

Taxonomical and nomenclatural revision of the *Nummulites* collection of M. Hantken

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(with 1 plate)

M. HANTKEN assembled a *Nummulites* collection of more than 1000 specimens in the second half of the 19th century. The items of this collection as special preparates are now kept in several European museums. Most of them are housed in the Earth and Palaeontological Department of the Hungarian Natural History Museum, and in the Natural History Museum of Eötvös University. The material of this collection of exceptional scientific value came from the most important localities of the Paleogene Tethys. A detailed taxonomical revision of the collection will be treated in a monograph to be published soon. This monograph gives the description of 43 taxa and illustrations on 20 photoplates. Here the most important taxonomical, phylogenetical, stratigraphical, palaeobiogeographical and science historical results are presented, supplemented with an excerpt from the revisional monograph giving the description and photoplate of one species: *Nummulites laevigatus* (Bruguière).

The Collection

The study of *Nummulites* is a very important part of HANTKEN's palaeontological oeuvre. He became interested in them in the late 1850s, when he was serving as mining engineer at the Eocene brown coal mine of Dorog (Transdanubia, Hungary). He started to work on them more intensively in 1861 only, starting their systematic collecting. It was in the same year that HANTKEN's friend and voluntary assistant, EDE ZSIGMOND MADARÁSZ prepared the first *Nummulites* sections.

They glued with Canada balsam the equatorial and transversal section of the chipped *Nummulites*, as well as a specimen displaying the surface, onto a circular glass plate. They fitted this into a black-bottomed hole in the middle of a thin wooden plate. They rimmed the preparate with shiny bluish violet paper and covered with green one. These were the so-called *green cassettes* that soon became well-known also abroad.

On the surface of the green cassettes, above the sections, the name and author of the taxon is indicated in printed or manual script. On most of them also the date of preparation (year, month, day) is indicated. On the back side there is a printed text "Collegerunt et praeparaverunt

Maximilian de Hantken et Sigismundus Eduardus de Madarász" (on some cassettes it is in Hungarian, not in Latin). The majority of the cassettes measure 50x70 mm, a minority 30x50 mm, and a few 26x76 mm. The number of sections embedded in Canada balsam is usually 3, but there are also green cassettes with 4 to 5, rarely 6-7 sections.

Thank to the intensive gathering and preparing work, by the early 1870s HANTKEN's collection has become so large and varied that to the World Exhibition in Vienna (1873) he could present a Collection of *Nummulites* consisting of 171 pieces. Its *Catalogue* ('Jegyzéke az 1873-ik évi bécsi világtárlaton kiállított *Nummulitok*nak. Pest, 1873') was printed also in German and Hungarian. Altogether 42 taxa are enumerated, 93 cassettes from 32 Hungarian localities and 78 cassettes from 43 foreign localities. The Collection was awarded the Golden Medal of the Exhibition.

As a matter of fact, the Collection contains much more specimens than the Catalogue. Several taxa are represented by numerous specimens (e.g. there are almost 100 *N. lucasana* and *N. striata*), while quite a number of species are not figured in

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the Catalogue (e.g. *N. lamarcki*, *N. baconicus*, *N. sismondai*, *N. deshayesi*, *N. cailliaudi*, *N. archiaci*, *N. fichteli*, *N. boucheri* and *N. budensis*).

The major part of the Collection went through a rather movemented history. The collection of the Budapest University was moved at least six times,

it was repeatedly rearranged, and in some cases was stored in humid rooms. As a consequence, its stock diminished, and its state deteriorated.

According to our present-day knowledge, the whereabouts of the cassettes is the following:

• Geological-palaeontological Department of the Hungarian Natural History Museum	511
• Department of Palaeontology, Eötvös L. University, Budapest	339
• Grammar School of the Calvinist College in Debrecen (Hungary)	224
• Natural History Museum, London (U.K.)	50
• University Babeş-Bolyai, Cluj / Kolozsvár (Rumania)	47
• Istituto di Geologia, Paleontologia e Geologia applicata dell'Università di Padova (Italy)	25
• Naturhistorisches Museum, Vienna (Austria)	24
• Musée de Géologie, Lausanne (Switzerland)	19
• Muséum National d'Histoire Naturelle, Paris (France)	1

The overall number of the known HANTKEN *Nummulites* cassettes is 1240.

