

STONE RAW MATERIALS AS INDICATORS OF HUMAN CONTACT DURING THE STONE AGE

Maciej Pawlikowski

Institute of Mineralogy, Petrography and Geochemistry, AGH-University of Science and Technology, Krakow, Poland

ABSTRACT. With the help of the FLINT computer program it is possible to compare data of various raw materials from different sites and deposits. The data concerning similarity is presented in percentages where 100% means same identity of the compared raw materials. The obtained data concerning the similarity of raw materials is useful for the determination of the origin of artefacts discovered at different archaeological sites.

Stone raw materials are interesting indicator of human migration during the Stone Age. The main problem of identification of the origin of raw materials is the determination of their similarity. The problem concerns the similarity of stone materials discovered at archaeological sites on one hand and rock outcrops in the other hand, as well as the similarity of stones found at different sites. The difficulty for comparison comes from the various description of raw materials discovered as artefacts at different sites (each archaeologist do this by his/her own way) as well as from lack of differentiation of the deposits (Alexandrowicz et al., 1999; Bańdo et al., 1993; Gatsov et al., 1990; Ginter et al., 1988; 1997; 2002; 2007; Kaczanowska, Kozłowski, Pawlikowski, 1979; 1989; 1996; Kamińska et al., 2000; Kozłowski, Pawlikowski, 1989; 1998a; 1998b; Kumuzelis et al., 1995; Pawlikowski, 1980; 1984; 1986; 1990a; 1990b; 1990c; 1991; 1992a; 1992b; 1993a; 1993b; 1993c; 1994a; 1994b; 1995a; 1995b; 1996; 2001; 2002a; 2002b; Pawlikowski et al., 1998; Yalcinkaya et al., 1995).

Due to the mentioned problems and because of the necessity of standardization of archaeological investigation (and description) a FLINT computer programme was created. Moreover, we started in 1980 to collect various stone raw materials (flints, obsidians, radiolarites, etc.) from archaeological sites as well as from natural deposits. So far, we have made a big lithoteca where most of the raw materials have a full macroscopic, microscopic and chemical data description (Table 1-2; Fig. 1). With the help of the FLINT computer program it is possible to compare data of various raw materials from different sites and deposits. The data concerning similarity is presented in percentages where 100% means same identity of the compared raw materials. The obtained data concerning the similarity of raw materials is useful for the determination of the origin of artefacts discovered at different archaeological sites.

Table 1

Example of mineralogical data (collected in FLINT computer program): analyses of grey flint (Pre- and Protodynastic site near Armant, Upper Egypt)

0. Locality	:	>> ARMANT <<		11. Grain size comp.:	
1. Sample	:	E-Arm-F3	- s -	0-5	: 87 %
2. Colour	:	light-Grey		5-10	: 8.2 %
3. Colour in UV	:	light-Grey		10-20	: 4.8 %
4. Patina	:	no data		20-40	: 0 %
5. Intercalations	:	no interc.		12. Comp. of elements:	
6. Gloss	:	satine		Ca	: 4.45 %
7. Transparency	:	bad		Mg	: 0.62 %
8. Cleavage	:	good		Na	: 0.033 %
9. Fracture	:	conchoidal		K	: 0.012 %
10. Mineral comp.	:			Fe	: 0.0100 %
Chalcedony	:	87	%	Mn	: 0.0020 %
Quartz	:	10.2	%	Zn	: 0.0032 %
Opal	:	0	%	Ni	: 0.0025 %
Carbonates	:	2.4	%	Cu	: 0.0005 %
Micas	:	0	%	Pb	: 0.0025 %
opaque min.	:	0.10	%	Cr	: 0.0020 %
other	:	0	%	Al	: ----
				13. Frequency	: big

