The provenance of stone tabernacle and altar table from the St. Emmeram's Cathedral (Nitra City)

Daniel Pivko

Department of Geology and Paleontology, Faculty on Natural Sciences, Comenius University, Mlynska dolina G, 842 15 Bratislava; pivko@fns.uniba.sk

AGEOS

Pôvod kamenného tabernákula a oltárnej dosky z Baziliky svätého Emeráma v Nitre

Abstract: An unique stone Renaissance tabernacle (1497) was discovered in the upper church of the St. Emmeram's Cathedral (Nitra) in the year 2007. The rocks from the tabernacle and probably altar table of the same age come from the Gerecse Mts. in northern Hungary. The parts of the tabernacle and altar table are from the Liassic red nodular limestone, which was quarried between Tardos and Lábatlan also in time when the tabernacle was made. On the basis of the stable oxygen and carbon isotope the analysed sample can be compared with the samples from Bányahegy quarry near Tardos and the samples from Late Gothic and Renaissance fountains and font of Matthias Corvinus king palace in Visegrád of the 15th century. Parts of the tabernacle are also from yellowish crinoidal limestone of the Lower Cretaceous which is probably from the Tata quarry. The altar table was prolonged to both sides by tuff from Obyce probably during the building of new Baroque main altar in the 18th century. "Gerecse red marble" was used almost in the same time in Gothic tombstone (1492) and Renaissance tabernacle (1497) both from the upper church of the St. Emmeram's Cathedral.

Key words: marble, limestone, St. Emmeram's Cathedral, tabernacle, Gerecse, Liassic, Cretaceous

1. INTRODUCTION

Renaissance tabernacle (1497) under baroque stucco was discovered in the upper church of the St. Emmeram's Cathedral in Nitra by the restoration team of Assoc. Prof. Vladimír Plekanec in the year 2007 (Fig. 1). The art-historical research was performed by Dr. Josef Medvecký, who appreciated it as a unique and the first Renaissance work in Slovakia and the first work of such type in Hungarian Kingdom (Medvecký, 2008). It was carved from two types of materials: red "marble" and yellowish "sandstone".

The samples for petrographic and provenance analysis were taken from both rocks. One sample was also taken from altar table of main altar of the upper church for comparison because the original table comes probably from the same period. From the red „marble" and the yellowish "sandstone" thin sections were made for microfacies study. Two samples of the red "marbles" were given to isotopic laboratory of the State Geological Institute of Dionýz Štúr in Bratislava for stable isotopes of oxygen and carbon.

Fig. 1. Early Renaissance tabernacle in the upper church of the St. Emmeram's Cathedral. Pilasters, top and bottom ledges were carved from yellowish crinoidal limestone, the inside part from red nodular limestone, both from northern Hungary.
Obr. 1. Ranno-renesančné tabernákulum horného kostola Nitrianskej katedrály. Pilastre, vrch a spodok sú vytesané zo žltkastého krinoidového vápenca, vnútro z červeného hľuznatého vápenca, obidva z Maďarska.

2. PETROGRAPHIC AND ISOTOPE ANALYSIS

From the petrographic point of view the red "marble" from tabernacle belongs to red nodular limestones of Jurassic age. The rock has two colours, lighter and less dark. The rock colours were compared with the colours defined in RAL colour range (RAL 1990). The lighter one is most similar to beige red RAL

Manuskript doručený: 22. septembra 2009
Manuskript revidovaný: 25. novembra 2009

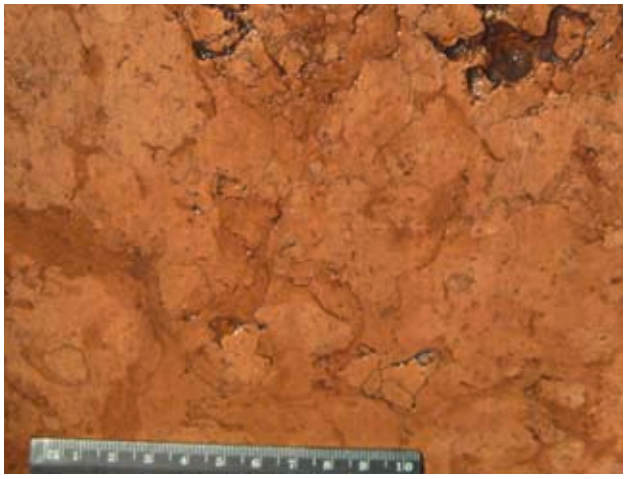

Fig. 2. Red "marble" from the tabernacle is most probably red nodular limestone of the Liassic age from the Gerecse Mts.
Obr. 2. Červený "mramor" z tabernákula je najpravdepodobnejšie červený hľuznatý vápenec liasového veku z pohoria Gerecse.

