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The Exploitation of Stone in Roman Dacia

PhD thesis - Abstract

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2022

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Key words: Antiquity, roman era, Roman Empire, province of Dacia, Dacia Porolissensis, Dacia Superior, Dacia Inferior, exploitation of stone, quarry, tools used in the extraction and carving of stone, exploitation techniques, geological analysis, construction materials, the corpus of quarries.

Abstract

At the time of its occupation and integration, the territory of Dacia has become a participant in the main course of the history of European antiquity. The roman domination represented the emergence of a new type of civilisation, superior in all of its aspects to all those existing before. The small and poor settlements, the fortifications positioned on hights and the rare pathways of the prehistoric period has vanished to be replaced by a series of towns, civil settlements, military ensembles, the most of which has been placed on easily accessible, lower sites, incorporating a huge number of constructions, including palaces and houses, sanctuaries and temples, baths, aqueducts, villas, annexes, etc., all of which become connected by a unified network of roads and watchtowers. To make all these constructions, there was a need for a single and simple raw material: stone. Fortunately, thanks to its geological characteristics of the freshly occupied territory, stone was available abundantly. Consequently, in a short period of time after the consolidation of the new province, the engineers of the empire had started to localise and to extract it, founding a series of quarries in the mountainous areas. During the time of the roman domination, stone represented the basic raw material for all type of constructions. This single fact, as we assume, justifies the importance and necessity of the studying the research of this theme, in all of its aspects.

Starting from the results of these researches, in this study I tried to register the current stage of knowledge related to the exploitation of stone in the territory of Roman Dacia. The diversity and profoundness of the theme, and the incompleteness of the information, is reflected in the contents as well as in the structure of the thesis, as certain aspects are more well known, whilst others are still being in the initial stage of studying.

The thesis is structured around three major parts, divided into chapters and subchapters, each chapter being dedicated to a certain aspect of studying the subject.

After the first, introductory part, the second one presents in detail the known and used methods and techniques for studying quarries in the roman era. In this field there are lot of questions, to which sometimes it is very difficult if not impossible to find an answer. In the case of the larger quarries, due to the modernization of the extraction techniques, like the use of

explosives and heavy equipment, generally the traces of roman quarrying have been reduced or have disappeared totally. In the case of the smaller, local quarries, it the major challenge remains to date them to a certain period. In order to find answers, evidence or to substantiate certain theories based on the data collected during field research and the special literature, it is a must to appeal to multidisciplinary methods, reaching equally to the domain of the humanities as well as to the natural and formal sciences, in order to find a solution for special problems. This chapter is divided into four subchapters, each of which is dedicated to a certain aspect, covering the possibilities from documentary research, towards field researches and interdisciplinary methods, and concluding the chapter with the potentials of petrographic analysis, including a case study from Porolissum on this matter as well.

In the third chapter, I present the exploitation of stone in the Roman Empire, with a special attention to roman Dacia, divided into four subchapters.

In the first subchapter were analysed the information provided by the ancient authors on the lithic materials and on the quarries of the empire. From them and from those, whose works survived till our times, we need to highlight two names, Vitruvius and Plinius the Elder. While treating this subject, Vitruvius was preoccupied mostly with the aspects concerning his own profession, engineering, approaching more practical questions in the making of constructions out of stone. Plinius attempted to make very comprehensive descriptions, in some cases indeed discussing certain details really thoroughly. Concerning quarrying, he offers a series of information on the origins and different types of marble, quarrying locations, mentioning even some well-known specialists, related to extraction techniques or sculpting. However, Plinius's aim was to write a short encyclopaedia "on the nature of rocks", accentuating their aspects and characteristics. All in all, although he is not offering too much specific information on the exploitation of stone, this work is essential in the study of marble quarries in the Roman Empire.

In the second subchapter, I presented generally the methods and techniques of processing the stone. Quarrying and sculpting are traditional crafts, the methods and techniques of which present a lot of similarities all around the world along history. In almost all traditional production centres can be find the same types of tools, the ways of extraction and the working of the blocks are the same, with only certain local differences. The tools used by the quarry workers and the carvers for a certain process, depends on the characteristics of the stone in use. The literal and epigraphical sources do not offer detailed information on the processes and techniques used by the romans for the detachment of the blocks from the surface of the quarry. Vitruvius has only a few mentions related to the extraction of stone. He writes that some materials can be quarried with easy, some even by cutting (like wood) into quadrate forms,

while others are more difficult to split. From Plinius the Elder we know that existed underground quarries on the peninsula of Paros, and that it is likely that the cutting of the stone with a saw, or the technique of cutting with a saw using sand, was invented in Caria. Unfortunately, it is clear that the incomplete information provided by the ancient authors is not really helping the understanding of the ways of extracting and processing the stone. Our theories are based on what are suggesting the tools used by the romans and the exploitation marks in roman quarries. On this matter, ethnographical studies are also useful, due to the fact that the tools and the way they are used has not changed that much since the roman period and throughout time, up until the time of industrialisation.

