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# **Applied mineralogy in characterization of materials from the post-Cistercian Abbey in Lubiąż**

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## **Abstract**

This paper overviews the use of natural dimension stones, stuccoes and plasterworks in the post-Cistercian Abbey complex in Lubiąż (syn. Leubus Abbey). It is a prestigious engineering work of Baroque architecture, with remnants of Romanesque and Gothic foundations, one of the largest sacral architectural complexes in the world. Geologists often contribute to solving specific questions in the field of archaeology, art history and conservation, and some problems related to renovation aspects cannot be solved without the assistance of applied sciences. Thus, the article provides some information on the so called “red nodular limestone” and “Swedish limestone,” decorating the abbatial church of the Assumption of the Virgin Mary. Additionally, a short characteristics of mineralogy of the stuccoes and plasters, related to their function, is presented.

## **Streszczenie**

Praca przedstawia przykłady zastosowania kamienia naturalnego, sztukaterii i zapraw tynkarskich w pocysterskim kompleksie architektonicznym w Lubiążu. Jest to perła barokowej sztuki, z zachowanymi relikdami założeń romańskich i gotyckich. Jednocześnie jest to jeden z największych zachowanych obiektów sakralnych na świecie. Wkład geologów w rozwiązywanie problemów z pogranicza archeologii, historii sztuki i konserwacji jest niezaprzeczalny. Poprawna renowacja dzieł sztuki wymaga wiedzy z obszaru nauk stosowanych. Stąd w niniejszej pracy zawarliśmy wiele informacji na temat tzw.

czerwonych wapieni bulastych oraz wapieni szwedzkich, zastosowanych w detalu architektonicznym klasztornej kościoła p.w. Wniebowzięcia Najświętszej Maryi Panny. W pracy przedstawiono również krótką charakterystykę mineralogiczną sztukaterii i zapraw tynkarskich, w powiązaniu z ich funkcją.

**Keywords:** Cistercian, Lubiąż Abbey, Leubus Abbey, dimension stone, “red nodular limestone,” “Swedish limestone,” stuccoes, plasterwork, applied mineralogy.

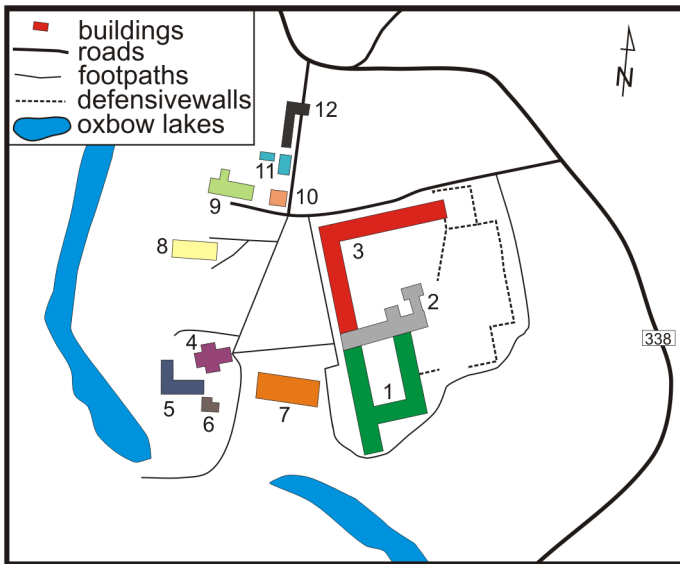
## Introduction

Geologists very often contribute to solving precise questions in the field of archaeology, art history and conservation, and some problems related to renovation aspects cannot be solved without the assistance of applied sciences. Provenance analyses are of great importance for renovation of historic artworks and monuments (Přikryl 2007). Thus, architectural details made of stone are of particular interest for geologists. The architectural, artistic, and historical aspects of the monastery buildings have been described by a number of researchers (Wyrwa et al. 1999; Łużyńska 2002, 2008; Kalinowski 1967; Kalinowski 1970, 1974; Wrabec 2010) but a deep scientific investigation of the materials is relatively sparse (Tur 2011). Taking this into the consideration, the aim of our research was to contribute to the existing knowledge about the studied site, mainly focusing on the identification of the stones used in the post-Cistercian Abbey in Lubiąż, and their distribution in the several parts of the monastic complex. The second objective was the characterization of the stuccoes and plasters, related to their function, including information about their properties and state of preservation of the materials.