Method of study

The first step was to identify and collect the material to be studied. Altogether 1240 green cassettes have been acquired from three collections in Hungary and six abroad (see above). The cassettes were labelled H (for HANTKEN) and a serial number running from 1 to 1240, in red, on both sides of the cassette was given, disregarding the signs of the owner museum. The duly labelled preparates were listed and master slips were made. All descriptions have been accurately copied, including the obvious misspellings and other errors. E. g. the name of the locality Magyar-Béla was not corrected to Magyar-Léta, neither the author's name Leymeric to Leymerie. Such corrections were made, reasonably, during the proper revision.

The second step was to look at the preservation state of the preparates. Relatively numerous preparates have been found to be unsuitable for investigation, due to their "adventures" and age (120-140 years): precipitation of humidity, cracks in the Canada balsam, broken plate, illegible script, etc.). A considerable number of preparates bore no locality name; these are scientifically irrelevant. Quite a number of preparates have been made from rocks, or from fossils other than *Nummulites*. These make up some 15 percent of the stock

altogether. At the end, 888 preparates have been found suitable for further study.

The following step was to reconstruct the *Nummulites* collection which have been established after D'ARCHIAC & HAIME (1853). From the available preparates several series could be compiled. However, neither of these are complete due to the absence of *N. distans* (not a single specimen has been found!).

The next task was to look for and identify the localities. A great majority of the 59 localities situated in historical Hungary and 77 foreign ones were easy to identify, several of them have become classic. However, some localities have been built in or ceased to exist. This means that the preparates are the only documents from those, in some cases renowned, localities (e. g. Piszke in the Gerecse Mts, Vaugirard in Paris). There are a few preparates that indicate the locality so vaguely (Himalayas, Persia, France, Belgium) that their value is rather limited.

Digital photographs were made of both generations of each taxon. These are stored in a computer data base, and are displayed on photo plates (general shape, equatorial and transversal sections).

Taxonomical revision

Recognizing and following HANTKEN's taxonomic procedure, two important points could be made.

(1) Unlike his contemporaries, HANTKEN based his determinations mainly on the internal features of the test.

(2) He did not work on pictures, but on a rich comparative material (probably this was the main reason of developing his own collection).

At the same time until the very end of his *Nummulites* studies he stucked to the one-generation approach of the taxa. Accordingly he described the A and B generations of a species as two separate species.

For this reason, the first step of my revision was to link together the dimorphous pairs and to name them in accordance with the nomenclatural rules. Table 1 shows the dimorphous pairs, while Table 2 the names given by HANTKEN and the valid ones that have resulted from the revision.

A necessary item of the revision was the description of the individual taxa. Fourty taxa have been described in much detail, a differential diagnosis has been given, and an illustration added. As an example the description and photodocumentation of *N. laevigatus* is presented here (Annex 1).

In the following we analyse the necessary and executed taxonomic changes in HANTKEN's groups that had been based on the work of D'ARCHIAC ET HAIME, 1853.

Group Nummulites laeves (smooth). HANTKEN ranged here eight taxa. Out of these, *N. complanata* and *N. Tchihatcheffi* are dimorphous pairs of the valid species *N. millicaput*. This is in close relationship with the big *N. distans* and *N. maximus*. Accordingly, these are taxonomically at the right place. *N. distans* would also belong here, but it could not be revised, since not a single specimen was found. Alien forms are *N. puschi* (to be ranged into the *laevigatus* group) as well as *N. gizehensis*, *N. lyelli* and *N. cailliaudi* which belong to the *partschi-lorioli-fabianii* group.

Group Nummulites reticulatae (reticular). This group is rather homogeneous. It consists almost exclusively the Priabonian members of the phylogenetic lineage *partschi-lorioli-fabianii*. These are: *N. fichteli* and its dimorphous pair *N. intermedia*, *N. fabiani* that comprises partly also *N. garansensis* and *N. molli*, and *N. archiaci* (designed by HANTKEN's handwriting as "nobis nov. sp."). Only *N. vicenzaensis* seems to be at the wrong place here. It would take some more investigation to find out the right place of this taxon which is represented by a few specimens only.

Group Nummulites subreticulatae (semi-reticular). This group is also fairly homogeneous. The closely related *N. laevigatus* (with its dimorphous pair *N. lamarcki*), *N. britannicus* and *N. scaber* (for HANTKEN: *scabra*). It is remarkable that *N. archiaci* displays some specimens that can be ranged here.

