuum cuestaensis* Pessagno, 1977

Hsuum olorizi El Kadiri, 1992 (pl. 1, figs. 1–4)

Holotype: Univ. Granada, KS 412-25.

Table 1 Summary of taxa studied by Federico Olóriz and/or coauthors, with data of the geological setting

Taxa	Age	Region
<i>Metastrebrites</i> Olóriz, 1978	Lower Kimmeridgian	Betic Cordilleras (Subbetic Zone), Spain
<i>Metastrebrites ellypticus</i> Olóriz, 1978	Lower Kimmeridgian (Zone Strombecki—parte basal de la Zone Divisum)	Betic Cordilleras (Subbetic Zone), Spain
<i>Metastrebrites praesemiformis</i> Olóriz, 1978	Lower Kimmeridgian (Strombecki Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Neochetoceras pseudodarwini</i> Olóriz, 1978	Lower Tithonian (Albertinum Zone-base of Verruciferum Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Semiformiceras semiforme tuberosum</i> Olóriz, 1978	Lower Tithonian (Verruciferum Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Semiformiceras semiforme rotundus</i> Olóriz, 1978	Lower Tithonian (Verruciferum Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Virgatosimoceras micrum</i> Olóriz, 1978	Lower Tithonian (Albertinum Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Virgatosimoceras uniformis</i> Olóriz, 1978	Lower Tithonian (Albertinum Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Simoceras (Simoceras) volanense magnum</i> Olóriz, 1978	Lower Tithonian (Verruciferum Zone–Burckhardticerias Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Simoceras (Lytogyroceras) subbeticum</i> Olóriz, 1978	Lower Tithonian (Burckhardticerias Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Simolytoceras</i> Olóriz, 1978	Lower Tithonian (Burckhardticerias Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Simoceras (Simolytoceras) andaluciense</i> Olóriz, 1978	Lower Tithonian (Burckhardticerias Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Aspidoceras (Pseudowaagenia) aeanthomphalum binodosum</i> Olóriz, 1978	Upper Kimmeridgian (Carouvi Zone–Beckeri Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Hybonoticerias (Hybonoticerias) robustum</i> Olóriz, 1978	Lower Tithonian (Hybonotum Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Hybonoticerias (Hybonoticerias) peltoceratoides</i> Olóriz, 1978	Lower Tithonian (Hybonotum Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Hybonoticerias (Hybopeltoceras) linaresi</i> Olóriz, 1978	Lower Tithonian (Hybonotum Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Lithacosphinctes</i> Olóriz, 1978	Lower Kimmeridgian (Platynota? Zone-Lower part of Strombecki Zone)	Betic Cordilleras (Subbetic Zone), Spain
" <i>Katrolieeras</i> " <i>geyeri</i> Olóriz, 1978	Lower Kimmeridgian (Divisum Zone (Uhlandi Subzone))	Betic Cordilleras (Subbetic Zone), Spain
" <i>Katrolicerias</i> " <i>serra-opima</i> Olóriz, 1978	Lower Kimmeridgian (Strombecki Zone—Divisum Zone (Uhlandi Subzone))	Betic Cordilleras (Subbetic Zone), Spain
" <i>Crussoliceras</i> " <i>postdivisum</i> Olóriz, 1978	Lower Tithonian (Verruciferum Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Biplisphinctes</i> Olóriz, 1978	Upper Kimmeridgian ("compsum" Zone-Beckeri Zone boundary)-lower Tithonian (Verruciferum Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Biplisphinctes spathi</i> Olóriz, 1978	Upper Kimmeridgian ("Compsum " Zone-upper part (?) Beckeri Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Biplisphinctes tithoni</i> Olóriz, 1978	Lower Tithonian (Verruciferum Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Torquatisphinctes laxis</i> Olóriz, 1978	Lower Tithonian (Hybonotum Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Torquatisphinctes transiens</i> Olóriz, 1978	Upper Kimmeridgian, (lower part) Beckeri Zone	Betic Cordilleras (Subbetic Zone), Spain
<i>Discosphinctoides</i> Olóriz, 1978	Upper Kimmeridgian (Cavouri Zone–Beckeri Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Subplanites rigidus</i> Olóriz, 1978	Lower Tithonian (Hybonotum Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Subplanitoides zeissi</i> Olóriz, 1978	Lower Tithonian (Verruciferum Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Subplanitoides radiatus</i> Olóriz, 1978	Lower Tithonian (terminal Verruciferum Zone-basal Richtereri Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Parapallasiceras recticosta</i> Olóriz, 1978	Lower Tithonian (Burckhardticerias Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Parapallasiceras pseudocolubrinooides</i> Olóriz, 1978	Lower Tithonian (Albertinum Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Parapallasiceras paracolubrinus</i> Olóriz, 1978	Lower Tithonian (Richtereri Zone-Burckhardticerias Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Parapallasiceras katroliforme</i> Olóriz, 1978	Lower Tithonian (Albertinum Zone-Verruciferum Zone)	Betic Cordilleras (Subbetic Zone), Spain