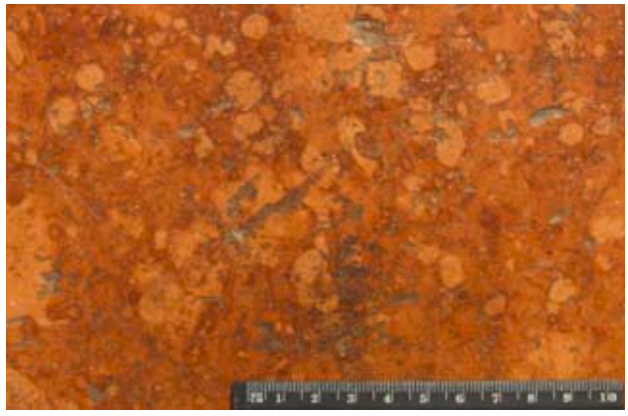

Fig. 4. Red „marble" from the altar table is most probably red nodular limestones of the Liassic age from the Gerecse Mts. Light small nodules are visible.
Obr. 4. Červený "mramor" z oltárnej dosky je najpravdepodobnejšie červený hľuznatý vápenec liasového veku z pohoria Gerecse. Viditeľné sú svetlé hľúzky.

3012 (eventually salmon pink RAL 3022), the darker one to RAL 8004 copper brown up to red brown RAL 8012 (RAL, 1990). The limestone contains large nodules (up to several cm) that are lighter then the matrix and have unsharp boundaries. In these nodules or outside them are smaller nodules (up to 1 cm) with thin dark rim (Fig. 2). One tile inside the tabernacle has unsharply limited bleached places, where large nodules appear darker. One fragment of ammonite was found.

According to microscopic study, the sample of the tabernacle is biopelmicrite (Folk, 1962) and wackestone (Dunham, 1962). The limestone contains mainly micritic matrix (up to about 68 %) in which peloids (at least 11 %), hardly identifiable fossils (at least 14 %), calcified sponge spicules (4 %) and other fossils (3 %) are scattered. Most of them are crinoid fragments, which probably create also the majority of hardly identifiable fossils, then spines of echinoids, foraminifers, ostracods and mollusc fragments (Fig. 3). Among foraminifers *Involutina liassica* was identified. Except of very fine calcite, the matrix contains also ferric hydroxides often accumulated in stylolites.

From geological point of view the red "marble" from altar table can be also ranked to red nodular limestones of Jurassic age. The rock colour is composed of three shades. The light colour is most similar to beige red RAL 3012 (eventually salmon pink RAL 3022), the darker one to RAL 8004 copper brow up to red brown

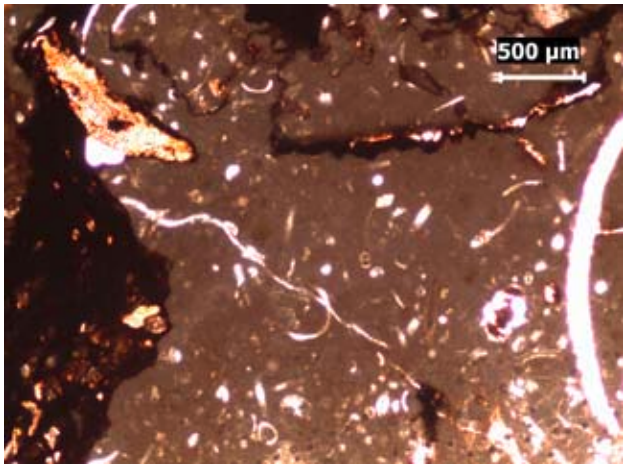

Fig. 3. Thin section of the Liassic red nodular limestone from the tabernacle. Biopelmicrite with crinoid fragments, peloids, calcified sponge spicules, foraminifers (*Involutina liassica*), ostracods and mollusc fragments.
Obr. 3. Liasový červený hľuznatý vápenec tabernákula vo výbruse. Biopelmikrit s úlomkami článkov krinoidov, peletami, kalcifikovanými ihlicami hubiek, foraminiferami (*Involutina liassica*), ostrakódami a úlomkami schránok mäkkýšov.