Group Nummulites punctulatae (punctuated). This group is heterogeneous. Its most common taxon is *N. perforatus*, with its generation A: *N. lucasanus*. While *N. perforatus* itself is a fairly well definiable taxon, the megasphaeric generation of *N. lucasanus* had been ranged into five "different" taxa: *N. perforatus*, *N. obesus*, *N. sismondai*, *N. deshayesi*, and *N. baconicus*. Well fit into this group: *N. praelorioli* with its A from *N. defrancei*, *N. aturicus* with its A form *N. rouaulti*, and *N. meneghinii*. On the contrary, *N. brongniarti* and *N. hungarica* have to be moved to the *laevigatus* lineage, and *N. curvispira* which is the megasphaeric generation of *N. gizehensis*, to the *partschi-lorioli-fabianii* group.

Group striatae (striped). This is the most heterogeneous group, and most of the taxa (altogether 14) belong to it. Here are to be found the two most variable collective taxa: *N. striatus* and *N. variolarius*. From *N. striatus* could be separated *N. anomalus* and *N. pulchellus*. Several specimens of *N. striatus* var. proved to be *N. variolarius*, *N. anomalus* and *N. zircensis*. Homogeneous taxa are *N. beaumonti*, *N. discorbinus* and *N. chavannesi* (with its A form the *N. rütimeyeri*). Rare are *N. bouillei* and *N. subramondi*, represented by its megasphaeric generation *N. ramondi*. *N. biarritzensis* may be regarded an important member of the lineage. (Also its A form, *N. guettardi*, has been identified). *N. subplanulatus*, described by HANTKEN as a new species, is richly represented. It has no phylogenetic relationship with *N. planulatus*, which belongs to the *laevigatus* group. *N. kovaciensis* is also common. Here belong also *N. vascus* (its generation A is *N. boucheri*) and *N. budensis* (described by HANTKEN). *N. irregularis* and its generation A, *N. murchisoni*, also fit into the *distans* lineage.

Group Nummulites planatae (flattened). This group comprises not *Nummulites*, but *Assilines*, recently called *Operculines*. Since this latter name is still controversial, in the present paper the name *Assilina* is used. The *Assilines* are rather varied, but this variation usually does not transcend the species boundaries. Most of the taxonomic problems were caused by *Ass. spira* and *Ass. exponens* (with its generation A, *Ass. mamillata*). The dimorphous pair *Ass. leymeriei-granulosa* and *Ass. placentula* are more stable taxa.

In the taxonomic work special problem was to describe and classify some taxa that were listed by HANTKEN but were not described by him. Here preliminary descriptions of the taxa – to be considered as *nomina nuda* – are given. The results of the revision are given in Table 2.

Although the main aim of our investigations was the taxonomic revision of HANTKEN'S *Nummulites* collection, during the revision quite a number of relationships and data were recognized,

which deserve attention from the phylogenetic, stratigraphic, palaeogeographic and science-historical points of view. In the following these relevant results are summed up.

Phylogenetic review

The data acquired during the taxonomic studies cast light on quite a number of phylogenetic relationships. With the help of these, HANTKEN'S taxa fit very well into the present author's sketch concerning the phylogenetic relationships of *Nummulites* (KECSKEMÉTI, 1987)

The taxa can be arranged in eight evolutionary lineages.

Lineage N. laevigatus. Its oldest member is the Cuisian *N. planulatus*. Out of this, straightly evolved the Early Lutetian *N. britannicus* and *N. scaber*, then the Late Lutetian *N. puschi*. Along a parallel lineage there are the Early Lutetian *N. laevigatus*, the Middle Lutetian *N. archiaci*, and finally the Late Lutetian *N. brongniarti* and *N. hungaricus*.

Lineage N. distans-irregularis starts with the Cuisian *N. distans*. It is closely followed by *N. irregularis*. The lineage is completed in the Late Lutetian with the big *N. millecaput*, *N. dufrenoyi* and *N. maximus*.

Lineage N. burdigalensis-perforatus. The taxa of this lineage are very well represented in the collection. The taxa set off in the Early Lutetian with two main branches and three minor ones. The *obesus* branch comprises *N. obesus* and the Late Lutetian *N. meneghinii*, the *aturicus* branch *N. aturicus*, followed by the Late Lutetian *N. perforatus*. The minor branches are represented by one species each, i.e. *N. baconicus*, *N. sismondai* and *N. deshayesi*.