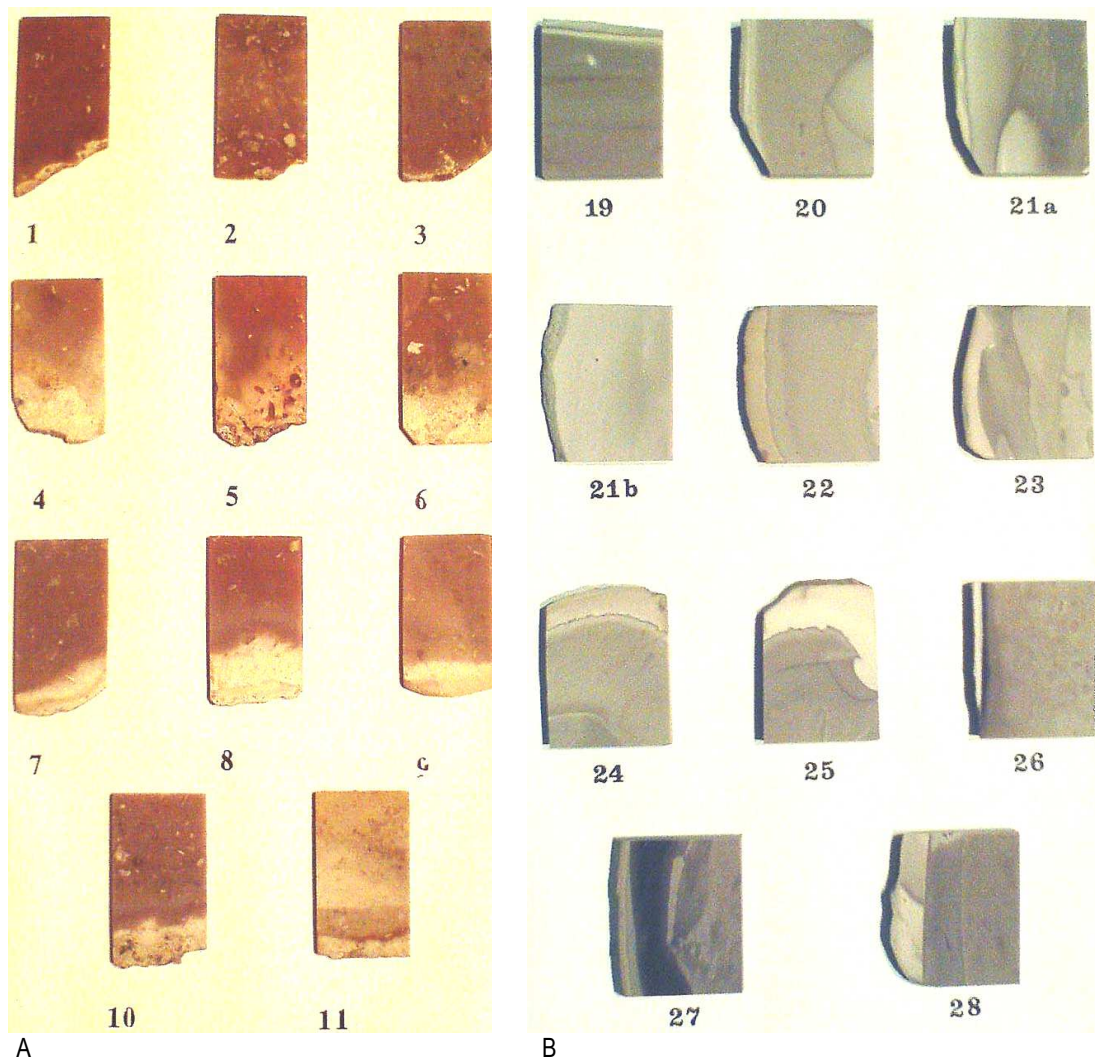


Fig. 1. Examples of collected raw materials – flints: A – Poland, Gojsć Palaeolithic site, various Jurassic flints (1-11); B – Upper Egypt (natural outcrops near the Kings's Valley), various types of Eocene flints (1-28)

Table 2

Example of mineralogical data (collected in FLINT computer program): analyses of Grey flints, Grubgraben Palaeolithic site (Lower Austria)

