

Editorial

The first scientific investigations of the sources of flint in Poland were undertaken by archaeologist Stefan Krukowski and geologist Jan Samsonowicz in the early 20th century. Krukowski used archaeological materials to identify the macroscopic characteristics of ‘chocolate’ flints, described their differences, and showed the potential location of the deposits (Krukowski 1920: 189–195; Budziszewski 2008: 33). In the search for deposits of flint, their outcrops, and prehistoric mines, Krukowski was accompanied by young geologist Jan Samsonowicz. The result of their cooperation was the discovery in 1921 of *in situ* deposits and surface accumulations of limestones containing fragments of flint and, in 1922, the identification of a prehistoric mine at Krzemionki Opatowskie (Krukowski 1923; Samsonowicz 1923; Bąbel 2014).

This long tradition of studying siliceous rocks has continued at the Institute of Archaeology and Ethnology, Polish Academy of Science. In 1965 Zygmunt Krzak published the first characterization of gray white-spotted (świeciechów) flint (Krzak 1965) and five years later he described Turonian flint from Ożarów (Krzak 1970). In 1971 Romuald Schild devised a classification of ‘chocolate’ flint from the north-east margin of the Holy Cross (Świątokrzyskie) Mountains (Schild 1971, 1976) and Bogdan Balcer investigated a flint mine in Świeciechów, Kraśnik district, and the use of gray white-spotted (świeciechów) flint during the Neolithic (Balcer 1975, 1976). In 1980 Jacek Lech discussed the geology of Jurassic-Cracow flint and showed its relevance to archaeology (Lech 1980). Since that time Polish archeologists have carried out many investigations on different types of flint (e.g., Budziszewski and Michniak 1983/1989; Pawlikowski 1989; Budziszewski and Michniak eds 1995; Schild and Sulgostowska eds 1997; Matraszek and Sałaciński eds 2002; Gutowski 2004; Borkowski *et al.*, 2008; Migaszewski *et al.*, 2006; Krajcarz *et al.*, 2014).

In addition to ongoing investigations describing the occurrence and geological nature of the raw material, determination of the number of levels at which the raw material occurs in the limestone, and the stratigraphic context and geological dating of the layers, a principal goal is to identify instrumental method/methods for accurately distinguishing siliceous rocks and applying the results in archeological studies. The cooperation between archeologists and geologists started by Krukowski and Samsonowicz continues and the collection of studies presented here are the latest results of those cross-disciplinary cooperative efforts directed to understanding the origin, occurrence and characteristics of siliceous rocks, and their exploitation and conveyance by prehistoric communities.

Ten years ago Zofia Sulgostowska and Andrzej Jacek Tomaszewski edited a volume celebrating Romuald Schild's 70th birthday (Sulgostowska and Tomaszewski 2008) and, one decade later, we would like to dedicate this volume to him in celebration of his 80th birthday. The summary of Schild's extensive scientific work appears in Zofia Sulgostowska and Andrzej Jacek Tomaszewski's – *On the 80th birthday of Professor Romuald Schild* (pp. 11–13). The bibliography of Professor Schild was assembled and prepared by Katarzyna Kerneder-Gubała (pp. 15–19).

Most of the papers published here were presented in preliminary form at a conference held in the Institute of Archaeology and Ethnology Polish Academy of Science in Warsaw on May 12, 2015, entitled: *Flint in time and space – Time and space in flint: Use of geochemical and petrographical methods in archaeology*. The meeting was supported by Polish Academy of Science and the Institute of Archaeology and Ethnology PAS with the aim of fostering cooperation and communication between scientists from different fields (Fig. 1).

The first three papers in the volume provide information on new flint sources, new deposits, and outcrops. In *Siliceous raw material from Bieszczady Mountains: Sources and use* (pp. 21–31) Andrzej Pelisiak presents the results of his latest research connected with Late Neolithic and Early Bronze Age human occupation in the Bieszczady Mountains. Two researchers (Zsolt Mester and Norbert Faragó) present new information on Hungarian limnosilicites in *Prehistoric exploitations of limnosilicites in Northern Hungary: problems and perspectives* (pp. 33–50). The last paper in this group, by Jacek Kabaciński and Iwona Sobkowiak-Tabaka, *A newly discovered source of 'banded flint' in the Polish lowlands* (pp. 51–65), illustrates an important first step to distinguish a new



Fig. 1. Professor Romuald Schild concludes the conference *Flint in time and space – Time and space in flint: Use of geochemical and petrographical methods in archaeology* at the Institute of Archaeology and Ethnology PAS, Warszawa. 12 May 2015. Photo D.H. Werra.

type of flint – Pęgów flint – by conducting instrumental neutron activation analysis (INAA). These four articles address the first step of work with siliceous rocks – field investigations and initial, mostly macroscopic, differentiation.