Lineage N. globulus-variolarius-incrassatus. Its basic form is the Lutetian *N. variolarius*. At the

Lutetian/Priabonian boundary mainly small size taxa with loose spire evolve from it: *N. chavannesi*, *N. budensis*, *N. bouillei* and *N. vascus*. The last two pass even the Eocene/Oligocene boundary.

Lineage N. discorbinus. It is represented by the species *N. discorbinus* and the *N. zircensis* (separated from HANTKEN'S "*N. striata* var." taxon). These are parallel rather than successive taxa. Both characterize the Late Lutetian part of the lineage.

Lineage N. partschi-lorioli-fabianii is much more varied. Its two well-developed branches are: the Pirabonian *fabianii* branch, represented by *N. fabianii* and *N. fichteli*, and the Late Lutetian *gizehensis* branch, comprising *N. gizehensis*, *N. lyelli*, *N. cailliaudi* and *N. vicenzaensis*. There is a third, incomplete branch, represented solely by *N. praelorioli*.

Lineage N. striatus evolves from *N. biarritzensis* existing at the beginning of the Late Lutetian. From this evolves directly *N. striatus* (one of the most common taxa of the collection!), and along side branches *N. subplanulatus* and *N. kovacsensis*, and *N. pulchellus* and *N. beaumonti*, respectively. The phylogenetically fairly isolated *N. subramondi* has been ranged here with a question mark.

Lineage N. anomalus-stellatus, comprising small-size taxa with strongly arched septa, is represented by the Late Lutetian *N. anomalus* only.

Stratigraphic data

The most important stratigraphic result is the definitive datation of the index taxon *N. subplanulatus* as Middle Eocene. This is a species common in the immediate cover of the lowermost brown coal deposits of Eocene age in Hungary. Its in-depth taxonomic investigation has revealed that its internal structure represents a much more advanced level of evolution than that of the Early Eocene *N. planulatus*, which had been considered its dimorphous pair. It can be declared with certainty that *N. subplanulatus* is a species independent from *N. planulatus*, and it displays

resemblances with the Middle Eocene species *N. striatus*. Accordingly *N. subplanulatus* can be regarded as a Late Lutetian/Bartonian member of the *N. striatus* lineage. This is confirmed also by the accompanying fauna which is beyond doubt Middle Eocene in age. In this manner, the Middle Eocene age of the *N. subplanulatus*-bearing brown coal deposits is proved, and the half-a-century controversy is closed.

Another remarkable stratigraphic achievement is the establishment of two long-distance correlations. The analysis of the fauna of different

localities rendered possible the high-probability correlation of several localities situated far away from each other.

The comparative faunal studies have shown that the Upper Eocene beds of the following localities are of the same age and well correlable:

The Vicenza region (Priabona, Malo, Monte Serrano, Vicenza: Bella Guardia), – Várerdő-hegy at Solymár, Kisgyőr in the Bükk Mts, Kolozsvár/Cluj in the Transylvanian Basin (Hója Hill, Bácsorok, Gálcseré).

Dorog basin (Tokod, Dorog, Bajót, Mogyorós), – Zólyom/Zvolen basin (Zólyomlipcse/Slovenska Lupča, Bajmóc/Bojnice), – Turóc/Turcianske Basin (Turik, Blatnica): these are uniformly of Lutetian-Bartonian age.

One more stratigraphic precision: it could be shown that the brown coal deposits of Nagykovácsi and Dorog are of the same age.

Palaeobiogeographic observation

Almost all important localities of the Tethys are represented by taxa in the collection. Consequently, also some biogeographic relationships could be recognized, mainly between the different partial basins.

Based on the faunal composition it is obvious that there was direct marine connection and intensive biotic interchange between the basins of London (Bracklesham), Bruxelles (Bruxelles, Lacken), Paris (Vaugirard, Chaumont, Beauchamp, Auvers) and Kassel (there is a preparate in the collection labelled "Cassel" as its locality).