## Historical notes

The Lubiąż Abbey, also known as the Leubus Abbey, is located about 50 km north-west of Wrocław. It is an architectural complex of beautifully situated buildings, for many centuries used by the Cistercian monks. The Cistercians came to Lubiąż in 1163 or, as other sources state, in 1150, and they took place of the Benedictines who had been there from 1150 (Wyrwa et al. 1999; Łużyńska 2002, 2008). After secularization of the Abbey in 1810 (Milecka 2009), it gradually underwent devastation which was, among others, due to the sheer size of the Abbey. Despite huge losses in the equipment of the monastery and dispersion of works of art accumulated over centuries, the object is still evidence of its former glory. For many years, efforts have been made to protect the interior decorations that have survived to the present time, i.e. sculptures, stuccoes, wall paintings or decoration of the façade.

The main buildings in the Abbey comprise: 1) the Abbatial Palace, 2) the church of the Assumption of the Virgin Mary, and 3) the cloister, with a common huge, richly decorated façade, representing the eastern frontage of the monastic square (Figures 1 and 2). The southern part of the square is flanked with a building of former brewery, bakery and water treatment plant. Its western part is occupied by St. Jacob's church, a carriage house, and residential buildings of monastic craftsmen that used to work in the Abbey. The northern part of the square is enclosed by a cloistral office, granaries, a cloistral hospital and a gate building.



- 1 - cloister
- 2 - church of the Assumption of the Virgin Mary
- 3 - abbatial palace
- 4 - St. Jacob's church
- 5, 6, 9 - residential buildings
- 7 - brewery, bakery and water treatment plant
- 8 - carriage house
- 10 - cloistral office
- 11 - granaries
- 12 - cloistral hospital and gate building



Figure 2. Aerial view of the Lubiąż Abbey complex from west. Photo courtesy of The Lubiąż Foundation

The Lubiąż Abbey was founded by Prince Boleslaw the Tall in the last quarter of the twelfth century. The church of St. Jacob, dated back to 1202, is the oldest object that belonged to the Lubiąż Abbey. Relics of Romanesque buildings were found within the church, as well as in the cloister. The first building was erected according to design of Bernard from Clairvaux (Łużyniecka 2008). The monastery complex was systematically expanded and rebuilt in the following centuries. It is not known, however, how many buildings in the complex were demolished during subsequent architectural changes. Archaeological and architectural research has shown that at the end of the thirteenth century, the eastern part of the church of the Assumption of the Virgin Mary was extensively rebuilt by implementing elements of Gothic architecture (Łużyniecka 2010). During the Hussite Wars (1428–1432), the whole complex was plundered and burned. The damage was so great that only St. Jacob's church and part of the outbuildings survived. After the cessation of the Hussite Wars, a huge reconstruction began at the beginning of the sixteenth century (Wyrwa et al. 1999), partly interrupted by the Thirty Years War (1618–1648), when the library and the archive were plundered by Swedish troops. The end of the war, and economic reform initiated by the Abbot Arnold Freiberg in 1649 enabled a great renewal of the whole complex in Baroque style (the so-called baroquisation). Within this period of time, the Abbatial Palace was erected, interior decorations of St. Jacob's church were changed, and the cloister and outbuildings were ex-

