

LOWER KIMMERIDGIAN			UPPER KIMMERIDGIAN			L. TITH	SUBSTAGE
PLATYNOTA /SILENUM	HYPSELOCYCLUM /STROMBECKI	DIVISUM /HERBICHI	ACANTHICUM	EUDOXUS /CAVOURI	BECKERI	HYB	ZONE
							Taramelliceras (Metahaploceras) subnereus Taramelliceras cf. karreri Taramelliceras (Metahaploceras) strombecki Taramelliceras (Metahaploceras) nodosiusculum Taramelliceras ? karreri T. (Fontannesella) aff. valentinum Hemihaploceras (Hemihaploceras) nobile Hemihaploceras (Zittelicerias) schwageri Taramelliceras acallopistum Hemihaploceras (Hemihaploceras) loczyi Taramelliceras intersistens

Figure 2. Stratigraphic distribution of studied taxa.

MATERIAL AND METHOD

The analysed material belongs to the author's collection, deposited in the National Geological Museum (MNG - GIR, Geological Institute of Romania) - Bucharest. Additional specimens from the collections by Professor Ion Preda were studied in the University of Bucharest and the Museum of Natural Sciences in Piatra Neamț. All specimens described by previous authors (Neumayr, Herbich, Preda) are reviewed here in order to complete the picture of the association existing in this region.

Method of comparison with the specimens known in literature and mentioned in synonymy was used in determination of species and furthermore, comparison with morphometric parameters and morphology of type specimen (Holotype or other type specimen) was made.

SYSTEMATICS

Abbreviations for the measurements, collections and outcrops:

Dmax = maximal diameter

Dph = phragmocone diameter

D = measured diameter

U = diameter of umbilicus

H = whorl height

W = whorl width

GIR = Geological Institute of Romania

GBA = Geological Institute of Austria (Bundesanstalt)

UBB = "Babeş Bolyai" University from Cluj Napoca

LGB = Geology Laboratory of Bucharest University

MPN = Museum of Natural Sciences - Piatra Neamț

F1 = Outcrop from western Ghilcoş walls

F2 = Outcrop from north-western Ghilcoş slope

F17 = Outcrop from "Ciofronca"; all in GRIGORE et al., 2009

A, D... K = studied sections (GRIGORE, 2002, 2011)

Family Oppeliidae Douville, 1890

Subfamily Taramelliceratinae Spath, 1928

Genus *Taramelliceras* Del Campana, 1905

Subgenus *Metahaploceras* Spath, 1925

Taramelliceras (*Metahaploceras*) *strombecki* (Oppel, 1857)

Pl. 1, Figs. 1a, b; 2

*1849 *Ammonites lingulatus nudus* - Quenstedt; p. 130; Pl. 9, Fig. 8.

1857 *Ammonites Strombecki* Oppel - Oppel; p. 687.

1873 *Oppelia Strombecki* Oppel - Neumayr; p. 166.

1876 *Ammonites (Oppelia) Strombecki* Oppel - Loriol; p. 36; Pl. 4, Figs. 1a, b.

1878 *Oppelia Strombecki* Oppel - Herbich; p. 148; Pl. 4, Fig. 1.

1879 *Oppelia strombecki* Oppel - Fontannes; p. 48; Pl. 7, Fig. 5.

1879 *Oppelia nugatoria* Fontannes - Fontannes; p. 50; Pl. 7, Figs. 8-9.

*1887 *Ammonites lingulatus nudus* Quenstedt - Quenstedt; p. 852; Pl. 92, Figs. 54-55.

1955 *Taramelliceras (Metahaploceras) strombecki* (Oppel) - Hölder; p. 135; Figs.tx. 157-161.

non1973 *Oppelia (Taramelliceras) strombecki* Oppel - Preda; Pl. 6, Fig. 1 (^ *Taramelliceras trachinotum*)

1978 *Taramelliceras (Metahaploceras) strombecki* (Oppel) - Oloriz; p. 110; Pl. 10, Fig. 1.

1993 *Taramelliceras (Metahaploceras) strombecki* (Oppel) - Sarti; p. 58; Pl. 1, Figs. 6a, b.