It is interesting also that on the basis of HANTKEN's collection comparison can be made

between the eastern and the western parts of the Tethys, relying upon the faunas of the Crimean peninsula and of the Pyrenees. It is amazing how far the fauna of Gamarde (Lesser Pyrenees) and of Sebastopol in the Crimea resemble each other. Even more astounding was the identical composition of the *N. gizehensis* faunas of Egypt (Cairo, Beni Hassan, Farafra), Northern Italy (San Giovanni Ilarione) and Felsőgalla in Hungary.

This type of comparison was originally not aimed at. But the short analysis made out of mere curiosity has pointed out how many new conclusions can be drawn based upon the information hidden in the more than 100 year-old collection.

History of science

No wonder this collection of high scientific value and esthetically high-standard presentation was awarded the Golden Medal of the 1873 Vienna World Exhibition. This medal can be seen in the director's conference room of the Geological Institute of Hungary (Budapest). The collection is widely known all over the world, since several museums and universities of Europe possess some part of it (see the chapter about the Collection).

The first preparate was made on December 6, 1861 by HANTKEN, most probably together with E. Z. MADARÁSZ. The last one was made in 1881.

About MADARÁSZ only scarce information is available. He was born 1822 in Pest, studied law, but never held an office, living from the rent of his houses. He devoted all his time to science. He was interested above all in microorganisms. He was in contact with KORNÉL CHYZER, TIVADAR MARGÓ, and JENŐ DADAY. For them, MADARÁSZ prepared numerous microscope drawings and preparates of artistic value. His name appears in print only in the

"Jegyzéke..." (*Catalogue*) of HANTKEN's Nummulites Collection. He died 1884 in Budapest.

The bulk of the Collection is kept in the two working places of HANTKEN, i.e. in the Geological and Palaeontological Department of the Hungarian Natural History Museum and in the Palaeontological Department of the Eötvös L. University (Budapest).

HANTKEN created this Collection with incredible diligence. He regarded it first of all as a material for comparison needed for his scientific studies. The material contained in the green cassettes was compiled from a much wider collection of several thousands of isolated specimens. Also this is kept at the Palaeontological Department of the Budapest University. I had the opportunity to study it; it represents a very great scientific value.

HANTKEN was in contact with all *Nummulites* experts of his time and with other renowned palaeontologists and geologists. Such were PH. DE LA HARPE, C. MUNIER-CHALMAS, C. SCHWAGER, K. ZITTEL, P. DESHAYES. He corresponded with

them, organized joint collecting trips, exchanged fossil material. In exchange for the fossils received he sent his beautiful preparates, which have become protected treasures of museums. Let me recall one typical case. When I asked the British Museum to send me for investigation HANTKEN'S preparates that are in their possession, I received

first only half of them. Only when this had been returned to the British Museum, did I receive the second part.

This exceptional scientific value is appreciated also in Hungary: the Ministry of National Cultural Heritage has declared it a protected collection.

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Table 1. The dimorphous pairs of taxa in HANTKEN's *Nummulites* Collection

Dimorphous pairs of <i>Nummulites</i>	<i>N. chavannesi</i> – <i>Rüttimeyeri</i>
	<i>N. vascus</i> – <i>Boucheri</i>
<i>N. complanata</i> – <i>Tchihatcheffi</i>	<i>N. biarritzensis</i> – <i>Guettardi</i>
<i>N. irregularis</i> – <i>Murchisoni</i>	<i>N. striata</i> – <i>contorta</i>
<i>N. gyzehensis</i> – <i>curvispira</i>	<i>N. subramondi</i> – <i>Ramondi</i>
<i>N. intermedia</i> – <i>Fichteli</i>	
<i>N. praelorioli</i> – <i>Defrancei</i>	Dimorphous pairs of <i>Assilina</i>
<i>N. fabianii</i> – <i>Molli</i>	<i>Ass. leymeriei</i> – <i>granulosa</i>
<i>N. laevigata</i> – <i>Lamarcki</i>	<i>Ass. exponens</i> – <i>mamillata</i>
<i>N. perforata</i> – <i>Lucasana</i>	
<i>N. aturicus</i> – <i>Rouaulti</i>	

Table 2. The taxa of HANTKEN's *Nummulites* Collection.