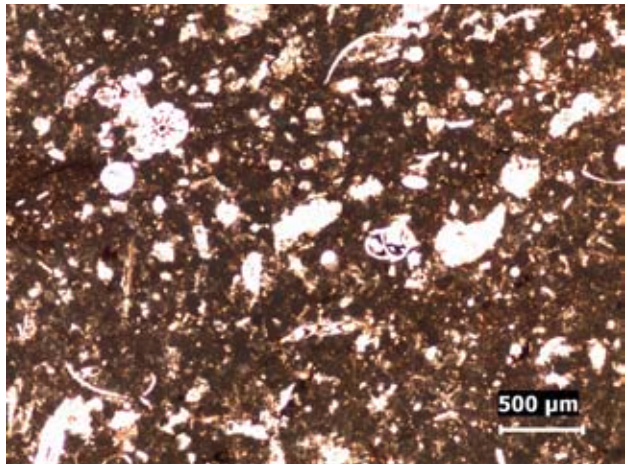

Fig. 5. Thin section of the Liassic red nodular limestone from the altar table. Biopelmicrite with crinoid fragments, peloids, foraminifers, ostracods and spines of echinoids.
Obr. 5. Liasový červený hľuznatý vápenec oltárnej dosky vo výbruse. Biopelmikrit s úlomkami článkov krinoidov, peletami, foraminiferami, ostrakódami a úlomkami echinoidov.

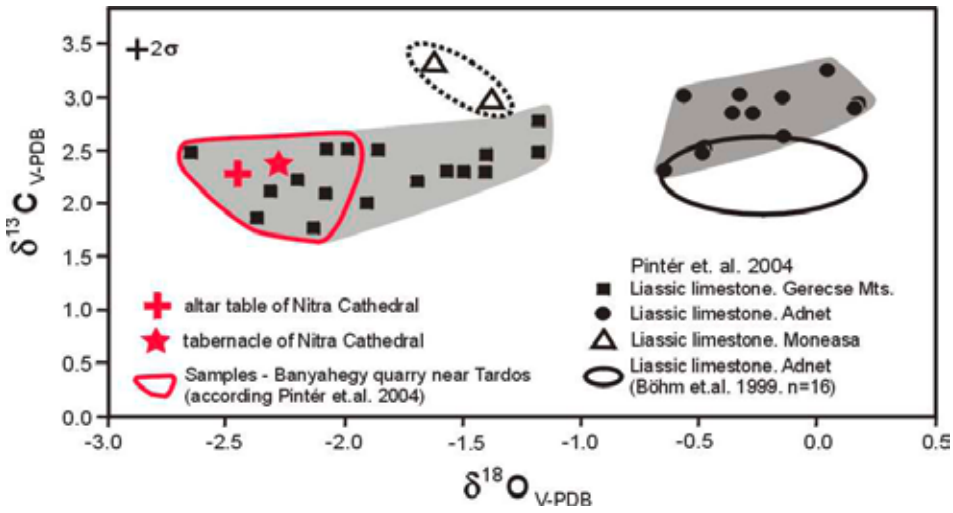

Fig. 6. Stable isotope values of the tabernacle and the altar table of the St. Emmeram's Cathedral compared with stable isotope values of the analysed samples from Hungarian, Austrian and Romanian quarries (according Pintér et al., 2004). Thick line in the left side of the picture encircles the samples from Bányahegy quarry near Tardos (according Pintér et al., 2004).

Obr. 6. Hodnoty stabilných izotopov z tabernákula a z oltárnej dosky Nitrianskej katedrály porovnané z hodnotami stabilných izotopov analyzovaných vzoriek z kameňolomov v Maďarsku, Rakúsku a Rumusku. Hrubá čiara v ľavej časti obrázka ohraničuje vzorky z kameňolomu Bányahegy pri Tardosi (podľa Pintéra et al., 2004).

RAL 8012. The lightest one is pale variety of beige red colour (RAL, 1990). The appearance of the limestone is similar to tabernacle. One part of the table contains small, quite sharply bordered oval and irregular nodules (up to 2 cm) scattered in darker matrix (Fig. 4). A fragment of ammonite is visible on the table.

According to microscopic analysis, the limestone of the altar table is biopelmicrite (Folk, 1962) and wackestone (Dunham, 1962). It contains mainly micrite matrix (46 %) including poorly identified peloids and very poorly preserved and dissolved fossils. In the matrix there are peloids (25 %), hardly identifiable fragments of fossils (17 %), crinoid fragments (8 %) and other fossils (about 4 %), including spines of echinoids, ostracod and mollusc fragments and foraminifers (*Nodosaria?, Dentalina?*) (Fig. 5). Along with very fine calcite, the matrix contains also ferric hydroxides.