2017 *Metahaploceras strombecki* (Oppel) - Fozy; Pl. 6, Figs. 2a, b; Pl.11, Fig. 7.

Material: LRp33F4, LRp134F6, LRp505F7 Grigore Collection in GIR; originates from green nodular limestones of F1 outcrop. Herbich's specimen (1878): Collection of UBB; originates from red nodular limestones – Ciofronca outcrop (F17).

Table 1. Measurements of *Taramelliceras (Metahaploceras) strombecki* (Oppel, 1857) specimens.

Specimen	Dmax	Dph	D	U	H	W	U/D	H/D	W/D	W/H
Lectotype	53	-	53	12.2	26	14.9	0.23	0.49	0.31	0.57
Herbich's specimen	81	64	81	16.2	39	24.3	0.20	0.48	0.30	0.62
LRp33F4	105	>105	81	16	41	25	0.20	0.51	0.31	0.61
LRp134F6	42	42	33	8	16	12.5	0.24	0.48	0.38	0.78
LRp505F7	65	>65	54	12	27	18	0.22	0.50	0.33	0.66

Remarks: the specimen LRp33F4 is a large phragmocone (>100mm), in the meantime the other two are medium sized. All of them represent phragmocones with morphology and morphometric parameters comparable with those of the lectotype. Herbich's figured specimen is medium size and yields partially preserved living chamber; compared with lectotype, is more involute, with thinner external ribs.

Occurrence: Early Kimmeridgian – top of Platynota Zone-Strombecki Zone in Ghilcoș outcrops; Early Kimmeridgian-Strombecki Zone in Italy and Spain; Hypselocyclum Zone in Bulgaria, France and Germany.

Taramelliceras (Metahaploceras) nodosiusculum (Fontannes, 1879)

Pl. 1, Figs. 3-4

1879 *Oppelia Karreri* Neumayr var. *nodosiuscula* - Fontannes; p. 49; Pl. 7, Fig. 6.

1929 *Oppelia Schmidlini* Moesch - Wegele; p. 30; Pl. 28, Figs. 3-4.

1955 *Taramelliceras (Metahaploceras) nodosiusculum* (Fontannes) - Hölder; p. 137; Figs. 164-166.

1973 *Oppelia (Taramelliceras) nobilis* Neumayr – Preda; Pl. 17, Fig. 14.

1978 *Taramelliceras (Metahaploceras) nodosiusculum* (Fontannes) - Oloriz; p. 113; Pl. 10, Figs. 4-5.

1986 *Taramelliceras (Metahaploceras) nodosiusculum* (Fontannes) - Sarti; p. 498; Pl. 2, Figs. 4a, b.

1993 *Taramelliceras (Metahaploceras) nodosiusculum* (Fontannes) - Sarti; p. 58.

1997 *Taramelliceras (Metahaploceras) nodosiusculum* (Font.) - Gradl&Schaerer; p. 10; Pl. 1, Fig. 10.

2017 *Metahaploceras nodosiusculum* (Fontannes) - Fözy; Pl. 19, Figs. 1a, b.

Material: LRp205F5 Grigore Collection in GIR. Preda's specimens (1973): Collection of MPN inv. 12MPN (Pl.17, Fig.14); originates from grey nodular limestones – Ghilcoș outcrop (F5-F10 profile), and 6a MPN, from red nodular limestones – Ghilcoș outcrop ("W" profile).

Table 2. Measurements of *Taramelliceras (Metahaploceras) nodosiusculum* (Fontannes, 1879) specimens.

Specimen	Dmax	Dph	D	U	H	W	U/D	H/D	W/D	W/H
Lectotype	70	-	70	15	32.9	21.7	0.21	0.47	0.31	0.66
Preda 12 MPN	32	-	32	7	16	-	0.22	0.50	-	-
Preda 6a MPN	31	-	31	6.5	15	13	0.21	0.48	0.42	0.87
LRp205F5	31	-	31	7.5	17	11.5	0.24	0.55	0.37	0.68

Remarks: my specimen (LRp205F5) is a small phragmocone which is more evolute than the lectotype, more depressed and with ribs more prominent at this diameter. Preda's specimens are two small phragmocones with parameters comparable with those of the lectotype, only the 6a MPN specimen has the more depressed whorl section.