According to HANTKEN	After revision
Names printed in bold are not figured in the "Jegyzéke..." (Catalogue)	
I. <i>N. laeves</i> aut <i>sublaeves</i>	
<i>N. complanatus</i> D'ARCH. <i>N. Dufrenoyi</i> D'ARCH. (<i>partim</i>) <i>N. Dufrenoyi</i> D'ARCH. (<i>partim</i>) <i>N. Puschi</i> D'ARCH. <i>N. Tchihatcheffi</i> D'ARCH. (<i>partim</i>) <i>N. Tchihatcheffi</i> D'ARCH. (<i>partim</i>) <i>N. Tchihatcheffi</i> D'ARCH. (<i>partim</i>) <i>N. distans</i> DESH. <i>N. gyzehensis</i> EHRENB. <i>N. Lyelli</i> D'ARCH. (<i>partim</i>) <i>N. Lyelli</i> D'ARCH. (<i>partim</i>) <i>N. Cailliaudi</i> D'ARCH. et HAIME	<i>N. millecaput</i> BOUB. B <i>N. dufrenoyi</i> D'ARCH. et HAIME B <i>N. maximus</i> D'ARCH. B <i>N. puschi</i> D'ARCH. A <i>N. millecaput</i> BOUB. A <i>N. dufrenoyi</i> D'ARCH. et HAIME A <i>N. maximus</i> D'ARCH. A <i>N. gizehensis</i> (FORSKAL) B <i>N. gizehensis</i> (FORSKAL) B <i>N. lyelli</i> D'ARCH. et HAIME B <i>N. cailliaudi</i> D'ARCH. et HAIME A
II. <i>N. reticulatae</i>	
<i>N. intermedia</i> D'ARCH. (<i>partim</i>) <i>N. intermedia</i> D'ARCH. (<i>partim</i>) <i>N. vicenzaensis</i> nov. spec. <i>N. garansensis</i> JOLY et LEYM. (<i>partim</i>) <i>N. Molli</i> D'ARCH. <i>N. Fichteli</i> D'ARCH. <i>N. archiaci nobis</i> nov. sp. (<i>partim</i>)	<i>N. fichteli</i> MICHELOTTI B <i>N. fabianii</i> (PREVER) A <i>N. vicenzaensis</i> HANTK. et MAD. B <i>N. fabianii</i> (PREVER) A <i>N. fabianii</i> (PREVER) A <i>N. fichteli</i> MICHELOTTI A <i>N. fabianii</i> (PREVER) A
III. <i>N. subreticulatae</i>	
<i>N. laevigata</i> LAM. (<i>partim</i>) <i>N. laevigata</i> LAM. (<i>partim</i>) <i>N. britannica</i> nov. <i>N. scabra</i> LAM. <i>N. Lamarcki</i> D'ARCH. <i>N. archiaci</i> HANTK. et MAD. (<i>partim</i>)	<i>N. laevigatus</i> (BRUG.) A <i>N. obesus</i> D'ARCH. et HAIME B <i>N. britannicus</i> HANTK. et MAD. B <i>N. scaber</i> (BRUG.) A <i>N. laevigatus</i> (BRUG.) A <i>N. archiaci</i> HANTK. ET MAD. A
IV. <i>N. punctulatae</i>	
<i>N. Brongniarti</i> D'ARCH. <i>N. perforata</i> D'ORB. <i>N. hungarica</i> nov. spec. <i>N. Defrancei</i> D'ARCH. <i>N. Meneghinii</i> D'ARCH. <i>N. Rouaulti</i> D'ARCH. <i>N. Lucasana</i> DEFR. (<i>partim</i>) <i>N. Lucasana</i> DEFR. (<i>partim</i>) <i>N. Lucasana</i> DEFR. (<i>partim</i>) <i>N. Lucasana</i> DEFR. (<i>partim</i>) <i>N. Lucasana</i> DEFR. (<i>partim</i>) <i>N. curvispira</i> MENEGH. <i>N. Sismondai</i> D'Arch. et Haime	<i>N. brongniarti</i> D'ARCH. et HAIME B <i>N. perforatus</i> MONTF. B <i>N. brongniarti</i> D'ARCH. et HAIME B <i>N. praelorioli</i> HERB et SCHAUB A <i>N. meneghinii</i> D'ARCH. et HAIME A <i>N. aturicus</i> JOLY et LEYM. A <i>N. perforatus</i> MONT. A <i>N. baconicus</i> HANTK. et MAD. A <i>N. sismondai</i> D'ARCH. et HAIME A <i>N. obesus</i> D'ARCH. et HAIME A <i>N. deshayesi</i> D'ARCH. et HAIME A <i>N. gizehensis</i> (FORSKAL) A <i>N. sismondai</i> D'ARCH. et HAIME B