The next group of papers feature collaborations between archaeologists and geologists, petrologists, and geochemists. In *Erratic flint from Poland: Preliminary results of petrographic and geochemical analyses* (pp. 67–82) Iwona Sobkowiak-Tabaka and colleagues present the results of petrographic and geochemical analyses of the erratic flint from present-day Poland using electron probe micro analysis (EPMA), scanning electron method (SEM) and energy-dispersive x-ray fluorescence (EDXRF) spectrometry. Next, Marcin Szeliga and Miłosz Huber, in *Mineralogical and petrographic characteristic of basic types of Turonian flints from the north–eastern margin of the Holy Cross Mountains: a preliminary report* (pp. 83–97) provide descriptions of the mineralogical-petrographical characteristics of Turonian flints from the Holy Cross (Świętokrzyskie) Mountains. In the following article *On the chemical composition of ‘chocolate’ flint from central Poland* (pp. 99–114) the editors of this volume and Rafał Siuda present the initial results of EDXRF spectrometric analysis of ‘chocolate’ flint from outcrops located on the northeastern slopes of the Świętokrzyskie (Holy Cross) Mountains. These three papers on employing instrumental methods are promising, while emphasizing that there is still much progress to be made along these lines. The last paper in this group *Reflectance spectroscopy as a chert sourcing method* (pp. 115–128) by Ryan Parish presents the results of analysis of a large number of chert artifacts from different geological formations to support his position that reflectance spectroscopy is a viable methodology for chert provenance research.

The next five articles are devoted mainly to archeological data. The first of these, Henrik Zoltán Tóth's *Palaeolithic heat treating in Northeastern Hungary?: An archaeometric examination of the possible use of fire-setting in Stone Age quarries in the Bükk area* (pp. 129–135) discusses signs of thermal alternations supported by laboratory testing, concluding that the Paleolithic use of fire-setting to extract lithic raw material cannot be excluded. Next, in *Archaeometric study of some functional tools from the Saspów and Wierzbica ‘Zełe’ flint mines sites* (pp. 137–150), Jolanta Małeczka-Kukawka and colleagues employ use-wear analysis, laser ablation, and SEM-EDS to examine red marks on the surface of flint tools, identifying the material traces as indicative of evidence for human processing of ochre. Next, in *The Lublin-Volhynian culture retouched blade daggers in light of usewear analysis of artefacts from burials at site 2 in Książnice, Poland* (pp. 151–165), Stanisław Wilk and Bernadeta Kufel-Diakowska present the results of use-wear analysis made on flint daggers to evaluate the suggestion that those artifacts signified social prestige in Lublin-Volhynian culture communities. They conclude that important social roles in Lublin-Volhynian culture may not have been determined exclusively on the basis of wealth. In *Early Neolithic flint mining at Södra Sallerup, Scania, Sweden*, Åsa Berggren and colleagues (pp. 167–180) describe the history of research at the mine and the most recent excavation, conducted in

2014. This article presents important facts about the mine (its geology, mining methods and tools, chronology, production and mining activity) as well as the social and cultural context of mining undertaken there. Finally, in *The use of erratic stone by the communities of the Linear Pottery culture: a view from the excavations in Kostomłoty, site 27, province of Lower Silesia*, Mirosław Furmanek and Mirosław Masojć (pp. 181–200) examine the differences in flintworking in the settlement at Kostomłoty, suggesting that observed differences were not related so much to the location of the site on the marginal of the centre of Linear Pottery culture settlement, as they were to the settlement reorganization and diminution of long-distance contacts characteristic of post-Linear Pottery culture groups.

Taken together, we hope that the chapters in this volume will contribute to, and advance, the research pioneered by Krukowski and Samsonowicz emphasizing interdisciplinary analysis and the contributions it can make to understanding the archaeological past.

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REFERENCES

- Balcer, B. 1975. *Krzemień świciechowski w kulturze pucharów lejkowatych. Eksploatacja, obróbka i rozprzestrzenienie*. Wrocław–Warszawa–Kraków–Gdańsk.
- Balcer, B. 1976. Position and stratigraphy of flint deposits, development of exploitation and importance of the Świeciechów Flint in prehistory. *Acta Archaeologica Carpathica* 16: 179–199.
- Bąbel, J.T. 2014. „Krzemionki Opatowskie”, najważniejszy zabytek górnictwa pradziejowego w Polsce. In D. Piotrowska, W. Piotrowski, K. Kaptur and A. Jedynek (eds), *Górnictwo z epoki kamienia: Krzemionki–Polska–Europa. W 90. Rocznicę odkrycia kopalni w Krzemionkach*, 53–121. Ostrowiec Świętokrzyskie, Silex et Ferrum I.