The samples of red nodular limestones from the tabernacle and the altar table were analysed for oxygen and carbon stable isotopes. The tabernacle sample has values of

$$\delta_{Sa}{}^{18}O\ [PDB] = -2.28 \text{ and } \delta_{Sa}{}^{13}C\ [PDB] = 2.384$$

and the altar table sample of

$$\delta_{Sa}{}^{18}O\ [PDB] = -2.45 \text{ a } \delta_{Sa}{}^{13}C\ [PDB] = 2.307 \text{ (Fig. 6 and 7).}$$

Yellowish decorative stone from the tabernacle is at the first sight fine sandstone with weakly distinct lamination manifested by parallel jointing of rock (Fig. 8). The colour is light ivory RAL 1015 (up to beige RAL 1001) (RAL, 1990). The samples from lower and upper ledges do not scratch glass and strongly react with diluted HCl. Therefore the rock does not contain quartz (or minimally) and it is composed of calcium carbonate. The rock is very fine (to fine) about 0.1 mm, and consists of shiny flats of calcite grains and scattered dark grains that are visible macroscopically.

Thin section from the lower ledge showed that the rock represents biomicrite limestone (after Folk, 1962) and packstone (after Dunham, 1962). The rock can be identified as crinoidal limestone or calcarenite on the basis of dominant fossils. Micrite matrix (42 %) prevails in the sample and part of it may come from destroyed lithoclasts or fossils. Grains are mainly represented by disturbed hardly identified remnants of fossils (44 %). Among them, crinoidal fragments dominate (Fig. 9). Most of other fossils belong to fragments of mollusc shells and sponge spicules (5 %), bentic and planktonic foraminifers (3 %). There are also spines of echinoids, red algae, hydrozoa, ostracoda, bryozoa and other fossils (together 3 %). Among foraminifers there are rotalinid forms, *Globigerina* (?) and *Heterohelix* (?). Clastic quartz is in small amount (about 1 %). The fossils have 0.1-0.4 mm (max. 0.6 mm) size what matches fine- to medium-grained calcarenite. The limestone is very well sorted.

3. INTERPRETATION OF THE RESULTS

The samples from the tabernacle and the altar table belong to the Jurassic on the basis of macroscopic features, e.g. ammonite remnants. The occurrence of *Involutina liassica* confirms the Liassic age. The microfacies with described fossil association is more similar to the microfacies described for the Liassic red nodular limestones from the Gerecse Mts. in Hungary and less for the Liassic red nodular limestones from Adnet in Austria (Pintér et al., 2004).

The studied nodular limestones are most probably the Hettangian to Sinemurian nodular limestones (ammonitico rosso) of the Pisznice Limestone Fm. (Pisznicei mészkő) from

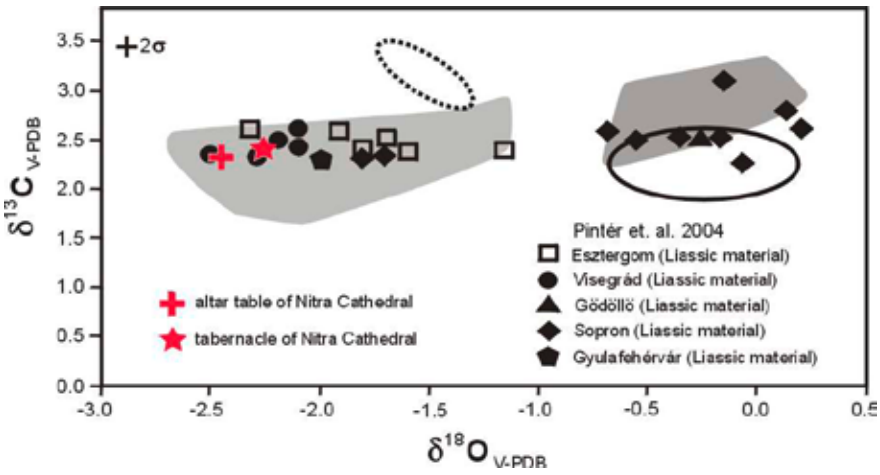

Fig. 7. Stable isotope values of the tabernacle and the altar table of the St. Emmeram's Cathedral compared with stable isotope values of the Hungarian archeological objects and with Hungarian, Austrian and Romanian quarries. Black circles are the samples of red „marbles" coming from Matthias Corvinus king palace in Visegrád (last quarter of the 15th century) (according Pintér et al., 2004).