panded. Additionally, a new library was opened, with its collection of books being systematically developed. In fact, the beginning of baroquisation dates back to the first half of the seventeenth century, when the rebuilding of the church of the Assumption of the Virgin Mary was initiated. However, it took place on a large scale under the reign of Arnold Freiberg's successor — Abbot Johannes Reich (1672–1691). In 1681, the nave was completed. At the same time, the foundation stone for the construction of the L-shaped Abbatial Palace was laid, located north of the church of the Assumption of the Virgin Mary (Kalinowski 1967; Kalinowski 1970; Kalinowski 1974; Wrabec 2010). The reconstruction of the church was performed with respect to its medieval style. The plan, spatial layout and shape of the church, although enriched with some minor details and decorations in the baroque style, remained unchanged. Only the Loretan Chapel, as a new object, was erected next to the northern arm of the transept. In 1715, the reconstruction of the church was completed by the erection of a vestibule (narthex) from its western side and two monumental steeples, topped with magnificent copper helmets. In the 1690s, the expansion of the cloister began, and continued up to the 1730s. Within this period of time, the baroque interior of refectory and library came into being. The interior décor was done by the Silesian greatest artists of the Baroque era, including a painter, Michael Willmann, known as “Silesian Raphael.” The monastery complex changed significantly and is currently regarded one of the greatest Baroque architectural endowments (Łużyniecka 2008).

After the secularization, starting from the second half of the nineteenth century, renovation works were carried out, mostly within the church of the Assumption of the Virgin Mary. Yet, they did not stop the progressing degradation.

The buildings of the former abbey served different functions: during the World War II a military facility was there, followed by the Soviet Army's hospital. Since 1989, the Lubiąż Foundation has been taking care of the object.

## The church of the assumption of the Virgin Mary — stuccoes, stones and their history of use

Despite considerable devastation of the Church of the Assumption of the Virgin Mary, some elements of the original décor have survived to the present day. In front of the entrance to the Loretan Chapel (from the transept side), there are fragments of its original flooring, replaced with sandstone ones at the beginning of the twentieth century (Grajewski 2010). Typically, diagonally arranged tiles, the so-called *opus alexandrinum*, are coloured in gray and claret (Figure 3), also visible in the main nave of the church of the Assumption of the Virgin Mary. Fossils, represented by *Orthoceras* and *Endoceras*, may be found in some tiles. The former fossil is known from the Ordovician-to-Triassic period, and the latter from the



Ordovician-to-Silurian period (Lehman, Hillmer 1991). The diagonally laid pattern, the colour of the tile and inferred Palaeozoic age suggest that the flooring represents the so-called Vasa flooring, also called *lapis sueticu*, Swedish limestone, or Swedish flooring (Walendowski 2000, 2010). The limestone was mined on the island of Öland since the time of the Vikings, and transported from Köpingsvik to the mainland (Woźniak 2004). In 1640, their trade was centralized, wrought tiles were delivered to the port of Kalmar and then exported to the many countries of Europe (ibid.). In the Middle Ages, the material was shipped primarily to the cities of the Hansa. In Poland the peak of import falls on the time of reign of Vasa (sixteenth–seventeenth century). The destination port was Danzig (now Gdańsk), from where the material was flumed up to the Lesser Poland (Małopolska; Walendowski 2010). The most striking is that the Vasa flooring was often ordered by the Cistercians (ibid.). The peak import to the Polish territory coincides well with the moment of intense baroquisation and reconstruction of the church of the Assumption of the Virgin Mary, under the leadership of Abbot Johannes Reich. The Vasa flooring can be found in many churches located in Northern and Central Poland (Sylwestrzak 2000). Among places worth mentioning are: Archcathedral Basilica of The Holy Trinity, Blessed Virgin Mary and St Bernard in Gdańsk Oliwa, The Cathedral Basilica of the Assumption of the Blessed Virgin Mary and St. Adalbert in Gniezno (Zakrzewski 2004), Archcathedral Basilica of St. Peter and St. Paul in Poznań (ibid.; Walendowski 2000), as well as numerous sacral objects of Pomerania (in Tczew, Toruń), Warmia (in Święta Lipka), and Masuria (in Barczewo; Zakrzewski 2004). The Vasa flooring can be found in the architectural complex of the University of Wrocław too. The best preserved Vasa floors can be observed in the University Church, or the Leopoldina Hall (Grodzicki et al. 2002).



