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A revision of VOGL's Eocene Nautilids from Hungary

András GALÁCZ[1]

(with 6 figures and 7 plates)

Searching the collections of the Eötvös L. University of Budapest for Nautilids studied by V. VOGL in 1910, has yielded only a few surviving specimens. However, this limited material comprised several examples which were described and figured by VOGL. The revision resulted in identifying and properly describing six species of four genera (*Euciphoceras regale, Eutrephoceras urbanus, E. centrale, Cimomia parallela, C.* sp. and *Angulithes sowerbyi*). These forms all came from classic Upper Eocene localities in or near Budapest, and one from the Middle Eocene of Transylvania (Romania).

Introduction

Viktor VOGL, the gifted but untimely departed Hungarian geologist-paleontologist published two papers on Eocene Nautilids from Hungary. One (VOGL 1910) is a short note on a new form from the Lower Oligocene Buda Marl, the other is a longer paper (VOGL 1908), describing several species on the basis of material in the collections of the Paleontology Department of the Budapest University. In that latter paper he gave only descriptions and cross-section of specimens with a single specimen figured as photograph. In a longer paper (VOGL 1911) on the so-called Piszke Marl occurring along the Danube, NW to Budapest, he also mentioned and briefly described some molluscs, including Nautilids.

Unfortunately, most of the material became lost in the past decades, but some of the original specimens were discovered in the collections, thus a revision could have been carried out. This revision is justified by the fact that Nautilids are usually rare, ancillary elements in Tertiary assemblages, and monographs summarizing data on more than one or two appearing species are even rarer in the literature.

Material

When VOGL worked out his little monograph, he found a well-represented Nautilid material of various species in the collection of the Budapest University. Some described specimens came from Transylvania, from the Collection of the Transylvanian Museum Society of Kolozsvár (Cluj) – these probably went back to that collection, thus will be not treated here. Most of the identified forms were represented by single specimens, of which some were rediscovered now. These are from Middle and Upper Eocene localities of the Transdanubian part of Hungary: from the so-called *perforatus* beds of Tatabánya, the 'Bryozoan marl of Piszke' (Piszke Marl Formation) and the 'Orbitoid limestone' of Budapest, Kissvábhegy (Szépvölgy Limestone Formation).

At the turn of the 19th and 20th centuries the Tatabánya and the Kissvábhegy quarries were intensively worked, and near Piszke a new railway cutting yielded fossils in great quantities. However, these exposures had been abandoned later, and now fresh material is almost impossible to obtain. Strangely enough, *Aturia rovasendiana*, what was the most common Nautilid in the Piszke marl and described by Vogl on the basis of more than 50 specimens, is completely unrepresented in the surviving collection. Thus a revision could be based only on the remnants of the original material

[1] Department of Palaeontology, Eötvös University, H-1117 Budapest, Pázmány Péter sétány 1/c, Hungary.
E-mail: galacz@ludens.elte.hu

and occasional specimens from the same localities in other collections.

VOGL described „*Nautilus crassiconcha* n.sp.", „*N. Leonicensis* DE ZIGNO" and „*N.* cfr. *Rollandi* LEYM." from the Middle Eocene of Tatabánya, „*N. regalis* SOW." and „*N.* cfr. *urbanus* SOW." from the Kissvábhegy Upper Eocene, and „*N. parallelus* SCHAF. var. *acuta* n. var.", „*N. Leonicensis* DE ZIGN.", „*N. Deluci* D'ARCH.", *N.* cfr. *vicentinus* OPPENH.", „*N.* aff. *tumescens* FRAUSCH.", „*N.* nov. sp. ind." and „*Aturia Rovasendiana* PAR." from the Upper Eocene of Piszke. The „*N.* nov. sp. ind." was later descibed by VOGL (1910, p.707) as „*Nautilus Szontaghi* n. sp."

Of these described forms the original specimens of „*Nautilus regalis* SOW.", „*N.* cfr. *urbanus* SOW.", „*Nautilus parallelus* SCHAF. var. *acuta* n. var.", „*N. Leonicensis*", „*N. Deluci*" are treated here. One specimen („*N.* cf. *centralis* SOW.") from the Transylvanian Kolozsmonostor, originally belonging to the Budapest collection, is also available.

THE original specimen of the only well-established new form, *Nautilus crassiconcha* n. sp. of Vogl, which was figured by photograph, is also lost. Nevertheless, the sepecies seems to be common in the Tansdanubian Middle Eocene, appearing in outcrops in the Bakony Mts (GALÁCZ 1987).

Systematic descriptions

In the following descriptions the measurements are given as D = biggest measurable diameter; Wh = whorl height at the measured D; Wb = whorl breadth at the measured D; U = umbilical breadth at the measured D. If possible, measurements at more than one planes were made to show tendencies in dimensions.

Numbers of specimens refer to the inventory of the collection of the Natural History Museum (TTKM) of the Eötvös L. University. The specimens from the Hungarian Geological Institute are referred as MÁFI.