Table 1 (continued)

Taxa	Age	Region
<i>Parapallasiceras bifurcus</i> Olóriz, 1978	Lower Tithonian	Betic Cordilleras (Subbetic Zone), Spain
<i>Parapallasiceras sinus</i> Olóriz, 1978	Lower Tithonian (Burckhardticerias Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Danubisphinctes bartheli</i> Olóriz, 1978	Lower Tithonian (Verruciferum Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Dorsoplanitoides pseudomirabilis</i> Olóriz, 1978	Lower Tithonian (upper part Verruciferum Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Paraberriasella propecta</i> Olóriz, 1978	Lower Tithonian (condensed bed Verruciferum Zone-Richterian Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Paraberriasella flexuosa</i> Olóriz, 1978	Lower Tithonian (condensed bed Verruciferum Zone-Richterian Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Richterian</i> Olóriz, 1978	Lower Tithonian (end of Verruciferum Zone ?-Richterian Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Richterian striata</i> Olóriz, 1978	Lower Tithonian (end of Verruciferum Zone ?-Richterian Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Lemencia pseudopergrata</i> Olóriz, 1978	Lower Tithonian (Burckhardticerias Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Lemencia pseudociliata</i> Olóriz, 1978	Lower Tithonian (upper part Admirandum/Biruncinatum Zone—Burckhardticerias Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Lemencia strangulata</i> Olóriz, 1978	Lower Tithonian (upper part Admirandum/Biruncinatum Zone—Burckhardticerias Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Lemencia interposita</i> Olóriz, 1978	Lower Tithonian (Burckhardticerias Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Burckhardticerias</i> Olóriz, 1978	Lower Tithonian (Burckhardticerias Zone). Some records in the lowermost part of upper Tithonian	Betic Cordilleras (Subbetic Zone), Spain
<i>Aulacosphinctes quadri</i> Olóriz, 1978	Lower Tithonian (Burckhardticerias Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Aulacosphinctes trifidus</i> Olóriz, 1978	Lower Tithonian—upper Tithonian boundary	Betic Cordilleras (Subbetic Zone), Spain
<i>Aulacosphinctes berriaselliformis</i> Olóriz, 1978	Lower Tithonian (lower part of Burckhardticerias Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Djurjurerias armonicus</i> Olóriz, 1978	Lower Tithonian (Burckhardticerias Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Djurjurerias anularius</i> Olóriz, 1978	Lower Tithonian (Burckhardticerias Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Simospiticerias</i> Olóriz & Tavera 1979a	Lower part of Upper Tithonian	Betic Cordilleras (Subbetic Zone), Spain
<i>Simospiticerias lojense</i> Olóriz & Tavera 1979a	Lower part of Upper Tithonian	Betic Cordilleras (Subbetic Zone), Spain
<i>Simospiticerias cristatus</i> Olóriz & Tavera 1979a	Lower part of Upper Tithonian	Betic Cordilleras (Subbetic Zone), Spain
<i>Cordubiceras</i> Olóriz & Tavera 1979b	Upper Tithonian, (Simplisphinctes Subzone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Simoceras (Cordubiceras) geminatum</i> Olóriz & Tavera 1979b	Upper Tithonian, (Simplisphinctes Subzone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Simoceras (Cordubiceras) cordubae</i> Olóriz & Tavera 1979b	Upper Tithonian, (Simplisphinctes Subzone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Barthelia</i> Olóriz & Schairer, 1983	Upper Oxfordian, (Bimammatum Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Barthelia subbetica</i> Olóriz & Schairer, 1983	Upper Oxfordian, (Bimammatum Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Crussoliceras almolaense</i> Olóriz et al., 1985	Kimmeridgian (Divisum Zone)	Betic Cordilleras (Subbetic Zone), Spain
<i>Simocoscoceras adversum andinum</i> Leanza & Olóriz, 1987	Lower Tithonian (upper part of Zitteli Zone)	Andean province, Argentina
<i>Simocoscoceras pszczolkowskii apulcoensis</i> Villaseñor et al., 2003	Middle part of lower Tithonian	Thurst and faults Province, Mexico
<i>Sulaites</i> Olóriz & Westermann, 1998	Middle Oxfordian	Indo-Southwest Pacific Subrealm
<i>Hybonoticerias cuencamensis</i> Olóriz & Villaseñor, 1999	Upper Kimmeridgian (upper Beckerian Zone)	Thurst and faults belt Province, Mexico
<i>Hybonoticerias gonzalezi</i> Olóriz & Villaseñor, 1999	Upper Kimmeridgian (upper Beckerian Zone)	Thurst and faults belt Province, Mexico
<i>Hybonoticerias gerninatum</i> Olóriz & Villaseñor, 1999	Upper Kimmeridgian (upper Beckerian Zone)	Thurst and faults belt Province, Mexico
<i>Hybonoticerias evanidum</i> Olóriz & Villaseñor, 1999	Upper Kimmeridgian (upper Beckerian Zone)	Thurst and faults belt Province, Mexico
<i>Ceratosphinctes rachistrophus amatitlaensis</i> Olóriz & Villaseñor, 2006	Late-early to early-late Kimmeridgian	Valles-San Luis Potosi Platform Province