Obr. 7. Hodnoty stabilných izotopov z tabernákula a z oltárnej dosky Nitrianskej katedrály porovnané z hodnotami stabilných izotopov uhorských archeologických objektov a z kameňolomami v Maďarsku, Rakúsku a Rumusku. Čierne krúžky sú vzorky červeného "mramoru" z kráľovského paláca Mateja Korvína vo Vyšehrade (posledná štvrtina 15. stor.) (podľa Pintéra et al., 2004).

the Gerecse Mts. (Haas, 2005). In Hungary the decorative stone of these limestones is named as Gerecsei vörös márvány (red marble) or less Gerecsei vörös mészkő (red limestone). The best suitable localities are Bányahegy near Tardos village, Nagypisznice and Kisgerecse south from Lábatlan town (Pintér et al., 2004). Similar material to the Nitra tabernacle is Adnet red nodular limestone from vicinity of Salzburg in Austria, by stonemasons marked as Adnet marble. It belongs to the Sinemurian Lienbacher Mb. of the Adnet Fm. (Delecat, 2005). Unlike the studied red nodular limestones Lienbacher type of Adnet limestone is striking by tiny round irregular bleach places (Kieslinger, 1964). Macroscopically it has almost always calcite veins, it is typically little bit darker, usually without visible remnants of ammonites. The Lienbacher type has better preservation of fossils under microscope. It usually does not contain peloids.

Jurassic red nodular limestones and similar ones used as decorative stones come also from northern Slovakia, Romania (Moneasa) and Italy (Verona). Slovakian red nodular limestone of the Pieniny Klippen Belt was quarried in vicinity of Stará Ľubovňa town for probably Gothic and Renaissance tombstones of eastern Slovakia region, but it is of the Upper Jurassic age. Romanian limestone from Moneasa is from the Liassic but it is distinctly crinoidal. Nodular limestone from Verona in Italy is of the Middle Jurassic age. The last two limestones were used in Slovakia in the second half of the 20th century.

The relation of the studied stones to the Hungarian or the Austrian Liassic localities can be unabiquously assigned on the basis of stable isotopes of oxygen and carbon (Pintér et al., 2004). The result of the measured values of stable oxygen and carbon isotope (see Fig. 6 and 7) is that the both analysed samples belong to the field of red "marbles" from the Gerecse Mts. (Fig. 6). If compared with the values published in the article of Pintér et al. (2004), Nitra samples are probably from Bányahegy quarry near Tardos. From Fig. 7 it follows that red "marbles" from Bányahegy locality (according Pintér et al., 2004) were used in the last quarter of the 15th century for Late Gothic and Renaissance fountains and font of Matthias Corvinus king palace in Visegrád.

The mentioned fossil community (especially some foraminifers and red algae) and general nature of the yellow crinoidal limestone of the tabernacle correspond to the Lower Cretaceous. The limestone was probably deposited in sublitoral environment with good sorting of shallow marine organisms. The analysed rock is the most related to Tata Limestone Formation (Tatai mészkő) from the northern Hungary (Trunkó, 1996), which was deposited in shallow sea on the Lower and the Upper Cretaceous border (Aptian to Albian). According to Schafarzik (1904) similar limestones were quarried in Tata where block size was 0.75 – 2 m^3. In Slovakia and Hungary there are other types of the Lower Cretaceous sediments with abundant crinoids but they were deposited in deeper water.

4.GERECSE „RED MARBLE" USING IN HISTORY

According Lővei (1992) Gerecse „red marble" was used in the Middle ages in Hungarian kingdom for making of tombstones from last quarter of the 12th to 70's of the 13th century, then from half of the 14th to the 16th century. According to historical sources the quarries were closed during the Turkish occupation (1526-1686). In Poland of the 14th up to the 16th century, Gerecse „red marble" was also used (Procyk, 1998). During the Turkish occupation "red marbles" from Adnet near Salzburg in Austria were transported along the Danube river to the western Slovakia. In this time, eastern Slovakia had its own source of such type. It was red nodular limestone of the Upper Jurassic

Fig. 8. Yellowish sandstone from the tabernacle of the St. Emmeram's Cathedral is crinoidal limestone (sandstone), Tata Limestone Fm. which was formed in middle part of the Cretaceous. It comes most probably from the northern Hungary.
Obr. 8. Žltkastý pieskovec z tabernákula Nitrianskej katedrály je krinoidový vápenec (pieskovec), zo súvrstvia Tata, ktoré bolo vytvorené v strednej časti kriedy. Najpravdepodobnejšie pochádza zo severného Maďarska.