The third subchapter was dedicated to the quarries of the Roman Empire. In order to understand the complexity of the system and the organisational background of the roman quarries, it worths to analyse some examples from the territory of the empire. As stone was the main building material, probably there were thousands of small quarrying locations, which were used on a local basis. The largest number of studies are published on the provincial situation of quarrying, concentrating on certain microregions or even local sites. This fact is absolutely logic, as it seems almost impossible to map every single quarry in the Roman Empire, even though the existence of some more general works could be useful. The approach of the subject on a regional basis is indicated also by the fact that the greatest quantities were exploited in the surrounding areas of settlements, towns or fortifications, to guarantee the requested building material in the shortest amount of time. Generally speaking, in most cases, in the surroundings or even in the proximity of larger towns, there is a great variety of choice at disposal of different types of rocks. For instance, in the case of Rome, seven different types of volcanic tuffs can be found, to which we need to add travertine, which makes eight types of suitable building material. Similarly, in the surrounding areas of Pompei we know of six types of volcanic rocks, etc. However, the importance of certain physical and aesthetic characteristics, determined the romans to use not only local materials, but to import stone as well, even from considerable distances. The greatest motivation behind the importation of marble from far away locations was its physical and aesthetic quality. The usage and the control upon marble is not just reflecting the lux, but more importantly, it represented the power and wealth of the empire. We encounter this tendency not only in the case of marble, but also regarding basalt, granite or other types of rocks with proper physical resistance or catchy aesthetics.

The fourth subchapter discusses the organizational and administrative aspects of the quarries. Due to the scarce sources upon this subject regarding the province of Dacia, I had to concentrate on the data from other provinces of the empire. The exploitation of stone per se –

technically speaking – was relatively simple, the complicated part of which came with the organisation of the processes, which necessitated workforce, preferably experienced and qualified, tools, payment, water, food and shelter. The tools had to be produced and had to be repaired constantly, what demanded raw materials, wood and coal, once again workforce, capable of realising the final product. The extracted stone blocks had to be manipulated inside the quarry, to be put on carriages or boats in order to be transported then to their place of use – all this needed to be well organised as well. In some cases, the huge denivelation or the topographical realities of the site has complicated the logistics of manipulating the blocks. In order to overcome the heights, slipways needed to be arranged or built, massive wooden sledges, wooden logs and ropes had to be ordered in massive quantities. The problem of workforce is not answered completely till present day, as we cannot determine who were working in the exploitation sites or the workshops. The most important quarries were positioned in the surrounding areas of legionary or auxiliary forts. The soldiers participated in different construction works, and many of them were craftsmen. This raises the question whether the soldiers or the residents of the civilian settlements around did work in the quarries and mines in the surroundings of forts.

In the lack of epigraphic evidence from roman Dacia it is difficult to make any theories regarding the organization and administration of quarries in this province. According to an inscription found in the quarry on *Dealul Bejan*, the presence of military personnel is confirmed. This fact is generally supported by the position of the quarries, as most of the quarries, with the exception of Napoca and Sarmizegetusa, are positioned in the proximity of military centres. Based on this information, we can assume that the quarries of Dacia were predominantly controlled by the roman army, so they were owned by the roman state. However, we must not exclude the possibility of the existence of certain local quarries or private extraction points, as well as the existence of lessees and sublessees. We suppose only in the case of Bucova that it had a special regime compared to the other quarries of the province.

The last, fourth chapter is the most extensive, as it presents the quarries of roman Dacia; this chapter was divided into three subchapters.

It the first subchapter were described, in general, the geographical and geological characteristics of the interested area, with a special attention on those with stone resources, that were used throughout history.

In the second subchapter is presented the history of research regarding the subject of roman quarries in Dacia, with a short look at other regions of the Roman Empire. It needs to be highlighted that consulting the old bibliography, and knowing the activity of the founders of

this domain, as the Téglás brothers, Gábor and István, provided a whole series of precious (even essential) information for present day researches.

The most extensive part of this study – including my own results of research of the past years – is a repertory of roman quarries and extraction points in roman Dacia. In the present state of research, I listed a number of 29 quarries, 20 of which is located in Dacia Porolissensis and 9 in Dacia Superior. In Dacia Inferior has not been identified any roman quarries, yet. Next to the quarries confirmed by field research, there is a number of unconfirmed quarries or erroneously mentioned points in the archaeological literature. In total, 39 unconfirmed exploitation sites were studied, 23 from Dacia Porolissensis, 13 from Dacia Superior and 4 from Dacia Inferior. Almost all of these quarries were identified in the proximity of military centres, with the exception of two cities, Sarmizegetusa and Napoca. These results partially can be explained by the more advanced state of research of the forts, but also by the probable fact of the more major impact of the military factor in the exploitation and the working of the prime materials. Most of these quarries are situated in mountainous and afforested regions, and we must highlight the fact that due to the natural (vegetation, geological erosion) and human (destructions caused by explosions of the modern era) factors, there are in an advanced state of degradation.