Occurrence: Early Kimmeridgian –Strombecki Zone in Ghilcoș outcrops; Early Kimmeridgian-Strombecki – Herbichi zones in Italy and Strombecki (Hypselocyclum) Zone in Spain, France and Germany.

Taramelliceras (Metahaploceras) subnereus (Wegele, 1929)

1876 *Oppelia Nereus* – Fontannes; p. 39; Pl. 5, Fig. 5.

1929 *Taramelliceras sub-Nereus* – Wegele; p. 119; Pl. 27, Fig. 12.

1955 *Taramelliceras (Metahaploceras) subnereus* (Wegele) – Hölder; p. 130; Pl. 15, Fig. 135; Pl. 16, Figs.142; 145.

Material: LRp232E3 Grigore Collection in GIR.

Table 3. Measurements of *Taramelliceras (Metahaploceras) subnereus* (Wegele, 1929) specimens.

Specimen	Dmax	Dph	D	U	H	W	U/D	H/D	W/D	W/H
Lectotype	49	-	49	6.5	28	16	0.13	0.57	0.33	0.57
LRp232E3	34	34	34	3	19	9	0.09	0.56	0.26	0.47

Remarks: my specimen (LRp232E3) is a small phragmocone, with whorl section more compressed than the Lectotype (Wegele's type specimen), similar to Fontannes specimen. It preserves well the specific ornamentation, with thin ribs and rare tubers.

Occurrence: Early Kimmeridgian –Platynota Zone in Ghilcoş outcrops; Early Kimmeridgian-Platynota Zone in France and Germany.

Subgenus *Fontannesiella* Spath, 1925

Tarmelliceras (?*Fontannesiella*) nov.sp. aff. *T. (F.) valentinum* (Fontannes, 1879)

Pl. 1, Fig. 5

aff. 1879 *Oppelia valentina* - Fontannes; p. 29; pl. 4, fig. 5-6.

Material: LRp133J Grigore Collection in GIR.

Table 4. Measurements of *Tarmelliceras (Fontannesiella)* nov.sp. aff. *T. (F.) valentinum* (Fontannes, 1879) specimen.

Specimen	Dmax	Dph	D	U	H	W	U/D	H/D	W/D	W/H	ic
Lectotype <i>Oppelia valentina</i>	94	-	90	22	40	25	0.24	0.44	0.28	0.62	1.36
LRp133J	240	40	32	8	16	11	0.25	0.50	0.34	0.69	1.4

Description: specimen LR133J is a small phragmocone which preserves well the ornamentation, comparable with that of the *Tarmelliceras (Fontannesiella) valentinum* (Fontannes, 1879) species; it differs from this species by a larger ventrum (at a smaller diameter than the type specimen), thinner lateral tubercles and rare ventral tubercles. Also, the stratigraphic level of my specimen is of an earlier age, Lower Kimmeridgian – Divisum Zone meanwhile *T. (F.) valentinum*, was described from Lower Tithonian; this specimen here can represent a form of transition between *Tarmelliceras trachinotum* and *T. (F.) valentinum*.

Occurrence: Early Kimmeridgian –Divisum Zone in Ghilcoş outcrop; Early Tithonian - Hybonotum - Albertinum zones in Italy, Spain and France.

Incerte sedis

Tarmelliceras karreri (Neumayr, 1873)

Pl. 1, Figs. 6, 7

1873 *Oppelia Karreri* – Neumayr; p. 168; Pl. 31, Figs. 8a, b.

1878 *Oppelia Karreri* Neumayr – Herbich; p. 153.

1973 *Oppelia (Tarmelliceras) karreri* Neumayr – Preda; Pl. 17, Fig. 15.