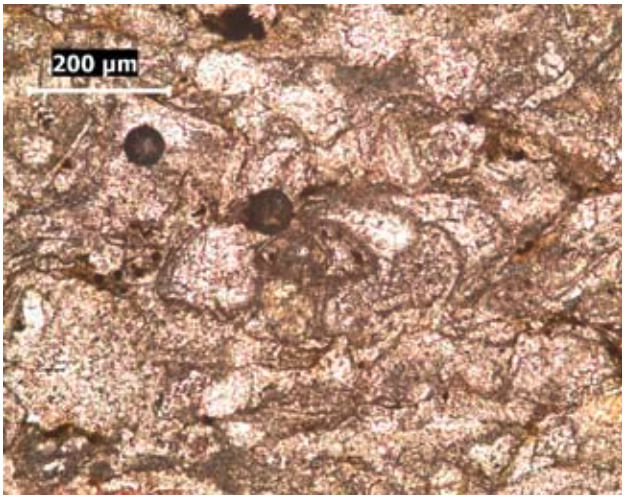

Fig. 9. Thin section of crinoidal limestone (sandstone), probably Tata Limestone Fm. Biomicrite with crinoid fragments, foraminifers, mollusc fragments and sponge spicules.
Obr. 9. Výbrus krinoidového vápenca (pieskovca) pravdepodobne zo súvrstvia Tata. Biomikrit s úlomkami krinoidových článkov, foraminiferami, úlomkami schránok mäkkýšov a ihlicami hubiek.

from Stará Ľubovňa vicinity. This limestone was used probably in southern Poland.

Gerecse „red marble" was also applied for tombstones in Hungary kingdom in 80's to 90's of the 15th century, the same time when the tabernacle (1497) from the St. Emmeram's Cathedral was finished. From the "red marble" e.g. Gothic tombstones from Spišská Kapitula Cathedral (1487 a 1499), St. Emmeram's Cathedral (1492), Košice townhall (1492) and Lipany church (1493) were probably made (Fig. 10). Most probably, from the red Gerecse marble the Renaissance plastic art was made, such as Visegrád madonna from 80's, fragment of frieze with dolphin from 90's of the 15th century, also the tabernacles from Inner City Parish Church of Budapest (1503-6 and 1507), the tabernacle from Pécs Cathedral (1506-10) and Bakócz Chapel of Esztergom Cathedral (1506-8). The information comes from electronic catalogue of Fine Arts in Hungary (www.hung-art.hu).

Fig. 10. Simple late gothic tombstone (1492) of the upper church of the St. Emmeram's Cathedral made probably from red nodular limestone from Gerecse Mts. In dark red-brown matrix, ligher nodules are scattered.
Obr. 10. Jednoduchý neskoro gotický náhrobník (1492) v hornom kostole Nitrianskej katedrály. Vyrobený je pravdepodobne z červeného hľuznatého vápenca z pohoria Gerecse. V tmavo červenohnedej základnej hmote sú rozptýlené svetlejšie hľuzy.

5.CONCLUSION

The rocks from which Renaissance tabernacle and also altar table in the upper church of the St. Emmeram's Cathedral were made come most probably from the northern Hungary, from the Gerecse Mts. Parts of the tabernacle and altar table were cut from the Liassic red nodular limestone, which was quarried between Tardos and Lábatlan in the Gerecse Mts. also in time when the tabernacle was made. On the basis of the stable oxygen and carbon isotopes the analysed sample can be compared with the samples from Bányahegy quarry near Tardos and the samples from Late Gothic and Renaissance fountains and font of Matthias Corvinus king palace in Visegrád of the 15th century. Parts of the tabernacle are also from yellowish crinoidal limestone (sandstone) of the Lower Cretaceous that is probably from Tata (Gerecse Mts.).

An interesting thing is that the Gerecse red marble was used at almost the same time for Gothic tombstone (1492) and Renaissance tabernacle (1497) both from the upper church of St. Emmeram's Cathedral.

Acknowledgements: The author wishes to express his thanks for the financial support of the grants APVV-0465-06 and APVV 0280-07, for help and ideas thanks to Assoc. prof. M. Sýkora, Assoc. prof. R. Aubrecht and Dr. Š. Józsa from Department of Geology and Paleontology of Faculty of Natural Sciences of Comenius University in Bratislava. The main thanks belong to God.