0. Locality	: >> Grubgraben <<	11. Grain size comp.:	
1. Sample	: A-Gr-F2 - S -	0-5	: 63 %
2. Colour	: greyish-Brown	5-10	: 31 %
3. Colour in UV	: Yellow-redish	10-20	: 4.0 %
4. Patina	: White	20-40	: 2.0 %
5. Intercalations	: no interc.	12. Comp. of elements:	
6. Gloss	: satine	Ca	: 0.043 %
7. Transparency	: medium	Mg	: 0.018 %
8. Cleavage	: good	Na	: 0.021 %
9. Fracture	: conchoidal	K	: 0.012 %
10. Mineral comp.		Fe	: 0.090 %
Chalcedony	: 63 %	Mn	: 0.0005 %
Quartz	: 36.7 %	Zn	: 0.0001 %
Opal	: 0 %	Ni	: 0.0000 %
Carbonates	: 0.30 %	Cu	: 0.0000 %
Micas	: 0 %	Pb	: 0.0008 %
opaque min.	: 0.10 %	Cr	: 0.0003 %
other	: 0 %	Al	: ----
		13. Frequency	: medium

Conclusion

The introduction of computer techniques into the examination of archaeological sites makes necessary the unification of artefact description. Without unification, the comparison of artefacts and other features present at the sites, as well as the determination of real relations (in the past) between human groups is mere science fiction.