Material *Tarmelliceras* cf. *karreri* (Neumayr): LRp3F4, LRp229E2, LRp298E2 Grigore Collection in GIR. Neumayr's Holotype (1873) in Collection of GBA –Viena; originates from grey nodular limestones – Ghilcoş outcrop (F1-F10 profile) and maybe Ciofronca outcrop (as specified in their paper). Herbich's specimens (1878): not figured, only described; it is probably originating from the grey-greenish nodular facies – Ghilcoş outcrop. Preda's specimen (1973): Collection of MPN inv. 9 MPN (Pl. 17, Fig. 15) originates from red nodular limestones – Ghilcoş outcrop (W1-W3 profile).

Table 5. Measurements of *Tarmelliceras karreri* (Neumayr, 1873) specimens.

Specimen	Dmax	Dph	D	U	H	W	U/D	H/D	W/D	W/H
Lectotype	79	-	79	18.5	39	25	0.23	0.49	0.32	0.64
Herbich's specimen	40	-	40	8	19	13	0.20	0.47	0.32	0.68
Preda 9 MPN	34	34	34	7.5	18	13.5	0.22	0.53	0.40	0.75
LRp3F4	92	92	86	17	44	27	0.20	0.51	0.31	0.61
LRp298E2	42	-	42	7	24	16	0.17	0.57	0.38	0.67

Remarks: Preda's specimen (9MPN) is a juvenile well preserved with morphometric parameters and morphology comparable with those of Neumayr's type specimen. My specimens are in different preservation conditions; LRp3F4 is a large phragmocone, with morphometric parameters near those of the type specimen and with rigid ribs, at median flanks bifurcated, but with less evident tuberculation due erosion. The other two specimens represents phragmocone fragments which preserve better the specific ornamentation; LRp298E2 has the whorl section higher, more involute, more dense ribbing and thinner tubers. LRp229E2 specimen is only a quarter whorl with H=29 mm, has more convexe flanks with narrow ventrum and thin ribbing and tubers, missing intercalary ribs.

Discussion: *T. karreri* seems to be the last representative from the Oxfordian *T. callicerum* (Opp.) group described by Hölder (1955) and known until now only from the type locality, while the specimen described by Fontannes (1879) from Crussol has a large umbilicus and a more rigid ribbing. *T. cf. karreri* can be an intermediary form between *T. karreri* and the *Metahaploceras*.

Occurrence: until now only from Romania (Eastern Carpathians) – Early Kimmeridgian-Platynota Zone in Ghilcoş outcrops.

Taramelliceras acallopistum (Fontannes, 1879)

Pl. 2, Fig. 1

1879 *Oppelia acallopista* – Fontannes; p. 44; Pl. 6, Fig. 5.1959 *Taramelliceras acallopistum* (Fontannes) - Hölder & Ziegler; p. 199.1959 *Taramelliceras undulatum* Berckhemer & Hölder – Hölder & Ziegler; p. 200; Pl. 22, Fig 2.

Material: LRp510D24 Grigore Collection in GIR.

Remarks: my specimen (LRp510D24) represents an external mould of a part from the last whorls, with a high (H) over 30 mm with well-preserved specific ornamentation.

Occurrence: Late Kimmeridgian-Beckeri Zone in Ghilcoș outcrops; Beckeri Zone (Subeumela Subzone) in France (Crussol), Germany and Russia (uppermost Eudoxus zone).

Taramelliceras intersistens Holder, 1955

Pl. 2, Fig. 2

1955 *Taramelliceras intersistens* n.sp. – Holder; p. 116; Pl. 19, Fig. 27.1973 *Oppelia (Streblites) lithographica* Opper – Preda; Pl. 16, Fig. 3.Material: LRp511H14, LRp286B5, LRp550B15 from Grigore Collection in GIR. Preda's specimen figured as "*Oppelia (Streblites) lithographica*" (1973), was relocated in Collection of LGB (inv. 4p) from Collection of MPN; it originates from the grey-yellowish marls and siltstones – Ghilcoș outcrop.Table 6. Measurements of *Taramelliceras intersistens* Holder, 1955 specimens.

