M E T O D Y I M E T O D O L O G I A

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THE SOURCE OF LATE MESOLITHIC OBSIDIAN RECOVERED FROM RYDNO XIII/1959, CENTRAL POLAND

Abstract: More than 40 years ago R. Schild reported the presence of obsidian and Vistulian lithics at Rydno XIII/1959 in central Poland, and speculated that the geological source for the obsidian lay in the Tokay region of Hungary. Non-destructive energy dispersive x-ray fluorescence analysis was conducted recently on the Rydno XIII obsidian artifacts, and the data generated support R. Schild, M. Marczak and H. Królik's suggestion (1975). The geological source of obsidian from a late Mesolithic site in Poland has been documented for the first time by instrumental data results.

Keywords: obsidian, Mesolithic, non-destructive energy dispersive x-ray fluorescence (EDXRF) analysis, Rydno, central Poland, Tokaj-Eperjes mountains.

Abstrakt: Ponad 40 lat temu na stanowisku Rydno XIII/1959 Romuald Schild odnotował obecność wytworów z obsydianu współwystępujących z krzemieniarstwem późnomezolitycznym (cykl wiślański). Postawiona została wówczas teza, że źródła pochodzenia obsydianu znajdują się w rejonie Tokaju na Węgrzech. W prezentowanym artykule okazy te poddane zostały niedestrukcyjnej metodzie EDXRF. Otrzymane wyniki potwierdzają tezę postawioną przez badaczy w 1975 r. Zaprezentowane wyniki są pierwszymi wskazującymi geologiczne źródło obsydianu z późnomezolitycznego stanowiska z Polski.

Słowa kluczowe: obsydian, mezolit, niedestykcyjna metoda EDXRF, Rydno, środkowa Polska, Góry Tokajsko-Slańskie.

INTRODUCTION

Nearly a century ago Stefan Krukowski (1920; 1922) noted the presence of obsidian at Polish archaeological sites and Józef Kostrzewski (1930) later brought these occurrences to the wider attention of the English-reading world. Many years later, after a more complete inventory and description of eastern European obsidians had been compiled (*e.g.*, O. Williams, J.G. Nandris 1977), neutron activation analysis of these archaeologically significant volcanic glasses (O. Williams-Thorpe, S.E. Warren, J.G. Nandris 1984; 1987) provided the chemical basis for ascribing artifacts to "source" (*i.e.* chemically distinctive varieties of obsidian) on the basis of congruence in elemental composition between geological samples and archaeological artifacts. Subsequent chemical refinements and additions to geological obsidian source profiles have been made using different instrumental methods (*e.g.*, K.T. Biró, I. Pozsgai, A. Vladar 1986; K.T. Biró, G. Bigazzi, M. Oddone 2000; Z. Kasztovszky, K.T. Biró, A. Markó, V.T. Dobosi 2008; M. Oddone, P. Márton, G. Bigazzi, K.T. Biró 1999; C.N. Rosania, M.T. Boulanger, K.T. Biró, S. Ryzhov, G. Trnka, M.D. Glascock 2008).

Obsidian is quite rare in Paleolithic and Mesolithic age archaeological sites in Poland (J.K. Kozłowski 1973, p. 15; B. Ginter 1986; R. Schild, H. Królik, A.J. Tomaszewski 1997; Z. Sulgostowska [1985]1990; *eadem* 2005, pp. 32–33; *eadem* 2006; M. Szeliga 2002), although it increases dramatically at sites in Hungary (K.T. Biró 1997; 2003; 2014; V.T. Dobosi 2011) and in Poland (J. Lech 1987; 1997, p. 628; M. Szeliga 2009) during the subsequent Neolithic. Given the rarity of late Mesolithic obsidian, the specimens from Rydno XIII/1959 were analyzed using non-destructive energy dispersive x-ray fluorescence (EDXRF) to determine their geological source of origin. To our knowledge, this is the first published report[1] of instrumental analysis of obsidian artifacts from a late Mesolithic context in Poland.[2]

THE SITE

Rydno[3] is located in the northeastern foothills of the Holy Cross Mountains (Góry Świętokrzyskie) in proximity to four villages (Łyżwy, Nowy Młyn, Michałów-Piaska and Grzybowa Góra) in the Skarżysko-Kamienna district of central Poland (Fig. 1). The Rydno XIII/1959 site, discovered in 1959 by Stefan Krukowski, is located in Grzybowa Góra.