Classis Cephalopoda CUVIER, 1795
Subclassis Nautiloidea AGASSIZ, 1847
Ordo Nautilida AGASSIZ, 1847
Superfamilia Nautilaceae BLAINVILLE, 1825
Familia Nautilidae BLAINVILLE, 1825
Genus *Euciphoceras* SCHULTZ, 1976

Euciphoceras regale (J. de C. SOWERBY, 1822)
Pl. 6, figs 2-3; Pl. 7, figs 2-3; text-fig. 1

1822. *Nautilus regalis* – SOWERBY, J., p. 77, pl. 355.
1849. *Nautilus regalis*, SOWERBY – EDWARDS, p. 46, pl. IV, pl. VIII, fig. 5.
non 1880. *Nautilus regalis* SOW. – DE GREGORIO, p. 2, pl. B, figs 6, 7.
1891. *Nautilus urbanus*, J. DE C. SOWERBY – FOORD, p. 320.
1908. *Nautilus regalis* SOW. – VOGL, p. 639, text-fig. 1.
1976. *Eutrephoceras* (*Euciphoceras*) *regale* (SOWERBY, 1822) – SCHULTZ, 1976a, p. 5, text-fig. 1/D.
1976. *Eutrephoceras* (*Euciphoceras*) *regale* (J. SOWERBY, 1922) – SCHULTZ, 1976b, p. 9, text-fig. 1D.
2004. *Euciphoceras regale* (J. DE C. SOWERBY, 1822) – GALÁCZ, p. 2, text-figs 2, 3.

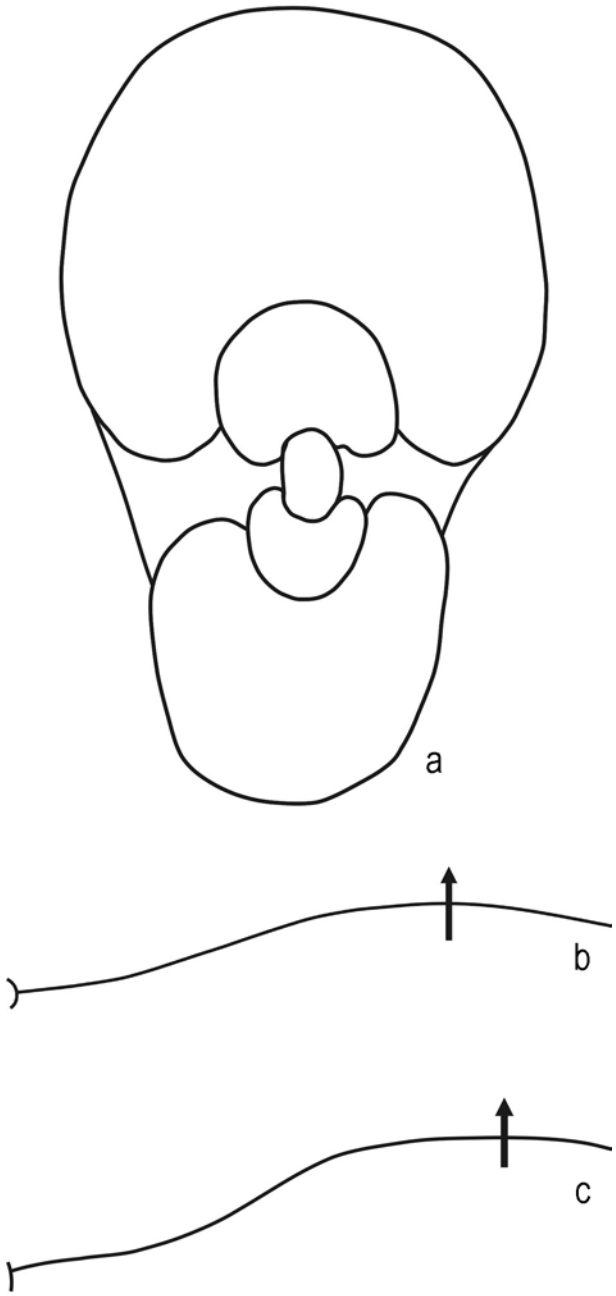
Material: Two specimens from the Middle Eocene of the Kissvábhegy quarry, Budapest.

The bigger specimen (with the old inventory number A4585) was collected by T. SZONTÁGH, geologist of the Hungarian Geological Institute, in 1884. This is the specimen what was described and figured with a cross-section drawing by VOGL (1907, text-fig.1). A further specimen from the same locality is originally from the collections of the Hungarian Geological Institute (Nos 75, 76), and was collected by K. HOFMANN, chief geologist of the Institute, in 1880. The specimen was broken into two, and this way inventoried.

Description: VOGL's specimen is a medium-size internal cast, septate up to 100 mm diameter. Its smooth flanks are slightly convex on the inner and middle whorls, then become flattened and parallel near to and on the body-chamber, forming wider than high subrectangular cross-section. The umbilicus is moderately narrow. The suture-line (Text-fig. 1c) is very simple, having a shallow lateral lobe and a wide, low ventral saddle.

HOFMANN's specimen is a phragmocone of a bigger example, showing the characteristic whorl-section (Text-fig. 1a). Its suture-line is very similar, with even shallower lateral lobe (Text-fig. 1b). Position of the siphuncle cannot be seen.

Remarks and comparison: The main difference between *E. regale* and the similar, simple-sutured *Eutrephoceras* and *Euciphoceras* species is the rectangular section of the adult whorls.



Text-fig. 1: *Euciphoceras regale* (J. de C. SOWERBY). a: cross-section, b: suture-line, of MÁFI specimen 46-47, 1 x; c: suture-line, of specimen of TTKM A 0791, 1 x.

Measurements:

specimen	Diameter (D)	Whorl-height (Wh)	Wh/D (%)	Whorl-breadth (Wb)	Wb/D (%)	Umbilical breadth (Ub)	Ub/D (%)
A0791	118 mm 90 mm	68 mm 53 mm	57 59	69 mm 50 mm	58 55	10.5 mm 7 mm	9 7
MÁFI 75-76	107 mm 68 mm 41 mm	63 mm 39 mm 23.5 mm	59 57 57	64 mm 39 mm 23.5 mm	60 57 57	8.5 mm 4 mm 2.5 mm	8 6 6

Genus *Eutrephoceras* HYATT, 1894

Eutrephoceras urbanus (J. DE C. SOWERBY, 1843)
Pls 2, 3; text-fig. 2.