For final thoughts, we would like to remark the fact that the research of quarries in the province of Dacia, is still in an incipient state. The main reason for this is the lack of field research. The small percentage of studies – especially the systematic ones – focusing on quarries and settlements makes difficult to date these sites or to determine the origins of the prime lithic material with comparative analysis. Even the identification of the quarries is a difficult task. The best locations were used before the roman period, and after that as well, in some cases up until present days. Due to these factors the traces of roman exploitation have been vanished, and only the petrographic analysis of the lithic material can provide some further clues. Geology, with its modern analysing methods, can also help the identification of the used building materials, and also in the clarification of certain trading (and cultural) schemes. However, there is still huge need for more researches in this domain. In many cases, although they are making certain geological and petrographic analysis, they are not conclusive in the matter of the origins of the lithic material, as some rocks present in a larger area can have very similar characteristics. Thus, if we want to study the exploitation of stone in certain area, we need to look at the local situation, the geomorphological characteristics of the region and the observations made during field research. Similarly, in lack of epigraphical evidence, the question regarding the administration and the workforce of the quarries remains unsolved, in

the case of the studied examples there was no sufficient information for convincing evidence. The solutions to these problems remain the task of further investigations.

Selective bibliography

ACKNER, JOHANN MICHAEL

- 1856 Die Römischen Alterthümer und Deutschen Burgen in Siebenbürgen. *Jahrbuch der Kaiserl. Königl. Central-Comission zur Erforschung und Erhaltung der Baudenkmale*. I. Wien. 3–50.

ADAM, JEAN-PIERRE

- 1984 *La construction romaine: matériau et techniques*. Paris.
2005 *Roman building. Materials and Techniques*. London–New York.

ALICU, DORIN–POP, CONSTANTIN–CĂȚĂNAȘ, VICTOR

- 1976 Atelierele de piatrărie la Ulpia Traiana Sarmizegetusa. *Acta Musei Napocensis*. XIII. Cluj-Napoca. 125–140.

BAJUSZ, ISTVÁN (RED.)

- 2005 *Téglás István jegyzetei. Régészeti feljegyzések*. I–II. Kolozsvár.

BAJUSZ, MÁTYÁS

- 2010 *Porolissum római kori kőbányái*. Lucrare de licență. Universitatea Babeș-Bolyai. Cluj-Napoca.
2012a *Carierele de piatră din Dacia Porolissensis*. Lucrare de masterat. Universitatea Babeș-Bolyai - Cluj Napoca.
2012b Carierele de piatră din zona castrului de la Porolissum. In: Peșan, Aurora–Bătrînoiu, Raluca-Eliza (ed.): *Arheologie și Studii Clasice*. 2. Cluj-Napoca. 84–103.
2015 Egy épület születése mennyeiségekben: a porollissumi amfiteátrum. In: Dobos, Alpár et alii (ed.): *Archaeologia Transylvanica. Studia in honorem Stephani Bajusz*. Budapest-Cluj-Napoca. 133–138.
2017 Orbán Balázs a homoródjánosfalvi római kori kőbányáról és alakrajzairól. *Acta Siculica*. 2016–2017. Sfântu Gheorghe. 89–93.

BARBU, MARIUS GHEORGHE

- 2013 Urme ale exploatării în carierele antice de andezit din județul Hunedoara. In: G. Prelipcean–A. Jaba–I. Condratov–M. Lupan–B. Cocieru–P. Stanciu (red.): *Lucrări*

volum conferința internațională desfășurată în cadrul proiectului, Doctoratul: O carieră atractivă în cercetare. III. Științe Sociale Suceava. Suceava. 29–42.

2014 Cariera romană de exploatare a calcarului de la Raportu Mare, jud. Hunedoara. *Sargetia. Acta Musei Devensis. V (XLI). Deva. 77–85.*

BARBU, MARIUS GHEORGHE–BĂRBAT, IOAN ALEXANDRU

2017 Noi informații arheologice privind exploatarea andezitului la Măgura Uroiului (jud. Hunedoara). *Banatica. XXVII. Cluj-Napoca. 187–231.*

BARBU, MARIUS GHEORGHE–BĂRBAT, IOAN ALEXANDRU–ȚUȚUIANU, COSTIN-DANIEL

2021 Noi date privind exploatarea andezitului în proximitatea municipiului Deva în preistorie și antichitate. *Terra Sebus. Acta Musei Sabiensis. XIII. 57–91.*