Specimen	Dmax	Dph	D	U	H	W	U/D	H/D	W/D	W/H
Lectotype	49	-	49	7	27	13	0.14	0.55	0.26	0.48
Preda 4p LGB	39	-	39	6	22	8	0.15	0.56	0.20	0.36
LRp511H14	-	-	-	5	17	6	-	-	-	0.35

Remarks: LRp511H14 specimen is a fragment of a whorl mould imprinted in marl, with well-preserved specific ornamentation with thin ribs like in the Hölder's type specimen. The other two specimens characterized by the same preservation, but they are deformed and less well-preserved, although also showing typical ornamentation.

Preda's figured specimen as "*Oppelia (Streblites) lithographica*" is represented by a half of the shell which preserves very well the specific ornamentation; only a tiny width due to its deformation in marls marks the difference with the type specimen described by Hölder.

Occurrence: Late Kimmeridgian-Beckeri Zone in Ghilcoș outcrops (B and H profiles); Pseudomutabilis-Beckeri zones in Germany.

Genus *Hemihaploceras* Spath, 1925Subgenus *Hemihaploceras* (Spath, 1925) in Sarti, 1993*Hemihaploceras (Hemihaploceras) nobile* (Neumayr, 1873)

Pl. 2, Figs. 3, 4

1873 *Oppelia nobile* – Neumayr; p. 167; Pl. 32, Figs. 3 a, b; 4a, b.1959 *Taramelliceras (Hemihaploceras) nobile* (Neumayr) – Berckhemer & Hölder; p. 77; Pl. 16, Fig. 74.non1973 *Oppelia (Taramelliceras) nobile* Neumayr – Preda; Pl. 17, Fig. 15 (= *T. (M.) nodosiusculum*).1978 *Hemihaploceras nobile* (Neumayr) – Oloriz; p. 117; Pl. 7, Fig. 5.1979 *Hemihaploceras nobile* (Neumayr) – Sapunov; p. 59; Pl. 13, Figs. 2a, b.Material - *Hemihaploceras. (H.) cf. nobile*: LRp194H8, LRp151B5 Grigore Collection in GIR.

Neumayr's lectotype (1873) from the Collection of MAFI (Maghiar Geological Institute) – Budapest – „A” figured Pl. 32, Figs. 3a, b and „B”, paralectotype (Pl. 32, Figs. 4a, b), which is deposited in the Collection of GBA – Viena; both are originating from the grey-greenish nodular facies – Ghilcoș outcrop (K profile). Herbich's specimens (1878): two specimens from grey-greenish nodular facies – Ghilcoș outcrop.

Table 7. Measurements of *Hemihaploceras (Hemihaploceras) nobile* (Neumayr, 1873) specimens.

Specimen	Dmax	Dph	D	U	H	W	U/D	H/D	W/D	W/H
Lectotype\	89	68	89	33	32	27	0.37	0.36	0.30	0.84
Neumayr's B specimen	68	-	68	22	28	20	0.32	0.41	0.29	0.71
Herbich's A specimen	76	-	76	20.5	33	17.5	0.27	0.43	0.27	0.53
Herbich's B specimen	92	80	92	28.5	37	21	0.31	0.40	0.23	0.57
LRp194H8	46	-	42	15	18	11.5	0.36	0.43	0.27	0.64
LRp151B5	38	-	38	13	16	10	0.34	0.42	0.26	0.63

Remarks: my specimens are two small phragmocones which partially preserves the conch. LRp194H8 specimen is more complete than LRp151B5, but the second preserves better the specific ornamentation, identically with the Sapunov's specimen (at the same diameter). The ornamentation with bifurcated and residuales into inner whorls (or juvenile stadium) on my specimens are discussed and confirmed by Hölder in BERCKHEMER & HÖLDER (1959).

The specimen „A” of Herbich is medium sized phragmocone and „B” is a large one and preserves a quarter from the living chamber; both are more involute, with a higher whorl section than the type specimen.

Occurrence: Late Kimmeridgian- Eudoxus-Beckeri zones in Ghilcoş outcrops; Eudoxus (Cavouri)-Beckeri zones in Germany, France, Switzerland, Spain and Bulgaria.