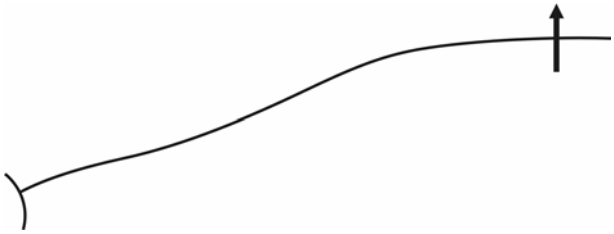
1843 *Nautilus urbanus* – SOWERBY, J DE C., p .36, pl. 628.
1849 *Nautilus urbanus* SOWERBY – EDWARDS, p. 46, pl. 3, fig. 2, pl. 8, fig. 4.
1891 *Nautilus urbanus*, J. DE C. SOWERBY – FOORD, p. 320.
1908 *Nautilus* cfr. *urbanus* SOW. – VOGL, p. 643.

Material: A single specimen from the Szépvölgy Limestone of the Kissvábhegy Quarry (Budapest).

Description: The specimen is an incomplete internal cast which preserved the final part of the phragmocone and a ca. 1/3 whorl body chamber. Probably an adult example because the last three septa show sutural crowding. A robust form with narrow umbilicus, convex flanks and highly arched venter. These latter form a high-oval whorl-section.

The suture-line (Text-fig. 2) is very simple, showing a low saddle near the umbilicus and a slight sinuosity on the flank, then crosses the venter radially. The siphuncle cannot be seen.

Comparison and remarks: The few descriptions of the species all mention the narrow umbilicus and the characteristic shape of the cross-section. This is high-oval with convex, i.e. non-flattened flanks. Another general comment on the species is its rarity.



Text-fig. 2: *Eutrephoceras urbanus* (J. DE C. SOWERBY), suture-line of specimen TTKM A 0783, 0.8 x.

Measurements:

specimen	Diameter (D)	Whorl-height (Wh)	Wh/D (%)	Whorl- breadth (Wb)	Wb/D (%)	Umbilical breadth (Ub)	Ub/D (%)
A 0783	200	108	54	88	44	16	8

Eutrephoceras centrale (J.SOWERBY, 1812)
Pl. 1, figs 2-3; text-fig. 3.

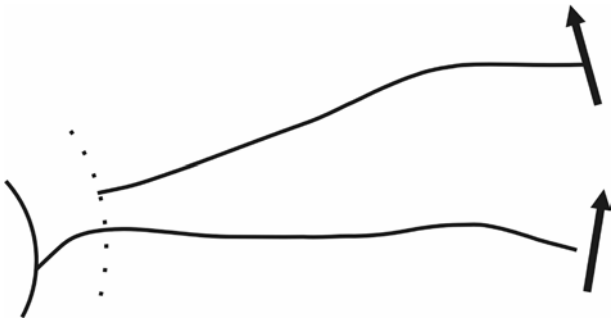
1812 *Nautilus centralis* – J. SOWERBY, p. 11, pl. 1, fig 1(left hand side)
1849 *Nautilus centralis*. SOWERBY – EDWARDS, p. 45, pl. 3, fig. 1, pl. 8, fig. 2
1891 *Nautilus centralis*, J.SOWERBY – FOORD, p. 316
1908 *Nautilus centralis* SOW. – VOGL, p. 9
1910 *Nautilus centralis* SOW. – VOGL, p. 220, text-fig. 6
1976 *Eutrephoceras* (*Simplicioceras*) *centrale* (J. SOWERBY 1812) – SCHULTZ 1976b, p. 8, text-fig. 1C)

Material: A single specimen from the collection studied and determined by VOGL. Originally it was collected by A. KOCH in 1884, in the famous locality Kolozsmonostor, near Kolozsvár (Cluj) in Transylvania. Most probably this is the smaller specimen of the two what VOGL mentioned. It is now in the collection of the Hungarian Geological Institute (MÁFI).

Description: A small, slightly deformed specimen with a short preserved part of the body chamber. Its most characteristic feature is the inflated, nearly globulate whorls with narrow and deep umbilicus, well-rounded umbilical margin and convex flanks and venter. The maximum whorl-width appears low on the flanks, near the umbilical margin. The last whorl becomes very depressed where the whorl-width exceeds significantly the whorl height.

The suture-line is very simple, almost straight radial, only slight undulations appear on the umbilical wall and around the middle of the flanks (Text-fig. 3).

Remarks: The specimen matches well the former descriptions and figures in the literature, being small, globular and having very simple suture. The compilation of SCHULTZ (1976, p. 8) suggests that *E. centrale* is one of the commonest Eocene Nautilids in Europe.



Text-fig. 3: *Eutrephoceras centrale* (J. SOWERBY), suture-lines of MÁFI specimen, 1.5 x.