Excavations, covering an area of 183 square meters, were undertaken at the site in 1959 by Romuald Schild and Stefan Karol Kozłowski (R. Schild, M. Marczak, H. Królik 1975, p. 52). Of special interest here was the excavation of a possible hut and the observation that: “Most of the Vistulian[4] lithics occurred among the apparent hut.

[1] A poster (“Transcarpathian Contacts of the Late Glacial Societies of the Polish Lowlands”) showing the results of analysis of obsidian samples of Swiderian and early Neolithic age was presented by I. Sobkowiak-Tabaka, Z. Kasztovsky, J. Kabaciński, B. Maróti, and K. Biró at the 2013 annual meeting of the European Association of Archaeologists, Pilsen, Czech Republic.

[2] On the basis of morphology, A.J. Tomaszewski, H. Królik, E. Ciepielewska, B. Laprus-Madej, D. Mańka (2008, p. 295) proposed that the core and other obsidian artifacts could belong to the Final Palaeolithic Arch-Backed Piece technocomplex (ABP) component at the site, dated ca. 11,700–10, 750 BP (Z. Sulgostowska 2005, p. 57). Z. Sulgostowska (2005, p. 111) also noted that the obsidian core was knapped in a non-Vistulian style. More recently, while acknowledging the overlap between the late Mesolithic and ABP component at the site (R. Schild, H. Królik, A.J. Tomaszewski, E. Ciepielewska 2011, p. 366), R. Schild wrote that “Slovakian or Hungarian obsidian is know from some Vistulian camps, *e.g.*, Cut XIII/1959” (R. Schild, H. Królik, A.J. Tomaszewski, E. Ciepielewska 2011, p. 78).

[3] Rydno, the name proposed by Stefan Krukowski, applies to an area containing several distinct archaeological sites (*cf.* A.J. Tomaszewski, H. Królik, E. Ciepielewska, B. Laprus-Madej, D. Mańka 2008, pp. 293–294). The name has no real meaning in Polish. It draws on the words “rudy” (red) and “rydz” (red mushroom), evocative of the red colored soils of the ochre-bearing site (R. Schild, H. Królik, A.J. Tomaszewski, E. Ciepielewska 2011, p. 15).

[4] The Mesolithic in Poland is divided into two cycles – the Narvian (ca. 9700–8000 BP) and the Vistulian (ca. 7300–6500 BP; Z. Sulgostowska 2005, pp. 74, 80). In this context, the term ‘cycle’ would

Fig. 1. The location of Rydno XIII/1959, Skarżysko-Kamienna district, in relation to obsidian sources of the Tokaj-Eperjes Mountains in northeast Hungary and southeast Slovakia

A – Kašov ("quasi-source" C1a) and Viničky (geological source C1b), Slovakia; B – Erdőbénye-Setétes (geological source C2E), Mád-Kakashegy (geological source C2E) and Tolcsva-Patkóhegy (geological source C2T), Hungary. After R. Schild, H. Królik, A.J. Tomaszewski, E. Ciepielewska 2011, Fig. 1.1.; L. Kaminská 2013, Fig. 1; J.K. Kozłowski 2013, Fig. 9

Ryc. 1. Położenie stanowiska Rydno XIII/1959, pow. skarżyski, w stosunku do złóż obsydianu w rejonie Gór Tokajsko-Slańskich w północno-wschodnich Węgrzech i południowo-wschodniej Słowacji

A – Kašov („pseudo-złoże" C1a) i Viničky (geologiczne złoże C1b), Słowacja; B – Erdőbénye-Setétes (geologiczne złoże C2E), Mád-Kakashegy (geologiczne złoże C2E) i Tolcsva-Patkóhegy (geologiczne złoże C2T), Węgry. Wg R. Schilda, H. Królik, A.J. Tomaszewskiego, E. Ciepielewskiej 2011, ryc. 1.1.; L. Kaminskiej 2013, ryc. 1; J.K. Kozłowskiego 2013, ryc. 9

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be equivalent to 'period' in North American archaeology, but in Polish archaeology it also carries culture-historical connotations. For example, the Narvian cycle is synonymous with "kultura komornicka" (Komornicka culture) and the Vistulian cycle is synonymous with "kultura janisławicka" (Janislavician culture) in central Poland (S.K. Kozłowski 1972, p. 128; R. Schild, M. Marczak, H. Królik 1975, p. 57; R. Schild, H. Królik, A.J. Tomaszewski, E. Ciepielewska 2011, p. 350; Z. Sulgostowska 2005, p. 217).