- Borkowski, W., Libera, J., Sałacińska, B. and Sałaciński, S. (eds.) 2008. *Krzemień czekoladowy w pradziejach. Materiały z konferencji w Orońsku 8–10 X 2003*. Warszawa-Lublin.
- Budziszewski, J. 2008. Stan badań nad występowaniem i prądziejową eksploatacją krzemieni czekoladowych. In W. Borkowski, J. Libera, B. Sałacińska and S. Sałaciński (eds.), *Krzemień czekoladowy w pradziejach. Materiały z konferencji w Orońsku 8–10 X 2003*, 33–106. Warszawa-Lublin.
- Budziszewski, J. and Michniak, R. 1983/1989. Z badań nad występowaniem, petrograficzną naturą oraz prahistoryczną eksploatacją krzemieni pasiastych w południowym skrzydle niecki Magoń-Folwarczyska. *Wiadomości Archeologiczne* 49: 151–190.
- Budziszewski, J. and Michniak, R. (eds) 1995. *Guide-Book of excursion 2: northern footslopes of Holy Cross Mountains VIIth International Flint Symposium. Warszawa-Ostrowiec Świętokrzyski. 4–8 September 1995*. Warszawa.
- Gutowski, J. 2004. Oolitowy cykl sedymentacyjny wczesnego kimerydu w profilu Wierzbicy koło Radomia. *Volumina Jurassica* 2 (2): 37–48.
- Krajcarz, M.T., Sudół, M., Krajcarz, M. and Cyrek, K. 2014. Wychodnie krzemienia pasiatego na Wyżynie Ryczowskiej (Wyżyna Krakowsko-Częstochowska). In D. Piotrowska, W. Piotrowski, K. Kapturek and A. Jedynak (eds), *Górnictwo z epoki kamienia: Krzemionka–Polska–Europa. W 90. Rocznice odkrycia kopalni w Krzemionkach*, 53–121. Ostrowiec Świętokrzyski, Silix et Ferrum I.
- Krukowski, S. 1920. Pierwociny krzemieniarskie górnictwa, transportu i handlu w holocenie Polski. Wnioski z właściwości surowców i wyrobów. *Wiadomości Archeologiczne* 5: 185–206.
- Krukowski, S. 1923. Sprawozdanie z działalności państwowego konserwatora zabytków prehistorycznych na okrąg kielecki w r. 1922. *Wiadomości Archeologiczne* 8: 64–84.
- Samsonowicz, J. 1923. O złożach krzemieni w utworach jurajskich północno-wschodniego zbocza Gór Świętokrzyskich. *Wiadomości Archeologiczne* 8: 17–24.
- Krzak, Z. 1965. Tymczasowa charakterystyka kopalni krzemienia w Świeciechowie. *Archeologia Polski* 10: 217–233.
- Krzak, Z. 1970. Wstępna charakterystyka kopalni krzemienia w Ożarowie Opatowskim. *Archeologia Polski* 15: 291–303.
- Lech, J. 1980. Geologia krzemienia jurajskiego-podkrakowskiego na tle innych skał krzemionkowych. Wprowadzenie do badań z perspektywy archeologicznej. *Acta Archaeologica Carpathica*, 20: 163–228.
- Matraszek, B. and Sałaciński, S. (eds) 2002. *Krzemień świeciechowski w pradziejach*. Warszawa.
- Migaszewski, Z.M., Galuszka, A., Durakiewicz, T. and Starnawska, E. 2006. Middle Oxfordian–Lower Kimmeridgian chert nodules in the Holy Cross Mountains, south-central Poland. *Sedimentary Geology* 187: 11–28.
- Pawlikowski, M. 1989. On the necessity of standardization of petrological investigations in archaeology. In J.K. Kozłowski (ed.), *‘Northern’ (Erratic and Jurassic) flint of southern Polish origin in the Upper Palaeolithic of Central Europe*, 7–15. Kraków.
- Schild, R. 1971. Lokalizacja prahistorycznych punktów eksploatacji krzemienia czekoladowego na północnowschodnim obrzeżeniu Gór Świętokrzyskich. *Folia Quaternaria* 39: 1–61.
- Schild, R. 1976. Flint mining and trade in Polish prehistory as seen from the perspective of the chocolate flint of central Poland. A second approach. *Acta Archaeologica Carpathica* 16: 147–177.
- Schild, R. and Sulgostowska, Z. (eds) 1997. *Man and Flint. Proceedings of the VIIth International Flint Symposium, Warszawa–Ostrowiec Świętokrzyski, September 1995*. Warszawa.
- Sulgostowska, Z. and Tomaszewski, A.J. (eds) 2008. *Man–Millennia–Environment. Studies in honour of Romuald Schild*. Warsaw.