BĂRBULESCU, MIHAI

1974 Reprezentarea obiectelor de piatră pe un capitel din Napoca. In: Daicoviciu, Hadrian (ed.): *In memoriam Constantin Daicoviciu. Cluj. 29–34.*

BEDELEAN, ION–POP, DANA

1992 Caracterizarea mineralo-petrografică a obiectelor arheologice din zona Moigrad (jud. Sălaj). *Acta Musei Porolissensis. Zalău. XVI. 293–298.*

BEDELEAN, ION–POP, DANA–BEDELEAN, HORIA

1993 Geologie și arheologie la Porolissum. *Acta Musei Porolissensis. Zalău. XVII. 185–199.*

BEJAN, ADRIAN

1998 *Dacia Felix. Istoria Daciei romane. Timișoara.*

BENEA, MARCEL–MÜLLER, W. HARALD–SCHWAIGHOFER, BERND

1997 Die Gesteine des Forums von Sarmizegetusa. *Acta Musei Napocensis. Cluj-Napoca. XXXIV/1. 837-848.*

BLAGG, TOMAS FREDERICK COLSTON

1976 Tools and Techniques of the Roman Stonemason in Britain. *Britannia. VII. Wales. 152–172.*

BLOXAM, ELIZABETH G.

2003 *The Organization, Transportation and Logistics of Hard Stone Quarrying in the Egyptian Old Kingdom: A Comparative Study. I. London.*

BORONEANȚ, VASILE

2000 *Arheologia peșterilor și minelor din România. București.*

BUDAY, ÁRPÁD

1936 Erdély földjeinek római kora. In: Asztalos Miklós (ed.). *Történeti Erdély*. Budapest. 129–144.

BÜLOW-JACOBSEN, ADAM

1996 Archaeology and Philology on Mons Claudianus 1987–1993. *Topoi. Orient-Occident*. VII. Paris. 2. 721–730.

CETEAN, VALENTINA–PEŢAN, AURORA

2017 Investigații petrografice la cetatea dacică Piatra Roșie. Micle, Dorel (coord.): *Arheovest. V2. In honorem Doina Benea. Interdisciplinaritate în Arheologie și Istorie*. Szeged. 803–826.

CHINTĂU IOAN

1993 Contribuții la istoricul cunoașterii exploatării și utilizării rocilor în Transilvania de nord-est. *Revista Bistriței*. VII. Bistrița. 283–293.

CHRISTESCU, VASILE

1929 *Viața economică în Dacia romană*. Ediția nouă. Christescu, Claudiu–Petolescu, C. Constantin (ed.). București. 2004

CIL

Corpus Inscriptionum Latinarum, 1863–

CRIȘAN, ION HORAȚIU (COORD)

2017 *Repertoriul arheologic al județului Cluj*. (Bibliotheca Musei Napocensis V). Cluj-Napoca.

CRÎNGUȘ, MARIANA

2004 Cu privire la activitatea lapidarilor din Dacia. *Acta Musei Porolissensis*. Zalău XXVI. 245–251.

DÎSCĂ, CĂTĂLIN-ANDREI

2021 Roman Sites and Discoveries Around Potaissa (V). New Data and Clarifications Regarding the Cheia Settlement and Stone Quarries of Roman Dacia. *Ziridava. Studia Archaeologica*. XXXV. 159–178.

DOMERGUE, CLAUDE

1990 *Les mines de la Peninsule Iberique dans l'Antiquité Romaine*. (Collection de l'École française de Rome 127.) Rome.

DUŠANIĆ, SLOBODAN

1977 Aspects of Roman mining in Noricum, Pannonia, Dalmatia and Moesia Superior. In: Temporini, H.–Haase W. (ed.): *Aufstieg und Niedergang der Römischen Welt. Geschichte und Kultur Roms im Spiegel der Neueren Forschung II. Principat*,

Sechster Band. Politische Geschichte (Provinzen und Randvölker: Lateinischer Donau-Balkanraum). Berlin–New York. 52–94.

EDREY, MEIR

2017 A stone quarry in Arnona, Jerusalem. *Salvage Excavation Reports*. X. 259–263.

FANT, J. CLAYTON

2001 Rome`s marble yard. *Journal of Roman Archaeology*. XIV14. 167–198.

FITZLER, KURT

1910 *Steinbrüche und Bergwerke im ptolemäischen und römischen Ägypten: ein Beitrag zur antiken Wirtschaftsgeschichte*. Leipzig.

FRIDVALDSZKY, JOANNE

1767 *Minerologia magni principatus Transilvaniae seu metalla, semi-metalla, sulphura, salia, lapides et aquae conscripta*. Claudiopoli.

GÁBLI, CECÍLIA

2006 *Caius Plinius Secundus Természettudományának I. könyve*. Fordítás és feldolgozás. Pécs.