Hemihaploceras (Hemihaploceras) loczyi (Jekelius, 1916)

Pl. 2, Fig. 5 a, b

1916 *Oppelia Loczyi* n.sp. – Jekelius; p. 271; Pl. IV, Figs. 9-10.

1925 *Oppelia Loczyi* n. sp. – Jekelius; p. 69; Pl. I, Figs. 9-10.

1969 *Hemihaploceras loczyi* (Jekelius) - Patruşius; Pl. 3; Figs. 6 (Lectotype) - 7.

Material: LRp224D26 Grigore Collection in GIR.

Table 8. Measurements of *Hemihaploceras (Hemihaploceras) loczyi* (Jekelius, 1916).

Specimen	Dmax	Dph	D	U	H	W	U/D	H/D	W/D	W/H
Lectotype	69	43	68	22	27	-	0.32	0.40	-	-
LRp224D26	~68	~44	~52	~18	~20	>7	~0.35	~0.38	>0.13	>0.35

Remarks: my specimen is deformed, medium-sized, with more than a half whorl of the living chamber. Ornamentation is similar to that described by Jekelius, with paired ribes connected in ventral tubers. Morphometric parameters are comparables with that of the Lectotype.

Occurrence: until now only from Romania (Eastern Carpathians) – Late Kimmeridgian (Beckeri Zone) in Bucegi (in “Pre-Leaota Facies”, “La Politie”) and in Ghilcoş outcrops.

CONCLUSIONS

Some species were recorded here for a first time and described: *T. (M.) subnereus*, *T. (?Fontannesiella)* nov.sp. aff. *T. (F.) valentinum*, *T. acallopistum*, *T. intersistens* and a rare species, *Hemihaploceras (H.) loczyi*, described earlier only by JEKELIUS (1916) from the Bucegi Mountains. Also, species described previously from this area by NEUMAYR, HERBICH and PREDA were reviewed here.