Measurements:

specimen	Diameter (D)	Whorl-height (Wh)	Wh/D (%)	Whorl-breadth (Wb)	Wb/D (%)	Umbilical breadth (U)	U/D (%)
MÁFI	105	60	57	74	70.5	11	10.5
	66	41	62	42	63.5	7	10.5

Genus *Cimomia* CONRAD, 1866

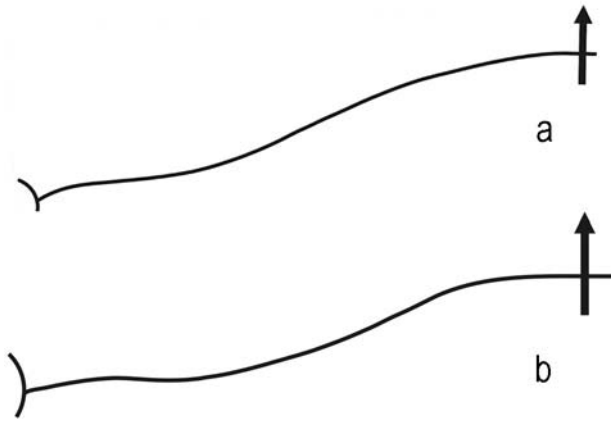
Cimomia parallela (SCHAFHÄUTL, 1863)
Pl. 1, fig. 1; Pl. 4, figs 1-2; text-fig. 4.

1863 *Nautilus parallelus* mihi – SCHAFHÄUTL, p. 216, pl. 56, fig. 1a-c.
1907 *Nautilus parallelus* SCHAFH. var. *acuta* n. var. – VOGL, p. 713, text-fig .2.
1917 *Nautilus parallelus* SCHFH. – LÖRENTHEY, p. 18, pl. 1, figs 1, 2; pl. 2, figs 1, 2; text-fig. 6.

Material: Two subadult specimens from the Upper Eocene Piszke Marl. Both specimens belonged to the original material of VOGL as part of the old collection of the Palaeontology Department, donated by M. HANTKEN.

Description: Medium-size form, with narrow umbilicus and high, elliptic whorl-section. The deep umbilicus is formed by vertical umbilical walls which round widely into the convex flanks. The maximum width of the whorl is below the middle. The venter is highly arched. The suture line (Text-fig. 4) is very simple with slight undulations. There is a low umbilical saddle and a short lateral lobe, then the suture-line becomes radial on the outer third of the flank and remains straight across the venter. Position of the siphuncle cannot be seen.

Remarks: Vogl, when creating the new varietas *acuta*, selected a compressed specimen with squeezed phragmocone (text-fig. 2 in VOGL, 1907). This specimen is refigured here (Pl. 3 figs 1-2) to show that the 'characteristic' acute whorl-section is a preservational feature.



Text-fig. 4: *Cimomia parallela* (SCHAFHÄUTL), a: suture-line of specimen TTKM A 0780; b: suture-line of specimen TTKM A 0789, both 0.9 x.

Measurements:

specimen	Diameter (D)	Whorl-height (Wh)	Wh/D (%)	Whorl-breadth (Wb)	Wb/D (%)	Umbilical breadth (Ub)	Ub/D (%)
A 0780	176	94	53.5	63	36	15	8
A 0789	165	93	56	66	40	11	6.5

Cimomia sp.
Pl. 7, fig. 1; text-fig. 5.

1907 *Nautilus* cfr. *Leonicensis* DE ZIGN. – VOGL, p. 10.

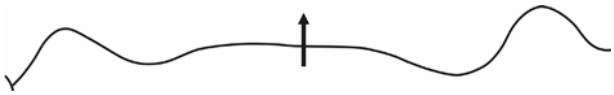
Material: VOGL (1907, p. 11) mentioned 'several strongly squeezed' specimens from the Piszke Marl, but this is the only surviving one from the original collection (A 0787). Collected by HANTKEN.

Measurements: This is a specimen of 175 mm diameter, but because of the distortion, dimensions based on other measurements cannot be given reliably.

Description: A medium-size specimen with very narrow, almost closed umbilicus even on this internal cast. The whorl-section is high-oval with convex flanks and venter.

The suture-line (Text-fig. 5) is of *Cimomia*-type with narrow and high umilical saddle and a deep, wide lateral lobe. The suture-line crosses the venter radially with a low, broad ventral saddle.

Remarks: VOGL identified this specimen as close to *C. leonicensis*, where he also ranged *'Nautilus undulatus'* (figured as *N. simplex*) of SCHAFHÄUTL (1863, p. 216, pl. 53, fig. 9). However, this form is so poorly figured that it is hard to state anything about its closer affinity. Just as in the case of this Piszke marl specimen, it is too deformed to determine on species level.



Text-fig. 5: *Cimomia* sp. Suture-line of specimen TTKM A 0787, 0.55 x.

Genus *Angulithes* MONTFORT, 1808

Angulithes sowerbyi (WETHERELL, 1836)
Pl. 5; Pl. 6, fig. 1; text-fig. 8.

1849 *Nautilus Sowerbyi* WETHERELL – EDWARDS, p. 48, pl. 6, pl. VIII, fig. 3.
? 1863 *Nautilus Sowerbyi* WETH. – SCHAFHÄUTL, p. 217, pl. 55, fig. 2.
1891 *Nautilus Sowerbyi*, WETHERELL. – FOORD, p. 323.
1908 *Nautilus Deluci* D'ARCH. – VOGL, p. 12, text-fig. 5.

Material: A single specimen from the Upper Eocene Piszke Marl. The labels of the specimen are mssing, however the infilling matrix, the preservation show unequivocally the provenance of the specimen. The cross-section figure in VOGL (fig. 5) could be identified as showing that of the here discussed example.

Description: A realtively big specimen with extremely compressed whorls of lanceolate cross-section. The umbilicus is very narrow, the umbilical wall is low and convex, the flanks are flattened and convergent, having the maximum whorl breadth near the umbilical margin. The venter is narrow, acute.