According to HANTKEN	After revision
<i>Names printed in bold are not figured in the "Jegyzéke..." (Catalogue)</i>	
<i>N. Deshayesi</i> D'ARCH. et HAIME	<i>N. deshayesi</i> D'ARCH. et HAIME B
<i>N. baconicus</i> HANTK. et MAD.	<i>N. baconicus</i> HANTK. et MAD. B
<i>V. N. plicatae vel striatae</i>	
<i>N. Ramondi</i> DEFR.	<i>N. subramondi</i> DE LA HARPE A
<i>N. Guettardi</i> D'ARCH.	<i>N. biarrizensis</i> D'ARCH. et HAIME A
<i>N. Beaumonti</i> D'ARCH.	<i>N. beaumonti</i> D'ARCH. et HAIME A
<i>N. Biarrizensis</i> D'ARCH.	<i>N. biarrizensis</i> D'ARCH. et HAIME B
<i>N. Kovácsiensis</i> nov. sp.	<i>N. kovacsensis</i> HANTK. et MAD. A
<i>N. striata</i> D'ORB. (<i>partim</i>)	<i>N. anomalus</i> DE LA HARPE A
<i>N. striata</i> D'ORB. (<i>partim</i>)	<i>N. zircensis</i> KECSKEMÉTI A
<i>N. striata</i> D'ORB. (<i>partim</i>)	<i>N. variolarius</i> (LAMK.) A
<i>N. striata</i> D'ORB. (<i>partim</i>)	<i>N. pulchellus</i> DE LA HARPE A
<i>N. striata</i> var. D'ORB. (<i>partim</i>)	<i>N. variolarius</i> (LAMK.) A
<i>N. striata</i> var. D'ORB. (<i>partim</i>)	<i>N. anomalus</i> DE LA HARPE A
<i>N. striata</i> var. D'ORB. (<i>partim</i>)	<i>N. zircensis</i> KECSKEMÉTI A
<i>N. contorta</i> D'ARCH.	<i>N. striatus</i> (BRUG.) B
<i>N. murchisoni</i> BRUNN.	<i>N. irregularis</i> DESH. A
<i>N. discorbina</i> D'ARCH.	<i>N. discorbinus</i> SCHLOTH. A
<i>N. irregularis</i> DESH.	<i>N. irregularis</i> DESH. B
<i>N. planulata</i> D'ORB.	<i>N. planulatus</i> (LAMK.) A
<i>N. subplanulatus</i> nov. sp.	<i>N. subplanulatus</i> HANTK. et MAD. A
<i>N. variolaria</i> SOW.	<i>N. variolarius</i> (LAMK.) A
<i>N. Rütimeyeri</i>	<i>N. chavannesi</i> DE LA HARPE A
<i>N. Bucheri</i> DE LA HARPE	<i>N. vascus</i> JOLY et LEYM. A
<i>N. budensis</i> HANTK.	<i>N. budensis</i> HANTK. A
<i>N. Bouillei</i> DE LA HARPE	<i>N. bouillei</i> DE LA HARPE A
<i>VI. N. explanatae</i>	
<i>N. exponens</i> SOW.	<i>Ass. exponens</i> SOW. B
<i>N. granulosa</i> D'ARCH.	<i>Ass. leymeriei</i> (D'ARCH. et HAIME) A
<i>N. placentula</i> DESH.	<i>Ass. placentula</i> (DESH.) A
<i>N. Leymeric</i> D'ARCH.	<i>Ass. leymeriei</i> (D'ARCH. et HAIME) B
<i>N. mamillata</i> D'ARCH.	<i>Ass. exponens</i> SOW. A
<i>N. spira</i> BOISY	<i>Ass. spira</i> (DE ROISSY) B

Annex 1

Excerpt from a revisional monograph on the Hantken Collection. References to plates are those as in that work. The illustrations to the description below are in Plate I at the end of this paper.