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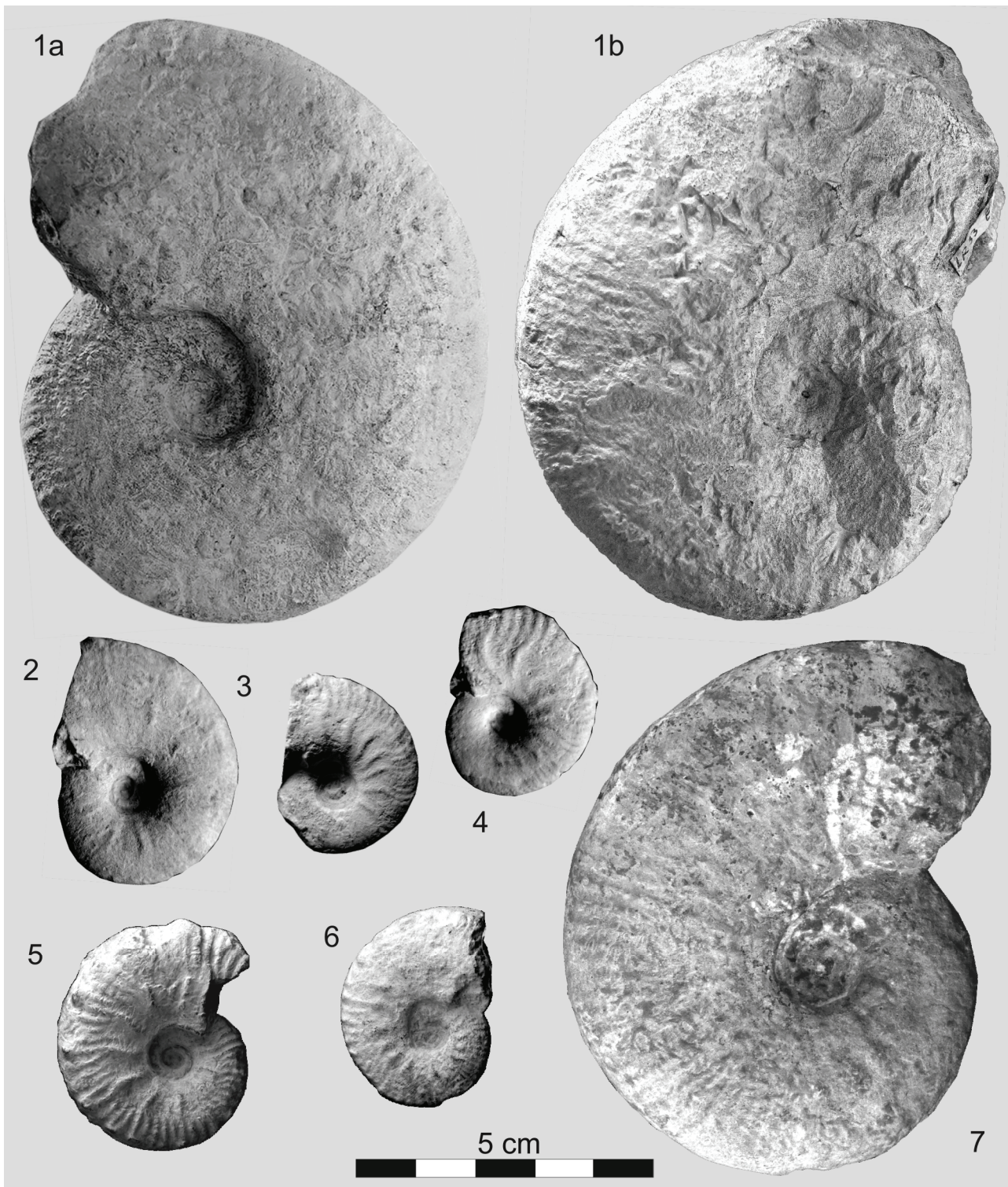
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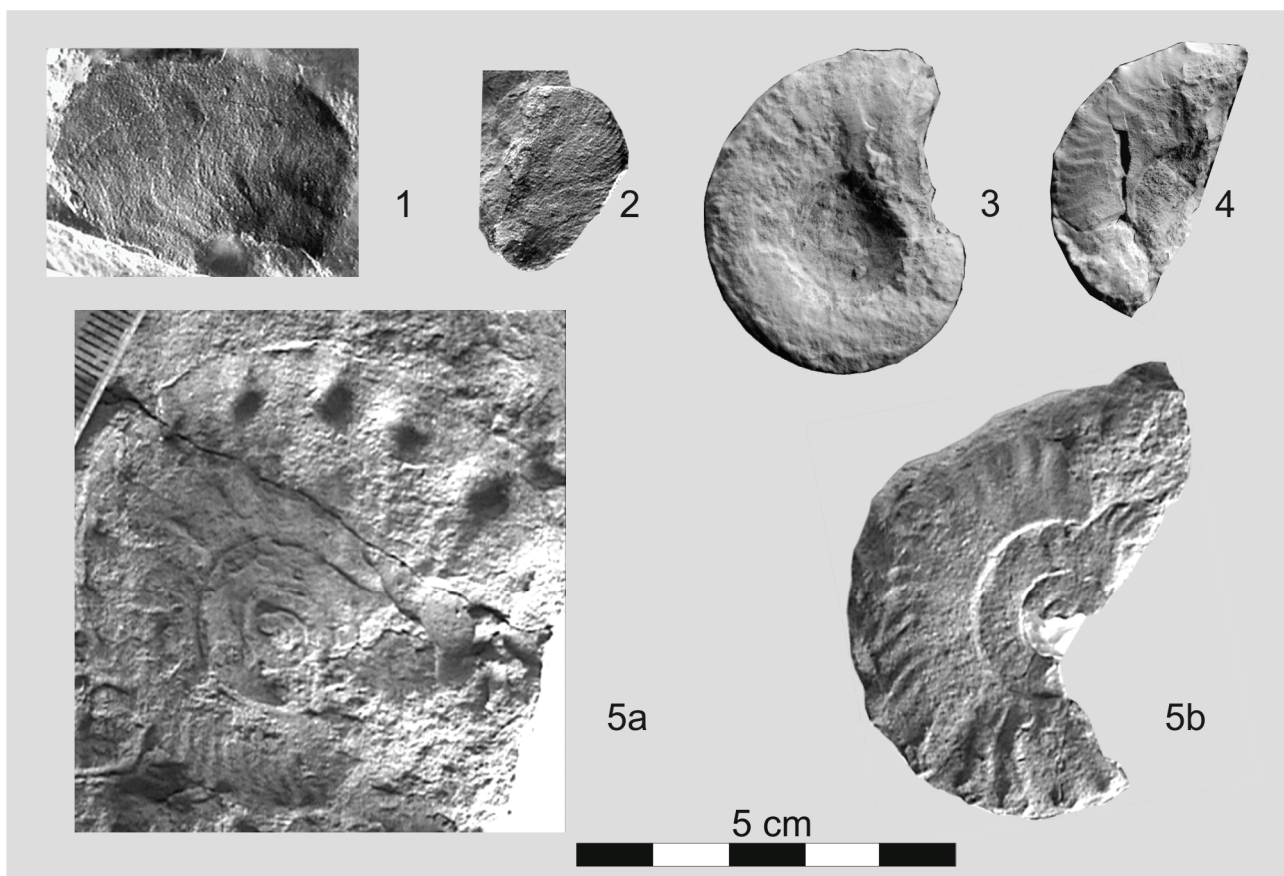
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Plate 1