Figure 3. Flooring tiles (Swedish flooring): A) in front of the entrance to the Loretan Chapel, B) in the Prince's Hall (Abbot's Palace)

The epitaph of Abbot Matthäus Rudolf von Hennersdorf (Figure 4) showing his likeness is another valuable monument in the church of the Assumption of the Virgin Mary. It is located in the southern wall of St. Benedict Chapel (southern chapel) situated opposite the entrance to the Prince's Chapel. The epitaph was established after the death of Abbot Matthäus Rudolf von Hennersdorf, in the second quarter of the seventeenth century (Kolbiarz 2010). It was carved in red nodular limestone (syn. ammonitico rosso, Knollenkalke, Wieczorek 1983), also known as the “royal marble” (it is not a marble in the petrographic sense; Procyk 1998, Wardzyński 2009). The latter name comes from the fact that the rock was highly appreciated among the upper classes. The red nodular limestone was mined in several European countries: the Gerecse-Mts. (Hungary), Adnet (Austria), Menyháza (Romania) and Verona (Italy; Pintér et al. 2004; Wardzyński 2009). Although it appears in distant occurrences, it has the same geological age and had formed in identical sedimentary environments in the western end of the Tethys (Vardar Ocean) during the Jurassic. The sedimentary basin was dislocated later and tectonically moved into its contemporary position (ibid.). Exotic blocks of nodular limestone are known from the Cretaceous Himalayas (Wieczorek 1983). The red nodular limestone, as a dimension stone, has been known since Roman times. Nevertheless, it did not play a significant role in those days, and above all, it was not transported over long distances. Its importance as a sculpting material began in the Middle Ages. Then the material, derived from Hungarian deposits (in Esztergom and Székesfehérvár), was known in the Czech Republic and Poland (Procyk 1998). In the following centuries, especially in the era of mature Gothic and Renaissance, it was popular throughout the whole Europe (Procyk 1998; Pintér et al. 2004; Wardzyński 2009; Uhlig et al. 2010; Kryza et al. 2011) and used in Polish and Lithuanian carving workshops. The important thing is that the Hungarian limestone dominated until the 15th century. Subsequently, the Austrian nodular limestone (“Adnet marble”) predominated. The Turkish occupation of Hungarian deposits, begun in 1526 and limiting export of the nodular limestone, has significantly contributed to the popularity of “Adnet marble” (Procyk 1998). In light of the above data, we conclude that the epitaph of Abbot Matthäus Rudolf von Hennersdorf was presumably carved in “Adnet marble” (“Wimberger” variety; cf. Uhlig et al. 2010) rather than in Hungarian nodular limestone. However, this idea needs confirmation on the basis of stable isotope analysis, since the petrographic analysis is an insufficient tool to distinguish between Hungarian and Austrian raw materials (Pintér et al. 2004).

The red nodular limestone has been used as a dimension stone in other historic monuments, like tombstones of: Kazimierz Wielki (Procyk 1998), Kazimierz Jagiellończyk, Jan Olbracht, Władysław Jagiełło (Kryza et al. 2011). However, data presented by Bromowicz, Magiera (2006) suggest that Italian Rosso di Verona “marble” should be considered as the most probable stone applied in the tomb of Władysław Jagiełło. In Wrocław, the nodular limestone was used as a dimen-

sion stone for tombstone of patrician Heinrich Rybisch, located in St. Elizabeth's Church (Kryza 2011), for cladding of interiors of the Feniks department store (Prell, Zagożdżon 2011), or tombstone of Bishop Adam Weisskopf, located in the Cathedral of St. John the Baptist (Zagożdżon, Śpiewak 2011). Other examples of the use of nodular limestone are sacral buildings in Gniezno, Włocławek, Nysa and Tarnów (Kryza 2011).



