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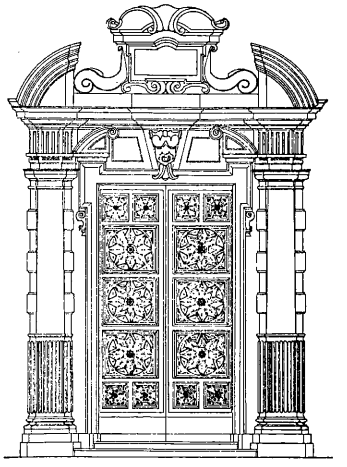

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ABSTRACT

Three ammonites, collected in the Upper Bajocian (*Subfurcatum* Zone) near Bayeux, N.W. France, are described and compared with the type-series of *Torrensia* from the Altopiano di Asiago, N.E. Italy. They belong to three species: *Orthogarantiana* (*Torrensia*) *gibba* (Parona), *O.* (*T.*) *sturanii* n.sp., ?*O.* (?*T.*) n.sp. ind.. Other two new unnamed species of *Torrensia* are also discussed from the *Subfurcatum* Zone of the Altopiano di Asiago and from the *Garantiana* Zone of Tivenys, N.E. Spain. General morphological features, similar ranges and especially septal sutures confirm the dimorphic coupling of *Torrensia* (m) and *Orthogarantiana* (M), classified in the Garantianinae of the Stephanoceratidae.

INTRODUCTION

The subgenus *Torrensia* is a rare microconch ammonite known in the *Subfurcatum* Zone (or *Niortense* Zone *sensu* Dietl, 1981) from the « *Posidonia alpina* » beds, northern Italy (Sturani, 1971) and from the Frogden Quarry, Oborne section, southern England (Parsons 1976); more recently, *Torrensia* has been recorded from the *Garantiana* Zone of Tivenys, north-eastern Spain (Fernandez-Lopez, 1983). Another occurence of this taxon has been recorded by Westermann (1975) in the Kambe Limestone Series of the Mombasa area, south-eastern Kenya, but this ammonite is not a true *Torrensia*, as will be seen below. Moreover, the systematic position of *Torrensia* is uncertain: placed in the family Stephanoceratidae, subfamily Garantianinae *sensu* Callomon (*in* Donovan et alii, 1981), following Sturani (1971) and Galacz (1980), or in the Erycitidae as tentatively suggested by Westermann & Riccardi (1979).

The opportunity to write this contribution has arisen through the study of three new specimens from the Bajocian of Bayeux, northern France, two of which belong to the taxa described as *Torrensia* by Sturani in the

Venetian Alps; the third specimen may represent a new unnamed species. Their septal sutures demonstrate that *Torrensia* is to be classified in the Garantianinae, as microconch dimorph of *Orthogarantiana.*

I am indebted to A. Prieur for his kind co-operation during my visit to the collections of the École des Mines, in the Département des Sciences de la Terre of Lyon-Villeurbanne, and to J.H. Callomon, S. Fernandez-Lopez and G.E.G. Westermann for their comments on the manuscript. The photographs are by R. Tinivella. Financial support provided by C.N.R. Geological and Mineralogical Science Committee, grant n. 82.02541.05.

THE SPECIMENS OF BAYEUX

I have examined three specimens from the Bajocian of Bayeux. The first is kept in the collections of the École Nationale Supérieure des Mines in Lyon-Villeurbanne (ENSM, *ex* coll. De Verneuil 1873); the other two were collected by myself during an excursion (1976) on the Bajocian of Calvados and are kept in the Geological Museum of Turin University (MGT). The specimens of Bayeux are larger than the minute ammonites of the type-series; nevertheless, they belong without doubt to the microconchiate subgenus *Torrensia,* as shown by the trapezoidal depressed whorl-section in the inner to middle whorls; the contracted body chamber with dilated lappets; the more or less developed segmentary growth; the strong nodes on the ventro-lateral edge; and ribs weakened externally by a shallow median furrow.