References

- Alexandrowicz, W. P., A. Durisova, L. Kaminska, B. Kazior, J. K. Kozłowski, M. Pawlikowski, K. Sobczyk. 1999. Gravettian/Epigravettian transition in the Vah valley in the light of new excavations in the Moravany-Banka near Pestany (Western Slovakia). – *Prehistoire Europeenne*, 14, 79-107.
- Bańdo, Cz., B. Drobniwicz, J. K. Kozłowski, A. Montet-White, M. Pawlikowski, K. Sobczyk. 1993a. Fosses d'extraction de taille a Wołowice, pres de Cracovie, Pologne. – *Antropologie (Paris)*, 97, 2-3, 111-130.
- Bańdo, Cz., A. Dagnan-Ginter, J. K. Kozłowski, A. Montet-White, M. Pawlikowski, K. Sobczyk. 1993b. Fosses d'extraction et ateliers de taille a Wołowice, Pres de Cracovie, Pologne. – *Antropologie (Paris)*, 97, 2-3, 271-290.
- Gatsov, I., B. Ginter, J. K. Kozłowski, H. Laville, M. Pawlikowski, N. Sirakov, C. Sirakova, C. Ferrier. 1990. Temnata Cave near Karlukovo (Bulgaria) an important geological and archaeological sequence in Northern Balkans (Excavation 1984-1985). – *Studia Praehistorica*, 10, 453 p.
- Ginter, B., J. K. Kozłowski, M. Lityńska, M. Pawlikowski. 1988. Field report from the excavation of the site MA 21/83 and MA 21a/83 near Armant in Upper Egypt in 1986. – *Mitteil. Deutschen Archaeol. Institut, Abl. Kairo*, 44, 86-104.
- Ginter, B., J. K. Kozłowski, M. Pawlikowski. 1997 (1996). Raw material procurement in the Tarifian and in the Nagada Culture: a case study from the Nile Valley in Upper Egypt. – In: *International Contacts in the Late Prehistory of Northeastern Africa*. Poznań, 165-179.
- Ginter, B., M. Połtowicz, M. Pawlikowski, S. Skiba, J. Trąbska, A. Wacnik, M. Winiarska-Kabacińska, P. Wojtał. 2002. Dzierżysław 35 – stanowisko magdaleńskie na przedpolu Bramy Morawskiej. – In: *Starsza i środkowa epoka kamienia w Karpatach Polskich*. Wyd. Muzeum Podkarpackie w Krośnie, 111-147.
- Ginter, B., M. Pawlikowski, A. Pazdur, M. Połtowicz, S. Skiba, A. Wacnik, J. Trąbska, P. Wojtał. 2007. Środowisko przyrodnicze w rejonie stanowiska magdaleńskiego na płaskowyżu głubczyckim. – *Prace Kom. Paleogeogr. Czwartorzędu PAU, Kraków*, 53-61.
- Kaczanowska, M., J. K. Kozłowski, M. Pawlikowski. 1979. Z dalszych badań nad surowcami krzemiennymi w południowej części Wyżyny Krakowsko-Częstochowskiej. – *Acta Archeol. Carpath.*, 19, 201-216.
- Kaczanowska, M., J. K. Kozłowski, M. Pawlikowski. 1984. *Flint's raw material from Yugoslavia*. Beograd, 260 p.
- Kamińska, L., J. K. Kozłowski, B. Kazior, M. Pawlikowski, K. Sobczyk. 2000. Long term stability of raw materials procurement systems in Middle and Upper Palaeolithic of Eastern Slovakia: a case study of the Topla/Ondava river valleys. – *Praehistoria*, 1, 63-81.
- Koumouzelis, M., J. K. Kozłowski, M. Nowak, K. Sobczyk, M. Kaczanowska, M. Pawlikowski, A. Pazdur. 1996. Prehistoric settlement in the Klisoura Gorge, Argolid, Greece (excavations 1993-1994). – *Prehistoric European*, 8, 143-175.
- Kozłowski, J. K., M. Pawlikowski. 1989. Investigations into the northern lithic raw materials in Upper Silesia, Poland. – *Prace Archeol.*, 43, 17-46.
- Kozłowski, J. K., M. Pawlikowski. 1998a. Stratigraphy of loess deposits, palaeomorphological events and human settlement. – In: *Complex of Upper Palaeolithic sites near Moravany, Western Slovakia. Vol. II. Moravany-Lopata II. Excavation 1993-1996 (Ed. J. K. Kozłowski)*. 13-26.
- Kozłowski, J. K., M. Pawlikowski. 1998b. Diachronic approach to the settlement structure and spatial analysis. – In: *Complex of Upper Palaeolithic sites near Moravany, Western Slovakia. Vol. II. Moravany-Lopata II. Excavation 1993-1996 (Ed. J. K. Kozłowski)*. 26-43.
- Kozłowski, J. K., M. Kaczanowska, M. Pawlikowski. 1986. Chipped stone industry – Gomolava. – *Prace Archeol.*, 37, 136 p.
- Kozłowski, J. K., M. Kaczanowska, M. Pawlikowski. 1996. Chipped stone industries from Neolithic levels at Lerna. – *Hesperia. J. Amer. School of Classical Studies at Athens*, 65, 3, 295-372.
- Pawlikowski, M. 1980. Raw materials used in the Gravettian sequence of site C2 at Kraków – Spadzista Street. – *Prace Archeol.*, 42, 75-79.
- Pawlikowski, M. 1989. On the necessity of standarization of petrological investigations in archaeology. – *Prace Archeol.*, 43, 7-15.
- Pawlikowski, M. 1990a. Mineralogical analysis of the loess samples. – In: A. Montet-White. 1990. *The Epigravettian site of Grubgraben, Lower Austria. The 1986-1987 Excavations (Ed. M. Otte)*. Univ. Liege, 37-47.
- Pawlikowski, M. 1990b. Origin of the lithic raw materials. – In: A. Montet-White. 1990. *The Epigravettian site of Grubgraben, Lower Austria. The 1986-1987 Excavations (Ed. M. Otte)*. Univ. Liege, 93-121.
- Pawlikowski, M. 1990c. Mineralogical analysis of raw materials of Stone Age. Methods and Application. – *Materials of Sci. Conference in Kansas – Lawrence*, 34.
- Pawlikowski, M. 1991. Mikroskopische Beschreibung und mineralogisch-petrographische Analyse der Rohstoffe. – In: Kaczanowska, M., J. K. Kozłowski. 1990. *Spatindustrie der Lengyel-Kultur aus Svodin, Slovaeki*. – *Prace Archeol.*, 50, 22-28.
- Pawlikowski, M. 1992a. The origin of lithic raw materials. – In: Kozłowski, J. K., H. Laville, B. Ginter. 1992. *Temnata Cave*. Jagiellonian University Press, 241-288.
- Pawlikowski, M. 1992b. *Petroarcheologia*. Skrypt AGH, N1321, 120 p.
- Pawlikowski, M. 1993a. Mineralogical, petrographical and geochemical analyses of flint from Jurassic limestones of Brzoskwinia, near Kraków. – In: K. Sobczyk, K. 1993. *The Late Paleolithic flint workshops at Brzoskwinia-Krzemionki near Kraków*. – *Zesz. Nauk. UJ*, 55, 74-81.
- Pawlikowski, M. 1993b. Lithic raw materials. – In: Kaczanowska, M. et al. 1993. *Neolithic and Eneolithic chipped stone industries from Sariskie Michalany, Eastern Slovakia*. Jagiellonian University Press, 29-38.
- Pawlikowski, M. 1993c. Wyniki badań mineralogiczno-petrograficznych ceramiki kultury pucha rów lejkowatych z osady w Poganiach. – In: Janikowska, D., J. Wierzbicki.