The suture-line (Text-fig. 8) bears a relatively high, rounded umbilical saddle and a wide, shallow lateral lobe. The suture-line crosses the venter radially. The specimen is not adult yet, because the last preserved sutures do not show crowding. Position of the siphuncle cannot be seen.

Discussion: In identifying flattened Nautilids the most common solution is to follow the tradition initiated by D'ORBIGNY (1840-42) and call these forms *Angulithes triangularis* MONTFORT, or to apply the other available name: *A. deluci* (D'ARCHIAC). The problems with these forms are the ill-defined types figured by simplified drawings (see FOORD 1891, p. 327). *A. triangularis* is well figured by D'ORBIGNY (1840-42, pl. 12), showing a narrow form with acute venter in the cross-section and a suture-line dominated by extremely broad lateral lobe and an insignificant, narrow umbilical saddle. *A. deluci* (see D'ARCHIAC & HAIME, p. 337, pl. 35, fig. 1, redrawn by MILLER 1951, text-fig. 11) is again a narrow form with sharpened venter and slightly different sutures. It was first described from North-Western India, and one topotype specimen (VRENDENBURG & COTTER 1928, pl. 2, figs 3-4)

shows that its body chamber at bigger sizes has broader section with rounded venter – quite different what the type figures suggest. In this respect the form described by SCHAFHÄUTL (1863, p. 217, l.55, fig. 2) is very similar. Another extremely compressed form with lanceolate whorl-section is *'Nautilus' Chudeaui* DOUVILLÉ, 1920, of which holotype, the single known specimen from the Eocene of Sudan was re-figured by MILLER (1951, pl. 10, figs 5, 6). While it resembles the Hungarian form, it has a different suture-line with narrow umbilical saddle and strongly projected ventral portion. On the other hand *A. sowerbyi*, a European species has high-triangular whorl-section and suture-line very similar to this Hungarian specimen. This latter is somewhat squeezed, so its more discoidal aspect could be a preservational artefact.

Text-fig. 6: *Angulithes sowerbyi* (WETHERELL), suture-line of specimen TTKM A 0784, 0.8 x.

Measurements:

specimen	Diameter (D)	Whorl-height (Wh)	Wh/D (%)	Whorl-breadth (Wb)	Wb/D (%)	Umbilical breadth (Ub)	Ub/D (%)
A 0784	195	115	59	68	35	17	8.5
	130	76	58.5	37	28.5	11	8.5

Conclusions

Appearing rarely, Nautilids, are subordinate elements occurring as few specimens even in rich Tertiary mollusc faunas. In Hungary the extremely rich and generally well-preserved Eocene mollusc assemblages, yielding superb bivalves and gastropods in thousands, contain one or two Nautilids. Small wonder, these fossils are neglected, mentioned only in faunal lists or figured on last plates of bigger monographs. VOGL's work was a pioneering effort trying to look over a field so poorly explored in his time. His small monograph, however, remained almost unknown for a wider scientific audience, especially because he figured his distinguished taxa only with sketchy whorl-sections, publishing only a single photograph. Nevertheless, the surviving material indicates that VOGL's determinations were based on careful studies, and most of his rediscovered original specimens were identified correctly.

The Eocene Nautilids are still waiting for revision, however this revision should be based on rich, stratigraphically controlled material, where morphological variability can be studied in space and time. Probably numerous cases of synonymy will be recognized. Now almost all larger basins of Tertiary oceans and seas have their own Nautilid faunas, of which knowledge and most of the spcies names go back to one or few classic works (e.g. the Paris basin to D'ORBIGNY 1840-42, the London basin to SOWERBY 1812-1846 and EDWARDS 1849, or north-western India to D'ARCHIAC & HAIME 1853 and VRENDENBURG 1935, etc.). The revision on *Aturia* by STURANI (1958) then by JUNG (1966) documented that the so many names given to *Aturia* having been encountered worldwide can be reduced to one or two, and this indicates reduced number of species of global distribution. Undoubtedly, a similar, strong reduction of species names of *Nautilus*-type Tertiary Nautilids will come. A clear and settled taxonomy will better help to capitalize on the probably greatest paleobiological use of Tertiary Nautilids: their application in paleobiogeography.

Acknowledgements

I am indebted to Prof. L. KORDOS, Director of the Hungarian Geological Institute and its Museum, who permitted an access to the collections and loaned specimens for study. I. SZENTE searched the University collections to trace original specimens studied by V. VOGL. L. MAKÁDI is thanked for help in making the text-figures. The work was supported by grant No. T43616 of the Hungarian Scientific Research Grant (OTKA).