ENSM: pl. 1, fig. 4, *Orthogarantiana* (*Torrensia*) *gibba* (Parona) - The original label indicates the quarry of St. Vigor, Bayeux. The sediment in the body chamber is a grey micritic limestone with small ferruginous ooids; this lithofacies is typical of the midddle part of the « Oolithe de Bayeux », which contains a mixed fauna of the late *Subfurcatum* Zone (*Baculata* Subzone) and of the *Garantiana* Zone (Rioult, 1964).

MGT-B1: pl. 1, fig. 1, *Orthogarantiana* (*Torrensia*) *sturanii* n.sp. - This specimens was collected from a loose block in the quarry of St. Vigor. The hematite coated shell and the large ferruginous oncoliths in the host rock indicate its provenence from the base of the « Oolithe de Bayeux ». This layer contains a mixed fauna with reworked ammonites of the *Humphriesianum* Zone and of the lower part (*Banksi* and *Polygyralis* Subzones) of the *Subfurcatum* Zone (Rioult, 1964; Westermann & Rioult, 1975; personal data).

MGT-B2: pl. 1, fig. 6, *?Orthogarantiana* (*?Torrensia*) n.sp.ind. - This ammonite comes from the middle part of the « Oolithe de Bayeux » in the type-locality of les Hachettes (layer 3b *in* Rioult, 1964).

Dimensions given in the descriptions refer to (A) measurements at the end of the body chamber and (B) at the previous half-whorl. D: diameter of the specimens. H: whorl height. W: whorl width. U: diameter of the umbilicus. P: number of primary ribs on the last whorl. F: furcation ratio between secondaries and primaries.

Class	CEPHALOPODA Cuvier, 1797
Order	AMMONOIDEA Zittel, 1884
Suborder	AMMONITINA Hyatt, 1889
Superfamily	STEPHANOCERATACEAE Neumayr, 1875
Family	STEPHANOCERATIDAE Neumayr, 1875
Subfamily	GARANTIANINAE Wetzel, 1937
Genus	*ORTHOGARANTIANA* Bentz, 1928
Subgenus	*TORRENSIA* Sturani, 1971

TYPE-SPECIES - *Stephanoceras gibbum* Parona, 1896 = *Torrensia gibba* (Parona) microconch, by original designation *in* Sturani, 1971, p. 154.

DIAGNOSIS (modified) - Microconch ammonite with cadicone inner and middle whorls, enlarging by segments; strongly contracted, often elliptically-coiled body chamber. Secondaries with a shallow external median furrow. Long lateral lappets preceded by well marked angular shoulders. Septal suture simplified planulate with a single « internal saddle » and a gently retracted umbilical lobe.

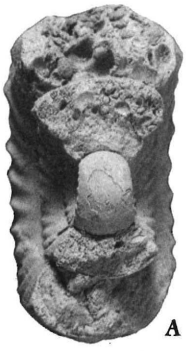
RANGE IN TYPE-REGION - The subgenus *Torrensia* was defined by Sturani on minute fossils coming from different coquina-beds ranging from *Banksi* to *Baculata* Subzone, *Subfurcatum* Zone, Upper Bajocian, in the Altopiano di Asiago area.

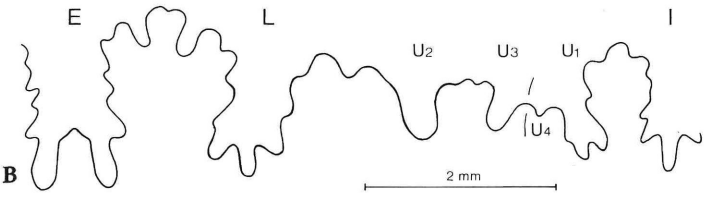
DISCUSSION - The septal sutures of *Torrensia* on the specimens of Bayeux closely resemble those of *Orthogarantiana schroederi* (Bentz) drawn by Schindewolf (1965, p. 213, f. 288), and the less decipherable ones illustrated by Bentz (1925, p. 184, ff. 11, 13) from *O. conjugata* (Quenstedt) and *O. densicostata* (Quenstedt). On the whole, there is a general similarity with various representatives of the Garantianinae (Westermann, 1956; Schindewolf, 1965). The suture of *O.* (*T.*) *sturanii* (MGT-B1: text-fig. 1B) is complete from external, E, to internal, I, lobes. It