Figure 4. The epitaph of Abbot Matthäus Rudolf von Hennersdorf carved in the nodular limestone (condition before conservation in 2012)

The frescoes painted in 1691–1692 by Karl Dankwart and Michael Willmann (Kozieł 2010) are visible in the domes of southern, St. Benedict Chapel and northern, St. Bernard Chapel. These domes are richly decorated with stuccoes — rendering coats, made of small amounts of aggregate (mainly very fine grained quartz) and lime binder, showing winged putti and acanthus scrolls (Figure 5). Such paste (Stefanidou, Papayianni 2005) with low water/lime ratio (Bakolas et al. 1995) allows to obtain its proper workability for stucco-work. As a finishing coat for more complicated details, a lime paste with small amounts of gypsum was used. This additive reduces drying shrinkage and setting time, resulting in unhurriedly preparing relief (Salavessa et al. 2013). Some decorations contain crushed brick, added intentionally, which serves as an artificial pozzolanic additive (Elsen 2006). In case of ceiling stucco, it acts as a dye, too.





Figure 5. A putto among acanthus leaves in the St. Bernard chapel

The Monument of Eight Bishops is located in the western side of the ambulatory (behind the presbytery), linking the chapels of St. Benedict and St. Bernard. The author of its decoration remains unknown. The object came into existence between 1691–1693 (Kozieł 2010). It consists of two shallow, semicircular closed niches, separated with profiled pilaster. In each niche, below the arch, there are cartouches with inscriptions. They are richly decorated with stucco (Figure 6). All inscriptions on the cartouches, as well as decorative convex details, are gilded. Wooden and gilded figures of bishops were originally set on pedestals of the niches. The interior wall of each niche, cartouches, are covered with lime plaster painted with vein decoration, imitating marble (so-called marbleding). The pedestals have red marbleding with white veins, whereas other details have black, as well as white ones (Figure 6). The red marbleding is lime stucco, consisting of fine grained quartz as a filler, coloured with strongly dispersed red ochre as a dye. The black marbleding contains gypsum as an additive, whereas soot plays a role of a dye.

## Final remarks

The main contribution of this paper is to provide a brief mineralogical characterization of chosen architectural details located in the church of the Assumption

of the Virgin Mary and to pay attention to some aspects of applied mineralogy. However, it does not exhaust the subject. In the church itself, as well as in the other post-Cistercian buildings in the Lubiąż Abbey, a geologist can find many other interesting details made of stone too. For example, there are numerous sandstone sculptures decorating the façade and interiors of the Loretan Chapel. It should be stressed that mineralogical studies play an important role in renovation of historic artwork. Our study, based on the results of the mineralogical characterization of ancient samples, helped to formulate compatible restoration products. This is an essential aspect while undertaking repair interventions.