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Plate 1

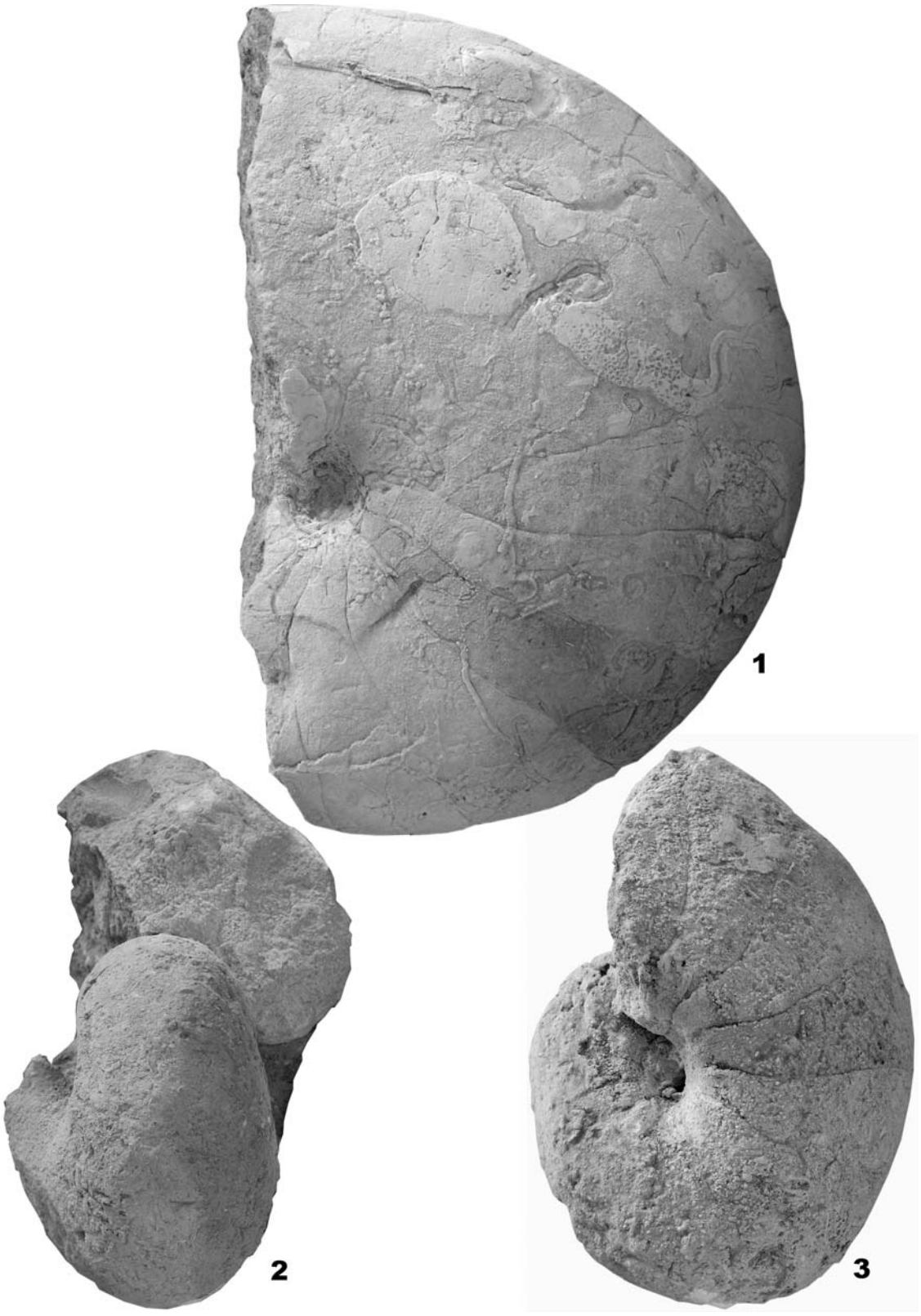
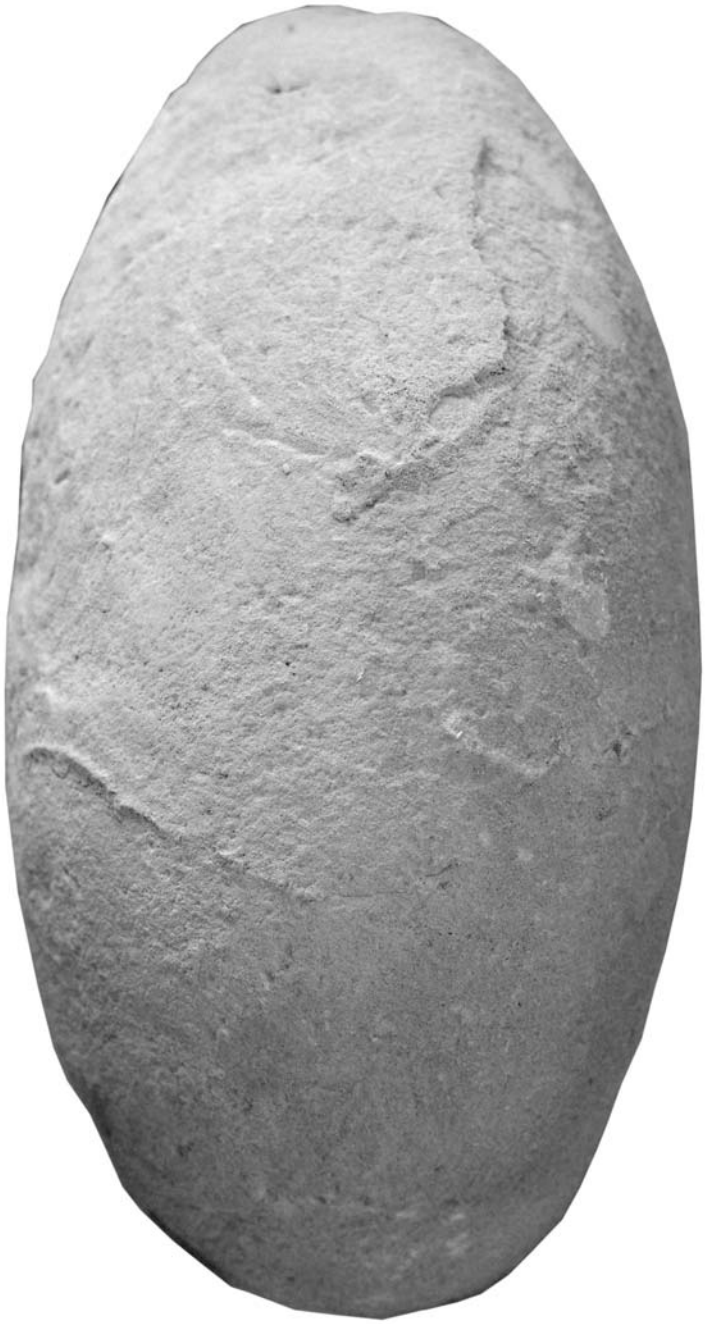