Table 1 (continued)

Taxa	Age	Region
<i>Vinalesphinctes tamanensis</i> López-Palomino et al., 2006	Upper Oxfordian (Bifurcatus Zone)	Valles-San Luis Potosi Platform Province
<i>Vinalesphinctes tenangensis</i> López-Palomino et al., 2006	Upper Oxfordian (Bifurcatus Zone)	Valles-San Luis Potosi Platform Province
<i>Housaites</i> Villaseñor & Olóriz, 2009	Mid-lower Tithonian to lower upper Tithonian	Thurst and faults belt Province, Mexico
<i>Geyericerias</i> Moliner & Olóriz, 2010	Uppermost part of the Ataxioceras lothari Zone to youngest part of the Ataxioceras hypselocyclum Z)	Eastern Iberian Chain, Spain
<i>Geyericerias aragoniense</i> Moliner & Olóriz, 2010	Uppermost part of the Ataxioceras lothari Zone to youngest part of the Ataxioceras hypselocyclum Zone	Eastern Iberian Chain, Spain
<i>Schneidia zacatense</i> Villaseñor, Moliner & Olóriz 2015	Lowermost Kimmeridgian (upper-to-uppermost Platynota Zone)	Thurst and faults belt Province, Mexico
<i>Hybonoticeras authariformis</i> Olóriz & Villaseñor 2018	Lowermost Tithonian	Basin and Range Province, Mexico
<i>Burckhardtieia</i> Villaseñor & Olóriz, 2019, 2020	Lower not lowermost Tithonian (two-fold division) to the Lower-Middle Berriasian	Basin and Range and thurst and faults belt Provinces, Mexico
<i>Burckhardtieia westermanni</i> Villaseñor & Olóriz, 2019	Lower upper Tithonian	Basin and Range Province, Mexico
<i>Aguilerites</i> Villaseñor & Olóriz, 2019	Upper Lower Tithonian	Basin and Range Province, Mexico

Original diagnosis: No provided by the author but description as follow. Elongated conical test, carrying a smooth horn of circular cross section and flattened cap-shaped end. The first three or four segments at the base of this horn bear uniformly dispersed nodules. For all the distal segments, except for the last two (which do not bear wrinkles), these nodules stretch into fine discontinuous and unaligned wrinkles. The outline of the test is marked by numerous tight constrictions (17 to 20); its external wall is finely perforated and shows, in addition to the discontinuous wrinkles, fine continuous longitudinal and transverse ribs whose meeting in two perpendicular directions determines square pore frames and gives the wall of the test a fine mesh appearance (translated from El Kadiri, 1992, p. 42).

Type locality: Oued El Halka, 5 km to SSW de Tétouan.

Age: Lower Jurassic (middle Toarcian to base of upper Toarcian).

5 Conclusion

The great academic trajectory of Federico Olóriz is marked by his contributions to the systematic paleontology for ammonites. In his Ph.D. Thesis he proposed six new genera, two new subgenera, thirteen amended family, subfamily and genera, forty new species, and four new subspecies. Since the publication date almost all taxa style in use with minor inclusion in synonyms. Olóriz and coworkers (see Introduction chapter for references) proposed seven genera, one subgenus,

17 species and two subspecies. Federico Olóriz has studied ammonites coming from different geological setting in Spain and others part of the world (Table 1), but his outstanding contribution was in the Betic Cordilleras (Subbetic Zone) ammonites. The comments above reflects the deep and carefully work of the author. Indeed, the six taxa dedicated to him are examples of the recognition of Federico Olóriz great knowledge of the Jurassic ammonites and other fossils.

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Declarations

Conflict of interest The author declares that there is no conflict of interest.

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