corresponds to a stage intermediate between the last two sutures of *O. schroederi* illustrated by Schindewolf (1965, f. 288 e-f) and shows a well marked U_1 with a small auxiliary lobe; this last element may be regarded as a reduced U_n conforming to the hypotesis that the Garantianinae evolved from the Stephanoceratinae (Sturani, 1971; Callomon *in* Donovan et al., 1981), in my opinion from the Cadomitinae (Pavia, 1983, text-fig. 25), at the boundary of the *Humphriesianum* and the *Subfurcatum* Zones.

These sutural similarities, the general morphological resemblance, including the median furrow, and the same stratigraphic range strongly suggest that *Torrensia* (m) and *Orthogarantiana* (M) are a dimorphic pair. From the systematic and nomenclatural point of view, *Torrensia* is here regarded as subgenus of *Orthogarantiana*, following the common practice of grouping paired dimorphs at subgeneric level in the same generic category (Callomon, 1969, 1981). On the other hand the straight secondaries with no or very feeble ventral nodes and the narrower median furrow of *Orthogarantiana* suggest its distinction against *Garantiana*. The most evident morphological and septal differences are between their microconch counterparts *Torrensia* and *Strenoceras*+*Pseudogarantiana*: it is hard to regard them as congeneric taxa. Consequently, I think that *Orthogarantiana*, with *Torrensia*, is a genus intermediate between *Cadomites* and *Garantiana*.

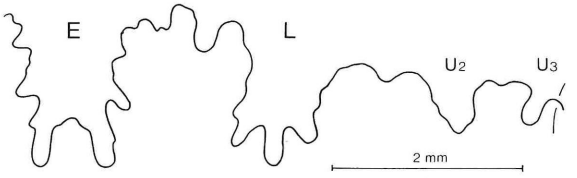
The dimorphic coupling of *Torrensia* and *Orthogarantiana* was already suggested by Sturani (1971, p. 154) on the basis of the association of *Torrensia* with some ammonites he classified as *Orthogarantiana conjugata* (Quenstedt) in the *Baculata* Subzone of the Altopiano di Asiago. In these specimens, however, septal sutures are never preserved, so that in this respect they do not support his supposition. Subsequently, Westermann (1975, p. 44) believed that Sturani's *O. conjugata* was not a true *Orthogarantiana*, because outer whorls of *O. schroederi* (type-species of the genus) do not show a coronate section with lateral edge, but have more rounded whorls resembling typical *O. conjugata* (Quenstedt, 1886-87, pl. 71, f. 10; Bentz, 1925, pl. 6, ff. 5,6). Sturani's *O. conjugata* may be compared with a specimen collected by myself in the « Oolithe de Bayeux ». This ammonite (text-fig. 3) appears identical with the one described by Westermann (1975, p. 44, Y3226) from the *Garantiana* Zone of Burton Bradstock, southern England. It has weak constrictions on the phagmocone; a coronate section up to the penultimate whorl; and, on the internal mould only, a mid-ventral depression of the ribs at the end of the phragmocone followed by a well marked furrow confined to the beginning of the body chamber. Its septum is bullate with non-suspensive and vertical umbilical lobes U, a narrow L and two internal saddles separated by a deep vertical « internal lateral lobe » (U_n). This septal feature is typical of the Cadomitinae (Westermann, 1956; Schinde-