Fig. 1: *Cimomia parallela* (SCHAFHÄUTL, 1863) lateral view. Upper Eocene Piszke Marl, Piszke, collected by M. HANTKEN.TTKM A 0780.
Figs 2-3: *Eutrephoceras centrale* (J.SOWERBY 1812). Fig. 2: ventral view; Fig.3: lateral view. Middle Eocene 'intermedia limestone', Kolozsmonostor (near Cluj, Romania), collected by A. KOCH, 1884. From the collection of the Hungarian Geological Institute. All figures in natural size.

Plate 2

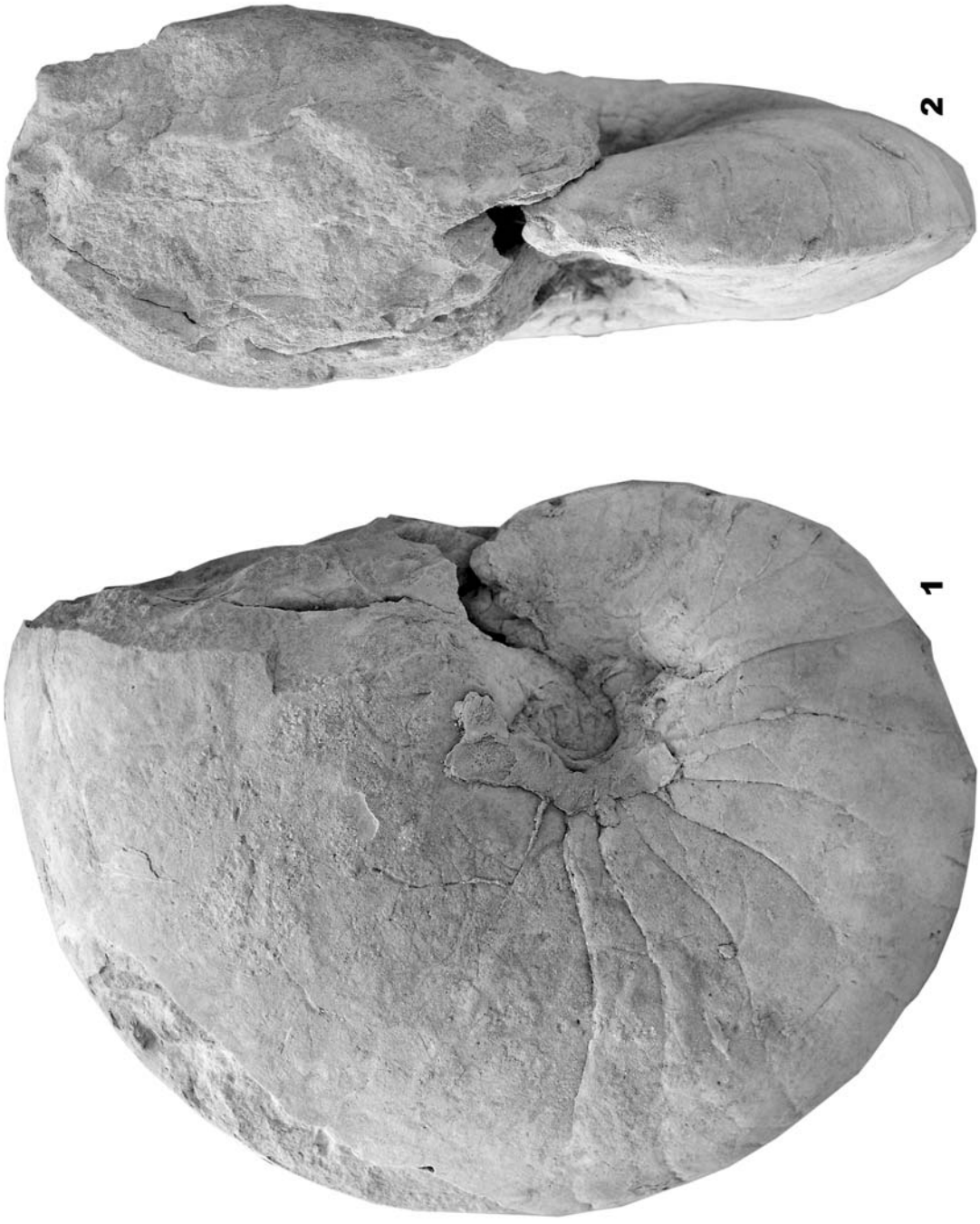
Eutrephoceras urbanus (J. de C. SOWERBY) lateral view. Upper Eocene Szépvölgy Limestone, Kissvábhegy Quarry, Budapest. TTKM A 0783. Ventral view see on Pl. 3. In natural size.

Plate 3



Eutrephoceras urbanus (J. DE C. SOWERBY) ventral view of specimen TTKM A 0783 on Pl.2. In natural size.