GAIED, MOHAMED ESSGHAIED – GALLALA, WISSEM – YOUNÈS, AMEUR

2015 Geoarchaeology of Roman Underground Quarries at Ksour Essaf (Tunisia). *Geoheritage*. VII. 375–382. <https://doi.org/10.1007/s12371-014-0138-4> <Accesat: 06.02.2022.>

GLODARIU, IOAN

1985–1986 *Cariere si exploatarea pietrei in Dacia preromana*. *Acta Musei Napocensis*. XXII–XXIII. 91–102.

GUTIERREZ GARCIA–MORENO, ANNA

2009 *Roman Quarries in the Northeast of Hispania (Modern Catalonia)*. Tarragona.

GOOSS, CARL

1876 *Cronik der Archäologischen funde Siebenbürgens*. Hermannstadt.

GROZA, HORAȚIU

2007 Considerații generale privind piatrăritul și unele aspecte ale meșteșugului tradițional practicat în satul Podeni, comuna Moldovenești, județul Cluj. *Acta Musei Napocensis*. XLI–XLII. 2. Cluj-Napoca. 359–364.

HARRIS, WILLIAM

2000 Trade. In: Bowman, A. K.–Garnsey, P.–Rathbone, D. W. (ed.): *The High Empire. AD 70–192*. (The Cambridge Ancient History). Second Edition. Volume XI. Cambridge. 710–740.

HIRSCHFELD, OTTO

1905 *Die Kaiserlichen Verwaltungsbeamten bis auf Diokletian*. Berlin.

HIRT, ALFRED MICHAEL

2010 *Imperial Mines and Quarries in the Roman World. Organization Aspects 27 BC–AD 235*. Oxford.

HORGA, MARIUS

2004 Petrografia materialului litic din castrul roman Ilișua. *Revista Bistriței*. XVIII. Bistrița. 105–114.

IAROSLAVSCHI, EUGEN

1997 *Tehnica la daci*. Cluj-Napoca.

IDR

Inscripțiile Daciei Romane = Inscriptiones Daciae Romanae, 1975–

IORDACHE, GHEORGHE

1970 Câteva observații asupra pietrăritului din comuna Vârciorova și Gura Văii. *Historica*. I. București. 145–156.

KESSENER, PAUL

2010 Stone Sawing Machines of Roman and Early Byzantine Times in the Anatolian Mediterranean. *ADALYA*. XIII. Antalya. 283–303.

KIRÁLY, PÁL

1894 *Dacia Provincia Augusti*. II. Nagybecskerek.

KONYELICSKA, LÓRÁND

2010 *A porolissumi (Moigrád, Szilágy megye) építkezéseken felhasznált kőanyag eredete*. Lucrare de licență. Universitatea Babeș-Bolyai. Cluj-Napoca.

KÓS, KÁROLY

1959– Pietrăritul și pietrele de moară din Ciceu. In: *Anuarul Muzeului Etnografic al Transilvaniei*. II. Cluj. 79–109

KÓFALVI, IMRE

1980 Kőfaragókról és kőbányákról. *Építés-Építészettudomány*. XII. 1–4. Budapest. 241–282.

LAZAROVICI, GHEORGHE–CULIC, DAN–LAZAROVICI, CORNELIA-MAGDA

2020 Semne rupestre de la Bucium (Sălaj). *Acta Musei Tutovenssis. Istoria veche și arheologie*. XVI. Bârlad. 101–116

LUCA, SABIN ADRIAN (COORD)

2008 Repertoriul arheologic al județului Hunedoara. *Bibliotheca Brukenthal*. XXVI. Ed. 2. Sibiu.

LUCA, SABIN ADRIAN–GUDEA, NICOLAE

2010 *Repertoriul arheologic al județului Sălaj*. (Bibliotheca Brukenthal XLV.) Sibiu.

MACREA, MIHAIL

1969 *Viața în Dacia romană*. București.

MARANO, YURIA. A.

2014 Le cave di marmo Nella Tarda antichità: aspetti organizzativi e produttivi. In: Boneto, Jacobo–Camporeale, Stefano–Pizzo, Antonio (ed.): *Arqueología de la construcción. IV. Las canteras en el mundo antiguo: sistemas de explotación y procesos productivos*. (Anejos de archivo español de arqueología LXIX.) 413–427.

MARQUARDT, JOACHIM

1884 Römische Staatsverwaltung. II. In: Marquardt, Joachim–Mommsen, Theodore: *Handbuch der Römischen Alterthümer*. V. Leipzig.

MARȚIAN, IULIAN

1920 *Repertoriu arheologic pentru Ardeal*. Bistrița.

MAXFIELD, VALERIE A.–PEACOCK, DAVID P. S.

2001 *Survey and Excavation 1987–1993. Mons Claudianus. Part 1*. I–II. Cairo.

MÂRZA, IOAN

1997 Andezitul utilizat de daci în construcțiile sacre de la Sarmizegetusa Regia – Petrografia și proveniența. *Acta Musei Napocensis*, XXXIV. 1. Cluj. 819–823.