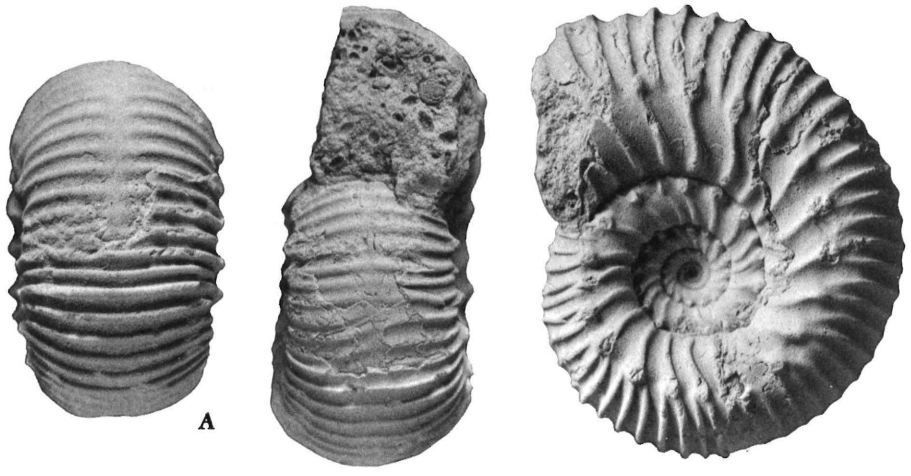




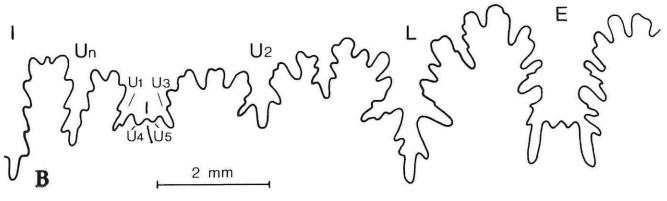
Text-fig. 1 - *Orthogarantiana* (*Torrensia*) *sturanii* n.sp.. Paratype. *Subfurcatum* Zone, (?) *Polygyralis* Subzone. St. Vigor quarry, Bayeux. MGT-B1. A) Section of the internal whorls, 3x. B) Septal suture.

Text-fig. 2 - Septal suture of *Orthogarantiana* (*Torrensia*) *gibba* (Parona). *Subfurcatum* Zone. St. Vigor quarry, Bayeux. ENSM.





Text-fig. 3 - *Cadomites* (*Polyplectites*) sp.ind.. *Subfurcatum* - *Garantiana* Zones. Les Hachettes, Bayeux. MGT-B3. A) Lateral and ventral views, 3x. B) Septal suture.



wolf, 1965, p. 171). The microconchiate specimen from Bayeux may hence be identified as *Cadomites* (*Polyplectites*) sp. ind.; it cannot be coupled with *Torrensia* because the septum of the latter is planulate.

It is difficult to be sure whether Sturani's determination of *Orthogarantiana conjugata* is correct or his specimens should be compared with *Cadomites* (*Polyplectites*) sp.ind. from Bayeux and Burton Bradstock. In my opinion, the minute ammonites from the Altopiano di Asiago may be safely identified as *O. conjugata* because of the continuity of the weak median furrow on the venter. Concerning the other objections raised by Westermann, we may note that a coronate section can be observed in the inner whorls of *O. schroederi*, where weak constrictions are also present (Bentz, 1925, pl. 5, f. 4).

Westermann (1975) excluded *Torrensia* from the Parkinsoniidae (now in the Garantianinae *sensu* Callomon) on the basis of the bullate septal and sutural features present in a fragment collected in the Upper Bajocian of the Kambe Limestone Series of Mombasa. More recently Westermann & Riccardi (1979, p. 115), for the same reason, have tentatively placed *Torrensia* in the subfamily Podagrosiceratinae (Erycitidae), noticing close affinities with *Ermoceras*. The ammonite from Mombasa is not a true *Torrensia*, however, because its septal suture is very different from that of *Torrensia* of Bayeux, as shown in the present work. Westermann's specimen may indeed be affiliated to the West-Tethyan *Ermoceras*-group, perhaps representing a transitional stage from Stephanoceratidae, where constrictions are known as not-rare accidental features (Westermann, 1954, pl. 34; Sturani, 1971, pl. 12).