1a, b. *Taramelliceras (Metahaploceras) strombecki* (Oppel) (LRp33F4)- phragmocone; green nodular limestone, Early Kimmeridgian-Hypselocyclum (Strombecki) Zone, North Ghilcoş; 2. *Taramelliceras (Metahaploceras) strombecki* (Oppel) (LRp505F7), green nodular limestone, Early Kimmeridgian-Hypselocyclum (Strombecki) Zone, North Ghilcoş; 3. *Taramelliceras (Metahaploceras) nodosiusculum* (Fontannes) (LRp205F5); green nodular limestone, Early Kimmeridgian-Hypselocyclum (Strombecki) Zone, North Ghilcoş; 4. *Taramelliceras (Metahaploceras) nodosiusculum* (Fontannes) Preda's specimen (12a MPN); green nodular limestone, Early Kimmeridgian-Hypselocyclum (Strombecki) Zone, North Ghilcoş; 5. *Taramelliceras (Fontannesiella)* nov.sp. aff. *Taramelliceras (Fontannesiella) valentinum* (Fontannes) (LRp133J); green nodular limestone, Early Kimmeridgian-Divisum Zone, North Ghilcoş; 6. *Taramelliceras karreri* (Neumayr) Preda's specimen (9 MPN); red-green spotted nodular limestone, Early Kimmeridgian-Hypselocyclum (Strombecki) Zone, Ghilcoş walls ("W" profile); 7. *Taramelliceras* cf. *karreri* (Neumayr) (LRp3F4)-phragmocone; green nodular limestone, Early Kimmeridgian-Hypselocyclum (Strombecki) Zone, North Ghilcoş.

Plate 2



1. *Taramelliceras (Taramelliceras) acallopistum* (Fontannes) (LRp510D24); grey-green marly facies, Late Kimmeridgian-Beckeri Zone, North Ghilcoș; 2. *Taramelliceras (Taramelliceras) intersistens* Holder (LRp511H14), grey-green marly facies, Late Kimmeridgian-Beckeri Zone, North Ghilcoș; 3. *Hemihaploceras (Hemihaploceras) nobile* (Neumayr) (LRp194H8); green nodular limestone, Late Kimmeridgian-Acanthicum Zone, North Ghilcoș; 4. *Hemihaploceras (Hemihaploceras) nobile* (Neumayr) (LRp151B5); grey-green nodular limestone, Late Kimmeridgian-Eudoxus Zone, North Ghilcoș; 5. *Hemihaploceras (Hemihaploceras) loczyi* (Jekelius) (LRp224D26), a – external mold and b – internal mold; green nodular limestone, Late Kimmeridgian-Beckeri Zone, North Ghilcoș.