MÂRZA, IOAN–MÉSZÁROS, MIKLÓS

1991 Les tufs volcanique de Transylvanie: historique, valeur théorique et pratique dans le développement de la géologie Transilvaine. In: Mârza, Ioan (ed.): *The volcanic tuffs from the Transylvanian Basin, Romania*. (Geological Formations Transylvania. 3.). Cluj-Napoca. 11–21.

MIRÓ, CARMEN ALAIX–REVILLA, EMILI.

- 2012 The Roman Quarry at Montjuic (Barcelona, Spain). In: Gutierrez Garcia-Moreno, Anna–Lapuente Mercadal, Pilar–María–Roda, Isabel (ed.): *Interdisciplinary Studies on Ancient Stone, Proceedings of the IX Association for the Study of Marbles and Other Stones in Antiquity (ASMOSIA) Conference (Tarragona 2009)*. Tarragona. 680–687.

MORARU, VIOREL–PÂRVU, VASILE

- 1988- Noutăți la Măgura Călanului. *Sargetia. Acta Musei Devensis*. XXI-XXIV. Deva.
1991 643-651.

MÜLLER, W. HARALD–SCHWAIGHOFER, BERND–PISO, IOAN–BENEA, MARCEL

- 2012 *Der Marmor im römischen Dakien*. Cluj-Napoca.

NEIGEBEUR, JOHANN FERDINAND

- 1851 *Dacien aus den Ueberrsten des klassischen Alterthums, mit besonderer Rücksicht auf Siebenbürgen. Topographisch zusammengestellt*. Kronstadt (Braşov).

NEMETI, IRINA–LUMINIȚA, SĂSĂRAN–EMANOIL, SĂSĂRAN

- 2015 Monumenti Scultorei nelle collezioni del Museo Nazionale di Storia della Transilvania. Studio sulle officine e le cave di pietra della *Dacia Porolissensis*. In: Alexandrescu, Cristina-Georgeta (ed.): *Cult and votive monuments in the Roman province. Proceeding of the 13th International Colloquium on Roman provincial art: Bucharest–Alba Iulia–Constanța, 27th of May – 3rd June 2013: within the frame of Corpus Signorum Imperii Romani*. Cluj-Napoca. 295-304.

OLTEAN, A. IOANA

- 2004 *Late prehistoric and Roman rural settlement and land-use in western Transylvania*. Glasgow.
2007 *Landscape, colonisation and romanisation*. London–New York.

ORBÁN BALÁZS

- 1868 *A Székelyföld leírása, I*. Pest
1870 *A Székelyföld leírása történelmi, régészeti, természetrajzi s népismereti szempontból. IV*. Pest.
1986a *Torda város és környéke. I*. Budapest.
1986b *Torda város és környéke. II*. Budapest

OROSZ, ENDRE

- 1926 Rómaiak nyomai a Bács-torok nevű kőbányában. *Erdélyi Irodalmi Szemle. Tudományos és Kritikai Folyóirat*. III. 1. Kolozsvár. 69–71.

PASCU, RADU

- 1929 *Carierele și apele minerale din România. Carierele și apele minerale din jud. Odorhei.* (Studii tehnice și economice. VI. Fasc. 6.) București.
- 1932a *Carierele și apele minerale din România. Carierele și apele minerale din jud. Someș.* (Studii tehnice și economice. VI. Fasc. 10.) București.
- 1932b *Carierele și apele minerale din România. Carierele și apele minerale din județele Hunedoara, Cluj, Turda, Bihor, Sălaj.* (Studii tehnice și economice. VI. Fasc. 11.) București.

PETRI, MÓR

- 1901 *Szilágy vármegye monográphiája.* I. Budapest.

PÎRVU, GOGU

- 1964 *Carierele din R.P.R.* București.

PISO, IOAN–ARDEVAN, RADU–FENECHIU, CARMEN–BEU-DACHIN, EUGENIA–LALU ȘTEFANIA

- 2016 *Lexicon Epigraphicum Daciae.* Cluj-Napoca.

POPA, DUMITRU

- 2002 *Villae, Vici, Pagi. Așezări rurale din Dacia romană intracarpatică.* București.

RAPP, GEORGE

- 2009 *Archaeomineralogy.* (Natural Science in Archaeology.) Berlin–Heidelberg.

ROCKWELL, PETER

- 1993 *The art of stoneworking: a reference guide.* Cambridge.

RUSSELL, BEN

- 2013 *The Economics of the Roman Stone Trade.* Oxford.

RUSSELL, BEN – GLICKSMAN, KRISTINA

- 2015 Recent work on Roman quarries near Korčula and on Brač. *Vjesnik za arheologiju i historiju dalmatinsku.* CVIII. <https://hrcak.srce.hr/broj/12353> 1. 223–244.