References

Delecat S., 2005: Adnet. In: Pálfy J. & Ozsvárt P. (Eds.): Program, Abstracts and Field Guide. 5th Field Workshop of IGCP 458 Project. T-J boundary events recorded in platform to basinal marine depositional environments of the western Tethys (Tata and Hallein, September 2005), A15-25.

Dunham R. J., 1962: Classification of carbonate rocks according to depositional texture. In: Ham (Ed.): Classification of Carbonate Rocks. Memoir 1, American Association of Petroleum Geologists, 108-121.

Folk R. L., 1962: Spectral subdivisions of limestone types. In: Ham (Ed.): Classification of Carbonate Rocks. *Memoir, American Association of Petroleum Geologists,* 1, 62-85.

Haas J., 2005: Kálvária Hill, Tata – a geological park – Mesozoic section including the T-J boundary. 5th field workshop IGCP 458 project Tata (Hungary). Puch bei Hallein (Austria), Field guide. H3-H9.

Kieslinger A., 1964: Die nutzbaren Gesteine Salzburgs. Berglandbuch, 436 p.

Lővei P., 1992: A tömött vörös mészkő – „vörös márvány" – a középkori magyarországi művészetben. *Ars Hungarica*, 20, 2, 3-29.

Medvecký J., 2008: Early Renaissance tabernacle from the year 1497 in Nitra. *Pamiatky a múzeá,* 57, 3, 28-30. (in Slovak).

Pintér F., Szakmány G., Demény A. & Tóth M., 2004: The provenance of „red marble" monuments from the 12th-18th centuries in Hungary. *European Journal of Mineralogy,* 16, 4, 619-629.

Procyk W., 1998: Marmury królewskie: zjawisko wietrzenia i problemy konserwacji. Cz. 1. Akademia Sztuk Pięknych w Warszawie. Wydział Konserwacji i Restauracji Dzieł Sztuki. Warszawa, 57 p.

RAL 1990: Farbenübersicht. Bonn, Ernst Peter and Sohn, 12 p.

Schafarzik F., 1904: A magyar korona országai területén létező kőbányák részletes ismertetése. Budapest: A Magy. Kir. Földtani Intézet kiadványai, 413 p.

Trunkó L., 1996: Geology of Hungary. Berlin,Stuttgart, Gebrüder Borntraeger, 464 p.

Resumé: V roku 2007 bolo počas reštaurovania objavené v hornom kostole Baziliky sv. Emeráma v Nitre renesančné tabernákulum s rokom 1497. Vytesané je z červeného hľuznatého vápenca a žltkastého piesčitého vápenca. Z obidvoch materiálov boli odobraté vzorky na petrografickú analýzu z výbrusov kvôli určeniu pôvodu hornín. Na porovnanie bola odobratá i vzorka červeného hľuznatého vápenca z oltárnej dosky hlavného oltára v hornom kostole. Dve vzorky hľuznatých vápencov boli vyhodnotené na stabilné izotopy kyslíka a uhlíka.

Červené hľuznaté vápence obsahujú veľké svetlejšie neostro ohraničené hľuzy a malé ostro ohraničené tmavo okontúrované hľúzky. Na oltárnej doske sú i drobné svetlé hľúzky a fragmenty amonitov. Mikroskopicky sú to biopelmikritové vápence a wackestone. Základná hmota obsahuje okrem veľmi jemnozrnného kalcitu i oxidy a hydroxidy železa. Vzorka z tabernákula má prevahu mikritovej základnej hmoty (68 %), v ktorej plávajú pelety (11 %), ťažko identifikovateľné úlomky fosílií (14 %), kalcifikované ihlice hubiek (4 %) a iné fosílie (3 %), z ktorých je najviac krinoidových článkov, zrejme tvoria i najväčšiu časť ťažko identifikovateľných fosílií. Vzorka z oltára obsahuje prevahu mikritovej základnej hmoty (46 %), včítane zle identifikovaných peliet a veľmi zle zachovaných a rozpustených fosílií. V základnej hmote plávajú pelety (25 %), ťažko identifikovateľné úlomky fosílií (17 %), články krinoidov (8 %) a iné fosílie (okolo 4 %). K ním patria u obidvoch vzoriek ostne ježoviek, ostrakódy, úlomky lastúrnikov a foraminifery. Zo vzorky z tabernákula vyšli hodnoty stabilných izotopov kyslíka a uhlíka: $\delta_{Sa}{}^{18}O$ [PDB] = -2,28 a $\delta_{Sa}{}^{13}C$ [PDB] = 2,384 a z oltárnej dosky: $\delta_{Sa}{}^{18}O$ [PDB] = -2,45 a $\delta_{Sa}{}^{13}C$ [PDB] = 2,307.