Figure 6. The Monument of Eight Bishops with red and black marbleizing

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## References

- Bakolas A., Biscontin G., Moropoulou A., Zendri E. 1995. Characterization of the lumps in the mortars of historic masonry. *Thermochimica Acta*, 269/270, pp. 809–816.
- Bromowicz J., Magiera J. 2006. Identyfikacja marmuru użytego w sarkofagu Władysława Jagiełły w Katedrze Wawelskiej. *Ochrona Zabytków*, 3, pp. 87–96.
- Elsen J. 2006. Microscopy of historic mortars — a review. *Cement and Concrete Research* 36, pp. 1416–1424.
- Grajewski G. 2010. Konserwacja zabytków opactwa Cystersów w Lubiążu do 1945 roku. In: A. Koziół (ed.). *Kościół klasztorny Wniebowzięcia NMP w Lubiążu. Historia stan zachowania koncepcja rewitalizacji*. Wrocław: Wydawnictwo Uniwersytetu Wrocławskiego, pp. 117–129.
- Grodzicki A., Kryza G., Kryza R., Walendowski H. 2002. Kamień w zespole architektonicznym Uniwersytetu Wrocławskiego (300 lat Wrocławskiej Alma Mater), Collegium Maximum. *Świat Kamienia*, 5, pp. 52–56.
- Kalinowski K. 1967. Działalność rzeźbiarska Macieja Steinla na Śląsku (Uwagi na marginesie publikacji L. Pühringer-Zwanowetz, Matthias Steinl). *Roczniki Sztuki Śląskiej*, 6, pp. 127–135.
- Kalinowski K. 1970. Lubiąż. In: T. Broniewski, M. Zlat (eds.). *Śląsk w zabytkach sztuki*. Wrocław -Warszawa-Kraków A: wydawnictwo?, pp. 22–25.
- Kalinowski K. 1974. *Architektura barokowa na Śląsku w drugiej połowie XVII wieku*. Wrocław: Zakład Narodowy im. Ossolińskich, pp. 245.
- Kolbiarz A. 2010. Nagrobek opata Matthäusa Rudolfa von Hennersdorf. In: A. Koziół (ed.). *Kościół klasztorny Wniebowzięcia NMP w Lubiążu. Historia stan zachowania koncepcja rewitalizacji*. Wrocław: Wydawnictwo Uniwersytetu Wrocławskiego, pp. 560–561.
- Koziół A. 2010. Dekoracja freskowo-sztukatorska w kaplicach św. Benedykta z Nursji i św. Bernarda z Clairvauxl. In: A. Koziół (ed.). *Kościół klasztorny Wniebowzięcia NMP w Lubiążu. Historia stan zachowania koncepcja rewitalizacji*. Wrocław: Wydawnictwo Uniwersytetu Wrocławskiego, pp. 186–195.
- Kryza R., Uhlig C.F., Kryza G., Striškiene E., Höck V. 2011. Wapienie Salzburga — “królewskie marmury” w Polsce i na Litwie. *Przegląd Geologiczny*, (59), 2, pp. 137–145.
- Lehmann U., Hillmer G. 1991. *Bezkregowce kopalne*. Warszawa: Wydawnictwa Geologiczne, pp. 406.
- Łużyńska E. 2002. *Architektura klasztorów cysterskich. Filie lubińskie i inne cenobia śląskie*. Wrocław: Oficyna Wydawnicza Politechniki Wrocławskiej, pp. 583.
- Łużyńska E. 2008. Architektura opactwa lubińskiego w średniowieczu. In: A. Koziół (ed.). *Opactwo Cystersów w Lubiążu i artyści*. Wrocław: Wydawnictwo Uniwersytetu Wrocławskiego, pp. 19–42.
- Łużyńska E. 2010. Średniowieczna architektura kościoła klasztoru Wniebowzięcia NMP w Lubiążu. In: A. Koziół (ed.). *Kościół klasztorny Wniebowzięcia NMP w Lubiążu. Historia, stan zachowania, koncepcja, rewitalizacja*. Wrocław: Wydawnictwo Uniwersytetu Wrocławskiego, pp. 13–30.
- Milecka M. 2009. *Ogrody cystersów krajobrazie małopolskich filii Morimundu*. Lublin: Wydawnictwo KUL, pp. 412.
- 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, pp. 619–629.
- Prell M., Zagożdżon P. 2011. Kamień naturalny w wybranych obiektach komercyjnych Wrocławia. *Prace Naukowe Instytutu Górnictwa Politechniki Wrocławskiej* 133, *Studia i Materiały*, 40, pp. 109–121.
- Přikryl R. 2007. Understanding the Earth scientist’s role in the pre-restoration research of monuments: An overview. In: R. Přikryl, R.B.J. Smith (eds.). *Building Stone Decay: From Diagnosis to Conservation*. Geological Society, London, *Special Publications*, 271, London, pp. 9–21.
- Procyk W. 1998. *Marmury Królewskie: zjawisko wietrzenia i problemy konserwacji, Część 1*. Warszawa: Akademia Sztuk Pięknych w Warszawie, pp. 57.