Plate 4



Figs 1-2: *Cimomia parallela* (SCHAFHÄUTL). Fig. 1: lateral view; Fig. 2: ventral view. Upper Eocene Piszke Marl, Piszke, collected by M.HANTKEN. TTKM A 0789. Original of text-fig. 2 of VOGL 1908, the cross-section of his *'Nautilus parallelus* SCHAFH. var. *acuta* n. var.'. X 0.9

Plate 5

Angulithes sowerbyi (WETHERELL) lateral view. Upper Eocene Piszke Marl, Piszke. TTKM A 0784. Original of text-fig 5 of VOGL 1908, the cross-section of his *'Nautilus Deluci* D'ARCH'. Ventral view see on Pl.6. In natural size.

Plate 6

Fig. 1: *Angulithes sowerbyi* (WETHERELL) ventral view of specimen TTKM A 0784 on Pl. 5.
Figs 2-3: *Euciphoceras regale* (J. DE C. SOWERBY). Fig. 2: Ventral view; Fig. 3: lateral view. Upper Eocene Szépvölgy Limestone, Kissvábhegy Quarry, Budapest, collected by T. SZONTÁGH, 1884. TTKM A 0791. Original of text-fig. 1 of VOGL 1908, the cross-section of his *'Nautilus regalis* SOW.'

All figures in natural size.

Plate 7

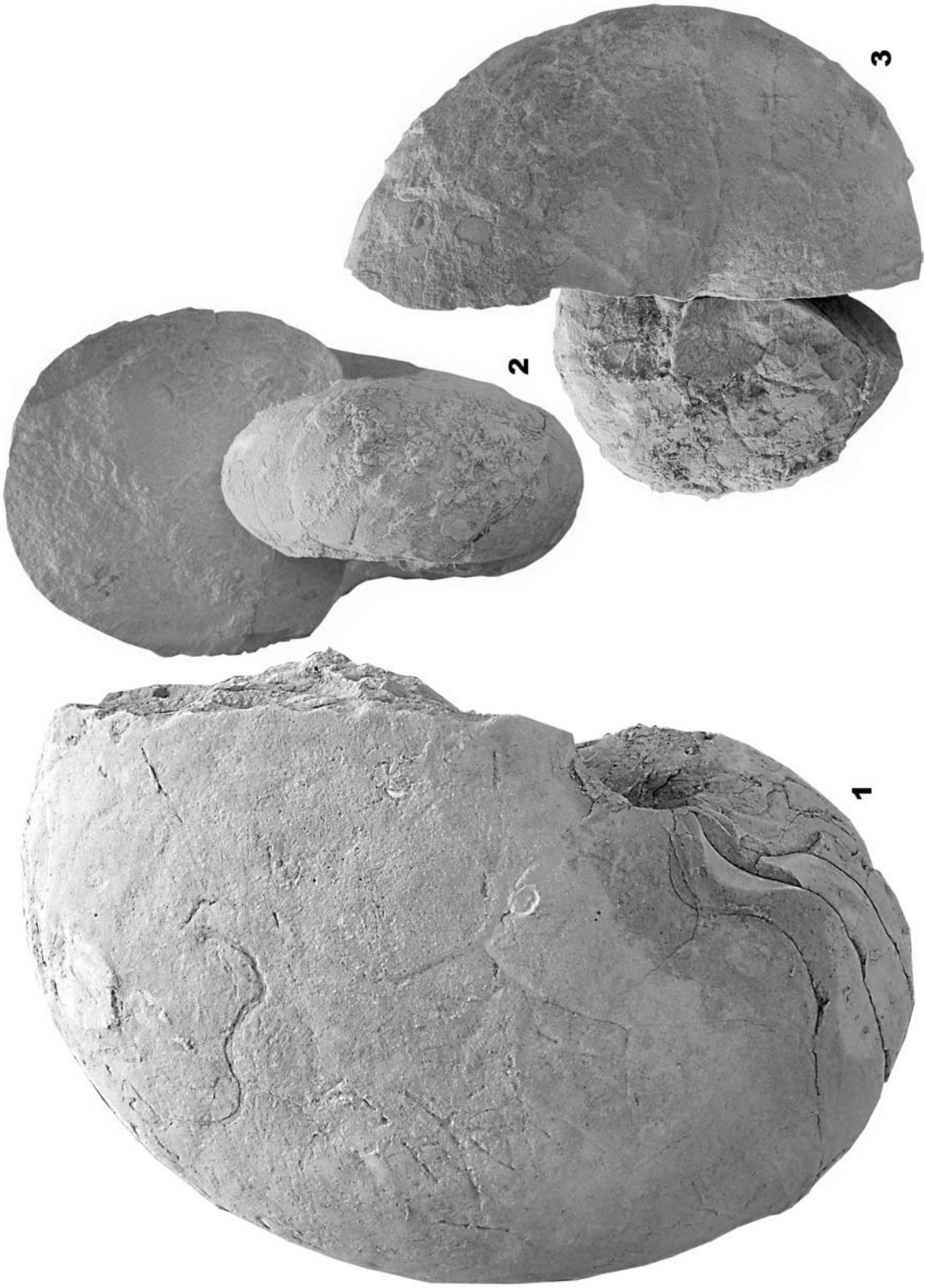


Fig. 1: *Cimomia* sp. lateral view. Upper Eocene Piszke Marl, Piszke, collected by M. HANTKEN. TTKM A 0787.
Figs 2-3: *Euciphoceras regale* (J. DE C. SOWERBY). Fig. 2: ventral view; Fig. 3: lateral view. Upper Eocene Szépvölgy Limestone, Kissvábhegy Quarry, Budapest, collected by K. HOFMANN, 1880. From the collection of the Hungarian Geological Institute. All figures in natural size.