Žltkastý piesčitý vápenec má náznak laminácie. V mikroskope ide o dobre triedený biomikritový vápenec a packstone. Podľa prevládajúcich fosílií možno horninu nazvať ako krinoidový vápenec alebo kalkarenit. Vo vzorke prevažuje mikritová základná hmota (42 %), ktorá môže čiastočne pochádzať aj z porušených litoklastov alebo fosílií. Zrná tvoria hlavne narušené, ťažko identifikovateľné zvyšky fosílií (44 %). Medzi nimi prevažujú fragmenty článkov krinoidov. Z ostatných fosílií je najviac úlomkov schránok mäkkýšov alebo ihlíc hubiek (5 %), bentických a planktonických foraminifer (3 %), ostňov ježoviek, červených rias, hydrozoí, ostrakód, machoviek a iných fosílií (3 %). Medzi foraminiferami sú rotalidné formy (*Globigerina* ? and *Heterohelix* ?). Klastického kremeňa je málo (1 %). Fragmenty fosílií majú veľkosť 0,1-0,4 mm (max. 0,6 mm), čo zodpovedá jemno- až strednozrnnému pieskovcu. Spomínaná asociácia fosílií najmä niektoré foraminifery a červené riasy a celkový charakter horniny napovedá na spodnú kriedu. Vápence pravdepodobne vznikali v sublitorálnom prostredí s dobrým triedením plytkomorských organizmov. Hornina je najbližšia tatským vápencom (Tatai mészkő) zo severného Maďarska, ktoré sa tvorili v plytkom mori na rozhraní aptu a albu. Podobné vápence s vyťažitelnosťou veľkých blokov sa získavali v Tate.

Hľuznaté vápence z tabernákula a oltárnej dosky majú liasový vek na základe makroskopických črt, zvyškov amonitov a výskytu *Involutina liassica.* Mikrofácie sú podobné hetanžsko-sinemúrskemu hľuznatému vápencu z pohoria Gerecse z Maďarska (pisznický vápenec) a menej sinemúrskemu hľuznatému vápencu z Adnetu v Rakúsku (lienbachský člen andnetského súvrstvia), ktorý má niektoré odlišné znaky od skúmaných vápencov ako drobné svetlé vybielenia, kalcitové žilky, zvyčajne bez viditeľných amonitov, lepšie zachovanie fosílií a bez peliet vo výbruse. Jednoznačná príslušnosť sledovaných vzoriek k maďarským lokalitám bola preukázaná meraním stabilných izotopov O a C. Porovnaním s grafmi vzoriek z pohoria Gerecse, vyšla lokalita Bányahegy pri Tardosi, odkiaľ sa vápence z tejto lokality použili v poslednej štvrtine 15. stor. pre výrobky do kráľovského paláca Mateja Korvína vo Visegráde.

V Uhorsku bol liasový hľuznatý vápenec z lokalít v pohorí Gerecse, nazývaný ako „Gerecsei vörös márvány" (gerečský červený mramor), používaný od konca 12. storočia až do tureckej okupácie južnej časti krajiny v 16. storočí. Od 14. stor. bol využívaný i v Poľsku. Počas tureckej prítomnosti sa do západnej časti Slovenska dovážal po Dunaji liasový hľuznatý vápenec od Salzburgu v Rakúsku so zaužívaným názvom „adnetský mramor". Na východe Slovenska sa vtedy ťažil vrchnojurský červený hľuznatý vápenec z bradlového pásma z okolia Starej Ľubovne. V 2. polovici 20. storočia sa používali liasový silne krinoidový vápenec Moneasa z Rumunska a taliansky strednojurský vápenec z Verony. V čase vzniku tabernákula v nitrianskej bazilike (1492) na konci 15. stor. a začiatkom 16. stor. sa „gerečský červený mramor" využíval na vyrábanie náhrobníkov, napr. gotické náhrobníky v katedrále v Szepeshely, v Nitre, pravdepodobne v Spišskej kapitule, v Košiciach, v Lipanoch a v Krakove. Z tohoto materiálu sú i renesančné plastiky Višegrádska madona, fragment vlysu s delfínom, i pastofória z kostola v Budapešti a katedrály v Pécsi. V hornom kostole Nitrianskej baziliky je na konci 15. stor. prechod od gotiky (náhrobník 1492) do renesancie (tabernákulum 1497).