N. laevigatus (BRUGUIÈRE), 1792
Plate 1, Figs 164, 166, 173, 205, 208, 1033, 1174

1792 *Camerina laevigata*, BRUGUIÈRE, p. 399

1804 *Nummulites laevigata*, LAMARCK, p. 241, pl. 47, fig. 21

1853 *Nummulites laevigata* LAM., D'ARCH. ET HAIME, p. 103, pl. IV, fig. 1-3, form B

1853 *Nummulites Lamarcki* nov. sp., D'ARCH. ET HAIME, p. 109, pl. IV, 14-16, form A

1911 *N. laevigatus* BRUGUIÈRE, BOUSSAC, p. 58, pl. II, fig. 1-4, 6, 9, 19-21

1924 *N. laevigata* BRUGUIÈRE, ROZLOZNIK, p. 167-168, II tábla, 9-18, III. tábla, 1-2

1969 *N. laevigatus* (BRUGUIÈRE), PAVLOVEC, p. 12, 102, pl. 4

1972 *N. laevigatus* (BRUGUIÈRE), BLONDEAU, p. 127, pl.

VII, fig. 11-14, pl. VIII, fig. 1-4, pl. IX, fig. 1-2
1981 *N. laevigatus* (BRUGUIÈRE), SCHAUB, p. 171, pl. 60: 18-31, 38-44

Locus typicus: Paris Basin
Stratum typicum: Lower Lutetian

Form A

Dimensions: diameter: 6-7 mm, thickness: 3-4 mm.

The test is lenticular, the rim is slightly obtuse. There is a central bulge. On the surface tiny pillars are concentrated; these are somewhat bigger than those in the middle. The septum stripes form a loose network, more arched at the rim.

Equatorial section: the mean diameter of the initial chamber is 0.3 mm. The spire is regular. The "pas" (pace) is slightly growing outwards. The number of whorls at 3 mm radius is 4 to 5. The number of the slightly arched septa in one quarter of the circle in the 2nd whorl is 3, in the third 4, in the fourth 5. The chamber is higher than long, this tendency increases towards the rim.

Transversal section: there are spiral plates covering each other regularly, obtuse rim, central bulge are characteristic. The chambers are rather big, the chamber leaves are long. The pillars are well-developed, regularly arranged.

Form B

Dimensions: diameter: 11-14 mm, thickness: 3 to 4 mm.

The test is flat, lenticular, with a central bulge, the rim is obtuse. On the surface the septa form a network, particularly well-visible at the rim. The pillars are rounded, fairly thick.

Equatorial section: the spire is regular, the rate is increasing outwards. The number of whorls at a radius of 6 mm is 9 to 13. The number of septa in one quarter of the circle in the third whorl is 4, in

the fourth 5, in the fifth 6, in the sixth 8, in the seventh 9, in the eighth 10. The septa are slightly arched. The chambers in the middle part are almost isometric, towards the rim they become higher, their heights surpassing their length. The marginal cord is of uniform thickness.

Transversal section: elongate convex shape with rounded rim. Succession of pillars well-visible. Chamber leaf long, chamber holes large.

Differential diagnosis: *N. laevigatus* is phylogenetically related to the Early Lutetian *N. britannicus* and *N. scaber*, to the Late Lutetian *N. brongniarti* and *N. puschi*, as well as to the Priabonian *N. fichteli*. But it differs from *N. britannicus* with its more regular spire, from *N. scaber* with its flatter test and smaller megasphere, from *N. brongniarti* and *N. puschi* with its lesser number of whorls and chambers, with its looser spire; from *N. fichteli* with its bigger size and looser septum network.

Localities: Southern Bakony: Ajka, Csékút, Úrkút; Western Bakony: Nagy-Ganna; Paris Basin: Vaugirard, Bollen near to Soisson, Mouchy; Belgium: Bruxelles; Germany: Cassel; Near East: Monte Karmon.

Plate 1

N. laevigatus (BRUGUIÈRE) A 10x

205 Csékút (according to HANTKEN *N. lamarcki* D'ARCH.)
205a equatorial section

208 Csékút (according to HANTKEN *N. lamarcki*)
208a surface
208d equatorial section

1033 Ajka (according to HANTKEN *N. laevigata* LAM.)
1033 equatorial section

N. laevigatus (BRUGUIÈRE) B 5x
(according to HANTKEN *N. laevigata* LAM.)

164 Vaugirard
164b transversal section
164c equatorial section

166 Csékút
166a surface

167 Vaugirard
167b equatorial section

173 Soisson
173b equatorial section
173c equatorial section

1174 Paris
1174a equatorial section