Orthogarantiana (Torrensia) gibba (Parona, 1896) (m)
Pl. 1; figs. 3, 4; Text-fig. 2

v 1896 *Stephanoceras gibbum* Parona, p. 17, pl. 1, f. 19.
v 1971 *Torrensia gibba* (Parona) - Sturani, p. 154, pl. 13, ff. 10-14.
1976 *Torrensia gibba* (Parona) - Parsons, pp. 126, 129.

MATERIAL - A well preserved specimen with shell from the « Oolithe de Bayeux » of St. Vigor quarry (ENSM; pl. 1, f. 4). The body chamber, 3/5 whorl long, retains the adult peristome with long divaricate lappets. The beginning of the last whorl and of the body chamber is marked by weakly impressed constrictions characteristic of segmentary growth. The shallow median furrow is more evident on the first half of the body chamber and becomes imperceptible near the peristome, where the secondaries are continuous and stronger accross the venter. The septal suture (text-fig. 2) shows simplified elements with three-pronged L and gently

retracted U_3. Measurements in mm (percentages in brackets) on ribs/tubercles:

	D	H	W	U	P	F
A -	13,1	4,3(32,8)	6,2(47,3)	6,1(46,6)	24	2,6
B -	10,6	3,2(30,2)	8,2(77,4)	4,8(45,3)	—	—

REMARKS - The ammonite from Bayeux matches very well with the type-series of *T. gibba.* It is closest to the lectotype and to some of the paralectotypes, expecially in the flat venter, the less wide section and the style of ornaments. Other paralectotypes (Sturani, 1971, pl. 13, ff. 10, 11, 13) show a more arched and broader venter with fewer nodes per whorl (pl. 1, fig. 3).

DISTRIBUTION - *Orthogarantiana* (*Torrensia*) *gibba* is known in the middle and upper part of the *Subfurcatum* Zone in the Venetian Alps (Sturani, 1971, *Baculata* Subzone) and in the Anglo-Parisian basin (Parsons, 1976: the « *Sphaeroidothyris* Bed » of the Frogden Quarry, Oborne, may be regarded as *Polygyralis* Subzone).

Orthogarantiana (Torrensia) sturanii n.sp. (m)
Pl. 1, figs. 1, 2; Text-fig. 1

v 1971 *Torrensia* aff. *gibba* (Parona) - Sturani, p. 155, pl. 13, f. 9.

DERIVATIO NOMIS - In the honour of the late Prof. C. Sturani, who first characterized the taxon.

HOLOTYPE - The small specimen of Sturani, refigured in pl. 1, fig. 2. The choice of this specimen as holotype is determined by its well-known age, while the better preserved paratype of Bayeux comes from a condensed layer.

STRATUM TYPICUM - Coquina beds of the Upper Bajocian, *Subfurcatum* Zone, *Polygyralis* Subzone from the Longara di Sotto locality, Altopiano di Asiago.

DIAGNOSIS - Coronate section extending up to the beginning of the body chamber with relatively narrow whorl and wide umbilicus; obsolete constrictions; dense ventro-lateral nodes.

MATERIAL - There are six sintypes in Sturani's collection (MGT) from the Longara di Sotto locality. Only the holotype is measurable. Dimensions, in mm, and percentages:

	D	H	W	U
A -	9,5	2,9(30,5)	4,3(45,3)	5,0(52,6)
B -	8,2	2,3(28,0)	5,1(62,2)	3,9(47,6)

The paratype from Bayeux (MGT-B1, pl. 1, fig. 1) is a reworked specimen collected at the base of the « Oolithe de Bayeux », probably of the *Polygyralis* Subzone. It measures:

	D	H	W	U	P	F
A -	15,5	4,6(29,5)	7,3(46,8)	7,8(50,0)	30	2,4
B -	13,4	3,9(29,1)	8,5(63,4)	6,7(50,0)	—	—

DESCRIPTION - The shell is typically cadicone with subconical large umbilicus (U 50) and trapezoidal-depressed whorls, much wider than high (text-fig. 1A). Flanks flat or gently convex with superficial seams and angular narrow edges, marked by a ventro-lateral row of blunt nodes. The broader venter is moderately to slightly convex and becomes inflated in the adult body chamber. The coiling is more regularly spiral than in *O.* (*T.*) *gibba.* The segmentary growth is unprominent, weak constrictions being marked by slightly strengthened secondaries, but without any evident increase of the whorl width. The body chamber occupies slightly more than half a whorl (200° on the paratype of Bayeux). Its adult part is contracted up to the beginning of the peristome (W 45,3-46,8). The maximum whorl width is reached half-way on the body chamber (W 62,2-63,4). Lateral lappets are divaricate and very long (80° on the holotype) and reach the lower whorl with their distal apophisis; lappets are preceded by deep growth lines and furrows.

Ornaments consist of dense, slightly prorsiradiate primary ribs, which become gradually higher on the flanks up to the blunt ventro-lateral nodes, so that the whorls of the nucleus appear ornamented only by tubercules. Each node gives rise to two gently arched secondaries with rare trifurcations and with more frequent intercalatories (F 2,4). On the internal mould of the body chamber the secondaries are weakened by a large median furrow, but they are continuous on the test; this furrow is imperceptible on the phragmocone.

The suture line of the paratype (text-fig. 1B) is planulate with a single dominant « internal saddle » (U_1-I); a large bifid auxiliary saddle (U_1-U_3) crosses the seam in a gently retracted suspensive lobe; L is three-pronged

and narrower than in *T. gibba* (text-fig. 2); the external saddle (E-L) is trifurcate on its distal part.

REMARKS - The paratype from Bayeux agrees with the holotype in all the morphological features, except in the less contracted body chamber and in the more arched section of the last whorl. *O.* (*T.*) *sturanii* is distinguished from *O.* (*T.*) *gibba* by narrower whorl section (W 63 *vs* 77), wider umbilicus (U 50 *vs* 46), denser ventro-lateral nodes and weaker constrictions.

The species *Orthogarantiana* (*Torrensia*) n.sp.ind. 1, described as new but unnamed by Sturani (1971, p. 155) from the *Banksi* Subzone, *Subfurcatum* Zone of the Altopiano di Asiago, shows a rather similar thickness of the ribs, but larger and more rounded whorl section; its flanks are moreover convex, with small umbilical wall at the seam and marked constrictions (pl. 1, fig. 5).

Another new unnamed species, *Orthogarantiana* (*Torrensia*) n.sp.ind. 2, has been recorded by Fernandez-Lopez (1983) from the *Garantiana* Zone of Tivenys. One of the two specimens of this new species, sent me on study by Fernandez-Lopez (3Ty48/7), is a small poorly preserved internal mould with typical features of *Torrensia*: cadicone section on the phragmocone, contracted body chamber, external median furrow. It shows stronger ornaments, compared with *O.* (*T.*) *gibba* and with *O.* (*T.*) *sturanii*; in particular, its secondary ribs are bifurcate on the phagmocone and uniformly strong up to the external median furrow; ventro-lateral nodes are more prominent; the external median furrow is larger and more evident.

?Orthogarantiana (?Torrensia) n.sp.ind.
Pl. 1, fig. 6

MATERIAL - A single specimen (MGT-B2) from the « Oolithe de Bayeux » of les Hachettes (*Subfurcatum* or *Garantiana* Zone). It measures:

	D	H	W	U
A -	10,2	3,2(31,4)	4,6(45,1)	4,8(47,1)
B -	8,5	2,6(30,6)	4,1(48,2)	3,9(45,9)

DESCRIPTION - The specimen is cadicone in shape up to the penultimate whorl and subplanulate in the body chamber. The phragmocone shows gently convex flanks with short vertical umbilical walls; the angular and nodular ventro-lateral edge is at about the external third of the flank;

the broad venter is moderately convex. The body chamber shows very low steep flanks, nodes in mid-whorl position and higher arched venter; it is about 2/3 whorl long and becomes flat and feebly contracted at the peristome. The latter one is provided with divaricate lateral lappets and a sort of blunt median rostrum. Some feeble constrictions with segmentary growth are observable on the last whorl. Ornaments consist of dense prorsiradiate primaries, ending in blunt ventro-lateral nodes, and simple or bifurcate large secondaries; these cross straight over the venter with an irregular median weaking, observable only on the body chamber.