SCHAFARZIK, FERENCZ

- 1904 *A magyar koronaországai területén létező kőbányák részlete ismertetése.* Budapest.

SIDEBOTHAM, E. STEVEN–BARNARD, H. –HARRELL, J. A. –TOMBER, R. S.

- 2001 The roman quarry and installations in Wadi Umm Wikala and Wadi Semna. *The Journal of Egyptian Archaeology.* LXXXVII. 135–170.

SUCEVEANU, ALEXANDRU

- 1977 *Viața economică în Dobrogea romană, sec. I-III e. n.* București.

TARCEA, CRINA

- 1997 Petrografia rocilor folosite ca râșnițe la Porolissum și în castrele de pe limesul de nord-vest al Daciei Porolissensis și proveniența acestora. *Acta Musei Napocensis*. XXXIV.1. Cluj-Napoca. 849–899.

TÉGLÁS, GÁBOR

- 1883– A Boli hegy Petrozsény mellett, mint őskori erőség. *A Hunyadmegyei Történelmi és régészeti Társulat Évkönyve*. III. Budapest. 27–32.
- 1883– Kirándulás a rómaiak bukovai márványbányájához. *A Hunyadmegyei Történelmi és régészeti Társulat Évkönyve*. III. Déva. 48–50.
- 1884b Praehistoricus arany-, vas- és kőbányászati eszközök Dáciában. *Archeologiai Közlemények*. XIV (Úf. IX). Budapest. 106–121.
- 1886b Római márványbányák a Bisztravölgyben, Bukova hunyadmegyei falu határán. *Archeológiai Közöny*. XIV. Budapest. 123–135.
- 1886c A jánosfalvi római kőbánya és annak három falképe Udvarhely megyében. *Archeológiai Értesítő*. Úf. VI. 1. Budapest. 21–26.
- 1887 Az erdélyi medence őstörténelméhez. *Orvos-Természettudományi Értesítő*. XII. 1. Budapest. 55–87.
- 1889a Római kőbánya a dévai Bezsán nevű hegyen. *Archeológiai Értesítő*. Úf. IX. 5. Budapest. 390–395.
- 1889b Kis-Kalán (Aguae) római fürdője és kőbányászata Hunyad megyében. *Archeológiai Értesítő*. Úf. VIII. 5. Budapest. 202–210.
- 1889c Római márványbánya a Bisztravölgyben, Bukova hunyadmegyei falu határán. *Földtani Közöny*. XXIII. Budapest. 13–19.
- 1889d Római kőbányászat a tordai hasadék keleti torkolata felett. *Archeológiai Értesítő*. Úf. IX. Budapest. 289–295.
- 1889- A hunyadmegyei történelmi s régészeti társulat múzeuma. *A Hunyadmegyei Történelmi és régészeti Társulat Évkönyve*. VI. Budapest. 109–118.
- 1890
- 1893a A rómaiak kőbányászata Potaissa vagyis a mai Torda közelében. *Földtani Közöny*. XIX. 4–6. Budapest. 154–160.
- 1893a A Fejér-Körösvidék jelentősége a rómaiak bányaadminisztrációjában. *Földtani Közöny*. XXIII. 9–10. Budapest. 272–276.
- 1895 A Limes Dacicus két Küküllő és Olt közötti részlete Udvarhely megye éjszaki és keleti hegységeiben Oroszfalutól Alsó-Rákosig. *Archeologiai Közlemények*. XIX (Úf. XVI). Budapest. 5–54.
- 1898 Római kőbányászat Porolissum közelében Szilágymegyében. *Archeológiai Értesítő*. Úf. XVIII. 2. Budapest. 118–124.
- 1902 Hunyad megye a dákok és a rómaiak idején. *Hunyadvármegye története*. I. Budapest. 34–211.
- 1904a Adalékok a rómaiak dáciai bányaiparához. Egy kőfaragó-mester (lapidarius) cégtáblája Kis-Kalánban (Ad Aquas). *Bányászati és Kohászati lapok*. XXXVII/1. 4. Budapest. 255.

- 1904b Bányába vonuló római bányászcsoporthoz Linaresből (Spanyolország). *Bányászati és Kohászati lapok*. XXXVII/1. 10. Budapest. 658–660.
- 1904c Óskori bálványfej és kőbányászati emlék a dévai Várhegyről. *Archeológiai Értesítő*. Úf. XXIV. 3. Budapest. 242–243.
- 1908a Hogyan néztek ki a rómaiak dácziai bányamunkásai? A kőrösbányai bányászszobrok. *Bányászati és Kohászati lapok*. XLI/1. 2. Budapest. 86–94.
- 1908b Aquincumi kőbányászati emlék a Krisztus utáni első és második század határáról. *Bányászati és Kohászati lapok*. XLI/1. 6. Budapest. 382–383.
- 1909 A görög és római idők márvány- és kőbányászatáról. *Bányászati és Kohászati lapok*. XLII/1. 1. Budapest. 30–38.
- 1913 Potaissa (Torda) bányapolgárságának háztartási emlékeiből. *Bányászati és Kohászati lapok*. XLVI/1. 1. Budapest. 22–28.
- 1914 A rómaiak bányagyarmata és kettős kőbányája Déva határában. *Bányászati és Kohászati lapok*. XLVII/1. 9. Budapest. 554–562.