1993. *Kopalnia surowców mineralnych kultury pucharów lejkwatych w Poganiach woj. Słupsk, Stanowisko 4 (strefa 10). Mat. do Bad. nad Grupa Lupawska Kultury Pucharów Lejkwatych. Inst. Prahistorii UAM. 3, 59-66.*
- Pawlikowski, M. 1994a. Geomorphology and geology of investigated area. – In: Ginter, B., J. K. Kozłowski. 1994. Predynastic settlements near Aremant. – *Studien zur Archaeol. und Geschichte Altagyptiens*, 6, 3-6.
- Pawlikowski, M. 1994b. Artefakt z obsydianu z osadów środkowopleistoceny w Rusku, Gm. Strzegom. – *Śl. Spraw. Archeol.*, 35, 79-84.
- Pawlikowski, M. 1995a. Karain and Okuzini caves, Turkey. General geology of area. Preliminary Report. – *Ankara Universitesi Basimevi XVI Kazi Sunuslari Toplantisi*, 351-369.
- Pawlikowski, M. 1995b. Site profile against the background of regional stratigraphy. – In: Hromada, J., J. K. Kozłowski. 1995. *Complex of Upper Palaeolithic sites near Moravany, Western Slovakia*. Jagiellonian University Press, Kraków, 23-27.
- Pawlikowski, M. 2001. Late Gravettian Shouldered points horizon sites in the Moravany-Banka Area. – In: J. K. Kozłowski. 2001. *Complex of Upper Palaeolithic sites near Moravany, Western Slovakia*. Nitra 2000, 180 p.
- Pawlikowski, M. 2002a. Results of preliminary mineralogical investigation of Tell el Farkha, Nile Delta, Egypt. – *Intern. Conference 'Origin of the State. Predynastic and Early Dynastic Egypt'. Cracow, 28-31th September 2002*, 59.
- Pawlikowski, M. 2002b. Determination of sources of raw materials: Results of field survey in the Burhan River Valley (Region of Antalya, Turkey). – In: Yalcinkaya, I., M. Otte, J. Kozłowski, O. Bar-Yosef Okuzini. 2002. *Final Palaeolithic Evolution in Southwest Anatolia. Earul 96*, Liege, 383 p.
- Pawlikowski, M., W. P. Alexandrowicz, L. Banasz, J. Hromada, J. K. Kozłowski, K. Sobczyk, B. Kazior. 1998. Correlation between loess profiles on the basis of mineralogical, malacological and anthropogenic indicators: a case study from Moravany-Lopata, Western Slovakia. – *Geoarchaeology*, 13, 6, 565-594.
- Yalcinkaya I., J. M. Leotard, M. Kaptal, M. Otte, O. Bar-Yosef, I. Caimi, A. Gautier, F. Gilot, P. Goldberg, J. Kozłowski, D. Lieberman, I. Lopez Bayon, M. Pawlikowski, St. Thiebault, V. Ancion, M. Patou, A. Barbier, D. Bonean. 1995. Les occupations tardiglaciaires du site d'Okuzini (Sud-ouest de la Turquie. Résultats préliminaires). – *Anthropologie*, 100, 4, 562-585.