REMARKS - The classification of this specimen as *Orthogarantiana* (*Torrensia*) is uncertain, because the septal suture is not preserved and it lacks of definite segmentary growth and well contracted body chamber. The paratype of *O.* (*T.*) *sturanii* from Bayeux, however, shows a similar non-contracted body chamber. The small size, the divaricate lappets and the coronate stage up to the penultimate whorl are nevertheless typical features of *Torrensia*. On the other hand, *Leptosphinctes* (*Cleistosphinctes*), which shows a similar morphological style, carries non-divaricate lappets and regular, non-segmentary constrictions.

If this specimen is an *Orthogarantiana* (*Torrensia*), it represents a new species, characterized by more rounded and narrow section and lower number of secondaries than in the four previously discussed species of *Torrensia*. More material is needed before this new species can be named.

RIASSUNTO

Nel lavoro vengono descritte tre ammoniti provenienti dal Baiociano superiore (zona a Subfurcatum) dei dintorni di Bayeux, Francia NW. Confrontate con le serie-tipo di *Torrensia* studiate nell'Altopiano di Asiago, Italia NE, esse risultano appartenere a tre specie: *Orthogarantiana* (*Torrensia*) *gibba* (Parona), *O.* (*T.*) *sturanii* n.sp., ?*O.* (?*T.*) n.sp.ind.. Vengono inoltre discusse altre due nuove specie indeterminate di *Torrensia*, provenienti dalla zona a Subfurcatum dell'Altopiano di Asiago e dalla zona a Garantiana di Tivenys, Spagna NE. Le caratteristiche morfologiche, la uguale distribuzione stratigrafica e soprattutto la linea di sutura confermano l'abbinamento dimorfico di *Torrensia* (m) e *Orthogarantiana* (M) entro le Garantianinae della famiglia Stephanoceratidae.

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EXPLANATION OF PLATE 1

Figs 1, 2 - *Orthogarantiana* (*Torrensia*) *sturanii* n.sp..

1 - Paratype. *Subfurcatum* Zone, (?) *Polygyralis* Subzone. St. Vigor quarry, Bayeux. MGT-B1 (cfr. text-fig. 1). 3x.

2 - Holotype. *Subfurcatum* Zone, *Polygyralis* Subzone. Longara di Sotto locality, Altopiano di Asiago. MGT-Sturani's collection. 4x.

Figs. 3, 4 - *Orthogarantiana* (*Torrensia*) *gibba* (Parona).