TÉGLÁS, ISTVÁN

- 1896 A keresztesmezei sarkophagokról. *Archeológiai Értesítő*. Úf. XVI. 1. Budapest. 65–68.
- 1899 A Torda melletti sziklahasadékról és a potaissai kőfaragó műhelyéről. *Archeológiai Értesítő*. Úf. XIX. 3. Budapest. 280–283.
- 1900 Római és más sírokról Alsó-Szent-Mihályfalván. Úf. *Archeológiai Értesítő*. XX. 4–5. Budapest. 391–393.
- 1902 A mikesi római romok szétdulása és a közelebbről Tordán talált római föliratokról. *Archeológiai Értesítő*. Úf. XXII. 1. Budapest. 79–83.
- 1904d A Potaissa maradványaiban 1903-ban és 1904-ben talált tárgyakról és feliratokról. *Archeológiai Értesítő*. Úf. XXIV. 5. Budapest. 410–413.
- 1910 Romok és leletek a Tordai Tündérhegyen. *Archeológiai Értesítő*. Úf. XXX. 2. Budapest. 123–130.
- 1911a A fügedi vicusról. *Archeológiai Értesítő*. Úf. XXXI. 5. Budapest. 435–437.
- 1911b A mezőbodoni és mezőszakáli vicusokról. *Archeológiai Értesítő*. Úf. XXXI. 1. Budapest. 77–80.
- 1912 Római kerek épületek Potaissa castruma közelében. *Archeológiai Értesítő*. Úf. XXXII. 1. Budapest. 93–96.
- 1915 Potaissai feliratok és domborművek. *Archeológiai Értesítő*. Úf. XXXV. 1–2. Budapest. 44–49.

TORMA, KÁROLY

- 1863 Adalék Észak-Nyugoti Dácia föld és helyirattanához. Székfoglaló értekezés, *Magyar Tudományos Akadémia Évkönyve*. XI. Pest.
- 1880a A limes Dacicus felső része. *Értekezések a Történelmi Tudományok Köréből*. IX. 2. Budapest.

1880b Adalék Dácia föld- és helyiratához. *Archaeologiai Közlemények*. XIV. 3. Budapest. 101–117.

TUDOR, DUMITRU

1968 *Orașe, târguri și sate în Dacia romană*. București.

VASS, JÓZSEF

1863 *Erdély a rómaiak alatt*. Kolozsvár.

VITRUVIUS

De Architectura Libri Decem. (În traducerea lui Gulyás Dénes.) 1988. Budapest.

VOLENSZKY, GYULA

1895 Kőkoporsókról a keresztesmezőn (Torda-Aranyosmegyében). *Archeológiai Értesítő*. Úf. XV. 1. Budapest. 72–73.

WOLLMANN, VOLKER

1973 Cercetări privind carierele de piatră din Dacia romană. *Sargetia. Acta Musei Devensis*. X. Deva. 105–130.

1996 *Mineritul metalifer, extragerea sării și carierele de piatră în Dacia Romană*. Cluj-Napoca.

WOOTTON, W–RUSSEL, B.–ROCKWELL, P.

2013a Stoneworking Tools and Toolmarks. *The Art of Making in Antiquity: Stoneworking in the Roman World*. Version 1.0. <https://artofmaking.ac.uk/content/essays/1-making-the-art-of-making-in-antiquity-w-wootton-j-bradley-b-russell/> <Accesat: 06.03.2022.>

2013b Stoneworking Techniques and Processes (version 1.0). În: *The Art of Making in Antiquity: Stoneworking in the Roman World*. https://artofmaking.ac.uk/media/uploads/uploads/stoneworking_techniques_and_processes-wootton_russell_rockwell-v1.0.pdf <Accesat: 06.03.2022.>

WURCH-KOZELJ, MANUELA

1988 Methods of Transporting Blocks in Antiquity. Athens. In: Herz N., Waelkens M. (ed.): *Classical Marble: Geochemistry, Technology, Trade*. (NATO ASI Series (Series E: Applied Sciences). 153. Springer, Dordrecht. 55-64.

ZĂGREANU, RADU IUSTINIAN

2014 *Arta sculpturală în Dacia Porolissensis*. Teză de doctorat. I. Universitatea Babeș-Bojai, Facultatea de Istorie și Filosofie, catedra de Istorie Veche și Arheologie. Cluj-Napoca.