- Salavessa E., S. Jalali, L.M.O. Sousa, L. Fernandes, A.M. Duarte. 2013. Historical plasterwork techniques inspire new formulations. *Construction and Building Materials*, 48, pp. 858–867.
- Stefanidou M., I. Papayianni. 2005. The role of aggregates on the structure and properties of lime mortars. *Cement & Concrete Composites*, 27, pp. 914–919.
- Sylwestrzak H. 2000. Surowce skalne w architekturze europejskiej. *Świat Kamienia*, 4, pp. 14–15.
- Tur A. 2011. Wietrzenie kamiennych elementów architektonicznych w warunkach zanieczyszczonej atmosfery na przykładzie obiektu klasztoru Lubiąż. Master thesis under the supervision of R. Kryza, G. Rusek, Wydział Chemii i Wydział Nauk o Ziemi i Kształtowania Środowiska, Uniwersytet Wrocławski, Wrocław, pp. 77.
- Uhlir C.F., R. Kryza, V. Höck. 2010. Kamienie budowlane i dekoracyjne z Salzburga —tradycja i teraźniejszość. *Przegląd Geologiczny*, 58 (6), pp. 472–479.
- Walendowski H. 2000. Posadzki wazowskie. Wapienie ordowickie ze Szwecji w architekturze Polski. *Świat Kamienia*, 2, pp. 22–23.
- Walendowski H. 2010. Szwedzkie wapienie z Olandii w Wielkopolsce. *Nowy Kamieniarz*, 6, pp. 46–50.
- Wardzyński M. 2009. Między Italią i Niderlandami. Środkowoeuropejskie ośrodki kamieniarsko-rzeźbiarskie wobec tradycji nowożytnej. Uwagi z dziedziny materiałoznawstwa. In: A. Lipińska (ed.). *Materiał rzeźby — między techniką a semantyką*. Wrocław: Wydawnictwo Uniwersytetu Wrocławskiego, pp. 425–456.
- Wieczorek J. 1983. Uwagi o facji “Ammonitico Rosso”. *Przegląd Geologiczny*, 4, pp. 247–252.
- Woźniak P. 2004. Skały Szwecji i ich eksploatacja. In: D. Król, P. Woźniak, L. Zakrzewski (eds.). *Kamienie szwedzkie w kulturze i sztuce Pomorza*. Gdańsk: Muzeum Archeologiczne w Gdańsku, pp. 7–22.
- Wrabec J. 2010. Barokizacja architektury kościoła klasztoru Wniebowzięcia NMP w Lubiążu. In: A. Kozieł (ed.). *Kościół klasztoru Wniebowzięcia NMP w Lubiążu. Historia, stan zachowania, koncepcja rewitalizacji*. Wrocław: Wydawnictwo Uniwersytetu Wrocławskiego, pp. 425–455.
- Wyrwa A.M., J. Strzelczyk, K. Kaczmarek. 1999. *Monasticon Cisterciense Poloniae*. vol. 1, 2. Poznań: Wydawnictwo Poznańskie, pp. 1016.
- Zagożdżon P., A. Śpiewak. 2011. Kamień w architekturze a geoturystyka miejska — przykłady z terenu Wrocławia. *Prace Naukowe Instytutu Górnictwa Politechniki Wrocławskiej 133, Studia i Materiały*, 40, pp. 123–143.
- Zakrzewski L. 2004. Kamienie szwedzkie w architekturze i sztuce Gdańska i Pomorza. In: D. Król, P. Woźniak, L. Zakrzewski (eds.). *Kamienie szwedzkie w kulturze i sztuce Pomorza*. Gdańsk: Muzeum Archeologiczne w Gdańsku, pp. 37–56.