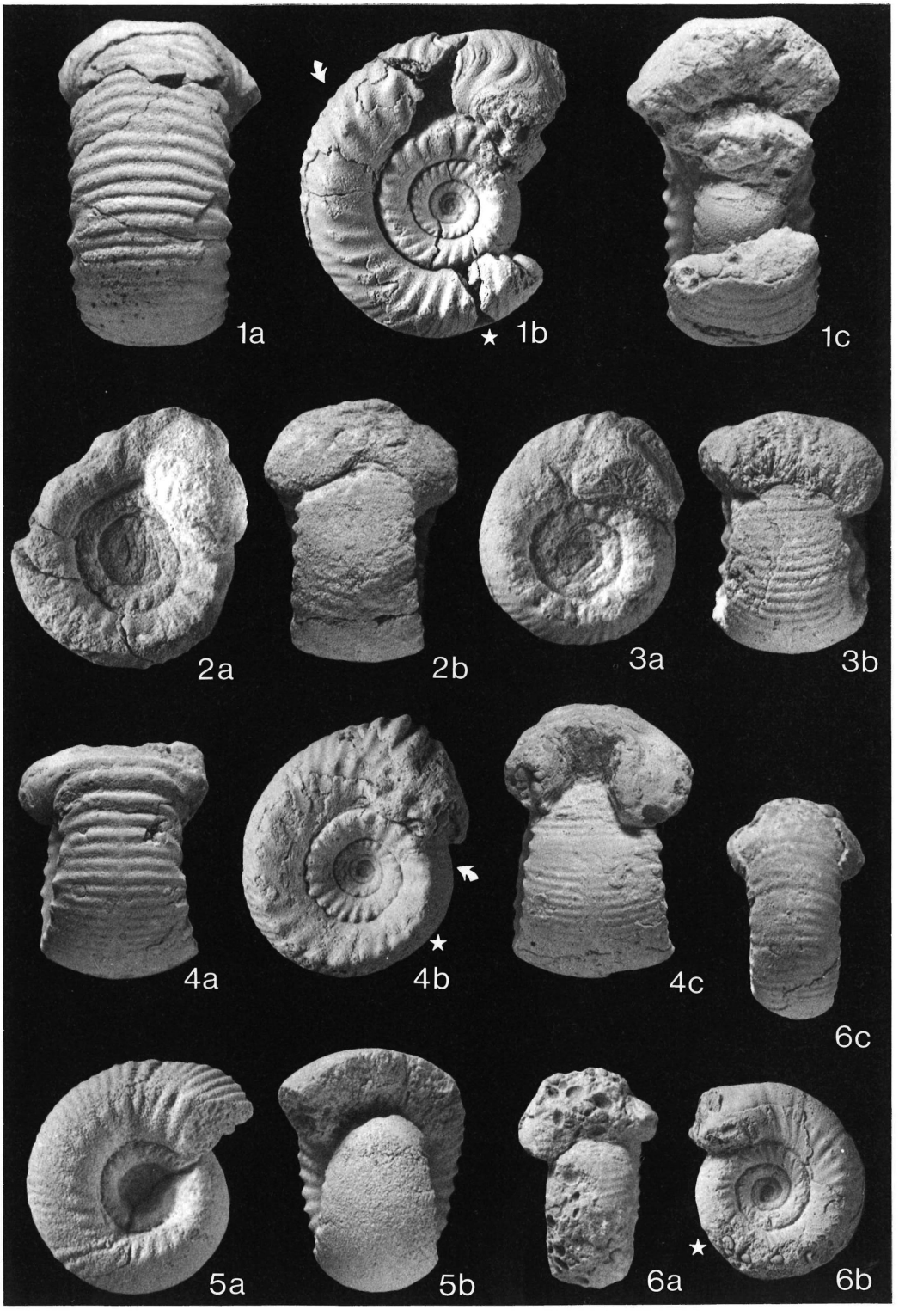
3 - Paralectotype. *Subfurcatum* Zone, *Baculata* Subzone. Monte Meletta, Altopiano di Asiago. MGT-Sturani's collection. 4x.

4 - *Subfurcatum* Zone. St. Vigor quarry, Bayeux. ENSM. 3x.

Fig. 5 - *Orthogarantiana* (*Torrensia*) n.sp.ind. 1.
Subfurcatum Zone, *Banksi* Subzone. Ponte sul Gelpach locality, Altopiano di Asiago. MGT-Sturani's collection. 4x.

Fig. 6 - ?*Orthogarantiana* (?*Torrensia*) n.sp.ind..
Subfurcatum-Garantiana Zones. Les Hachettes, Bayeux. MGT-B2. 3x.

Symbols besides figures indicate: (→) the position of the septal suture drawn in the paper; (✱) the beginning of the body chamber.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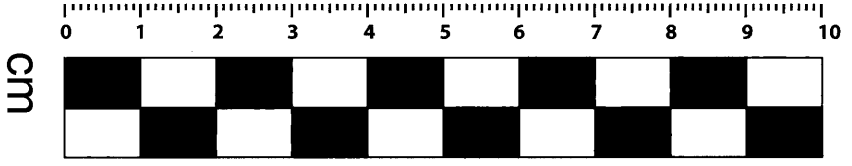
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