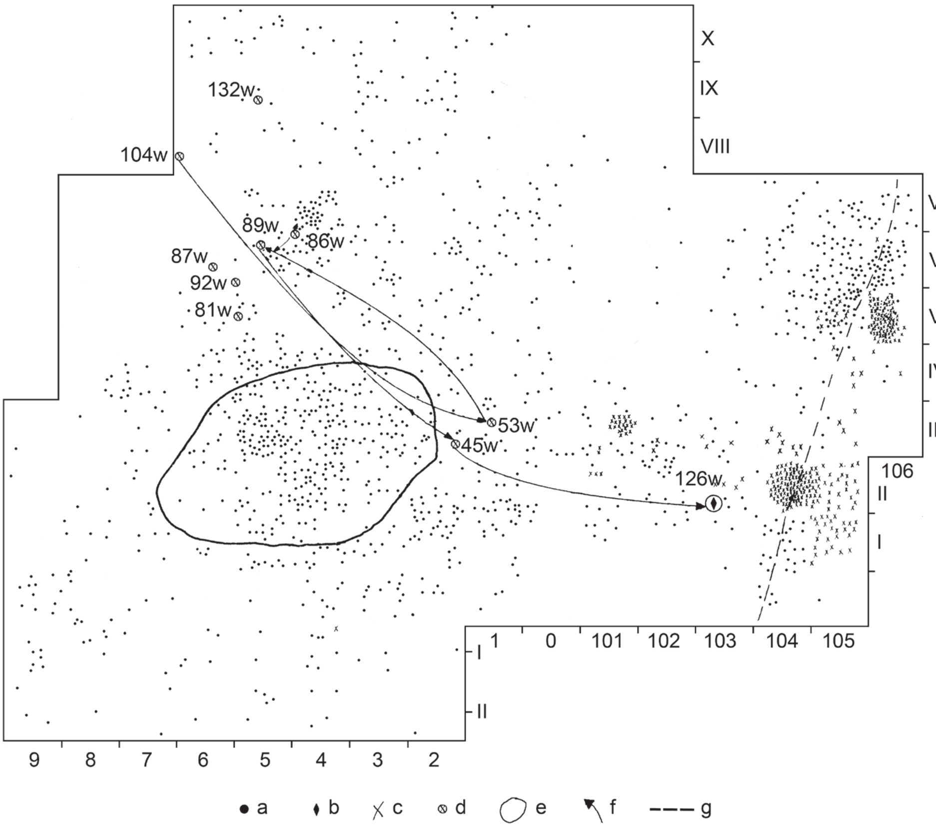

Fig. 2. The location of obsidian artifacts at Rydno XIII/1959, Skarżysko-Kamienna district, in relation to other Vistulian lithics from the site

a – pieces of flint (flakes, blades, chips); b – core; c – small fragments of bone; d – obsidian; e – line indicates limits of the hut; f – lines indicate refitting; g – to the south of the broken line the site is partly destroyed.

After R. Schild, M. Marczak, H. Królik 1975, Fig. 50 updated

Ryc. 2. Układ przestrzenny wytworów z obsydianu w relacji do innych materiałów późnomezolitycznych na stanowisku Rydno XIII/1959, pow. skarżyski

a – wytwory krzemienne (odłupki, wióry, łuski); b – rdzeń; c – małe fragmenty kości; d – obsydian; e – zarys obiektu mieszkalnego; f – linie wskazujące okazy złożone; g – na południe od przerywanej kreski – obszar częściowo zniszczony.

Wg R. Schilda, M. Marczak, H. Królik 1975, ryc. 50 ze zmianami

Almost all of the raw material in Rydno XIII/1959 comes from the western group of chocolate flint quarries, probably from Tomaszów Mine (R. Schild, H. Królik, M. Marczak 1985); of interest is the presence of obsidian" (R. Schild, H. Królik, A.J. Tomaszewski, E. Ciepielewska 2011, pp. 351, 366).

The obsidian was not directly associated with this hut, but its cooccurrence with other Vistulian lithics at the site was taken as support for an age identity between them (R. Schild, M. Marczak, H. Królik 1975; R. Schild, H. Królik, A.J. Tomaszewski, E. Ciepielewska 2011; see Fig. 2).

OBSIDIAN ARTIFACTS

Ten obsidian artifacts were recovered from Rydno XIII/1959 (Fig. 2). In Late Mesolithic times, three of these specimens (numbers 45w, 53w, and 104w in Fig. 2) had been detached from, and were later refitted in the laboratory to, the obsidian core (no. 126w) recovered from the site (R. Schild, M. Marczak, H. Królik 1975, p. 110). Table 1 provides a description of all of the obsidian artifacts from Rydno XIII/1959, as illustrated in Fig. 3 herein.

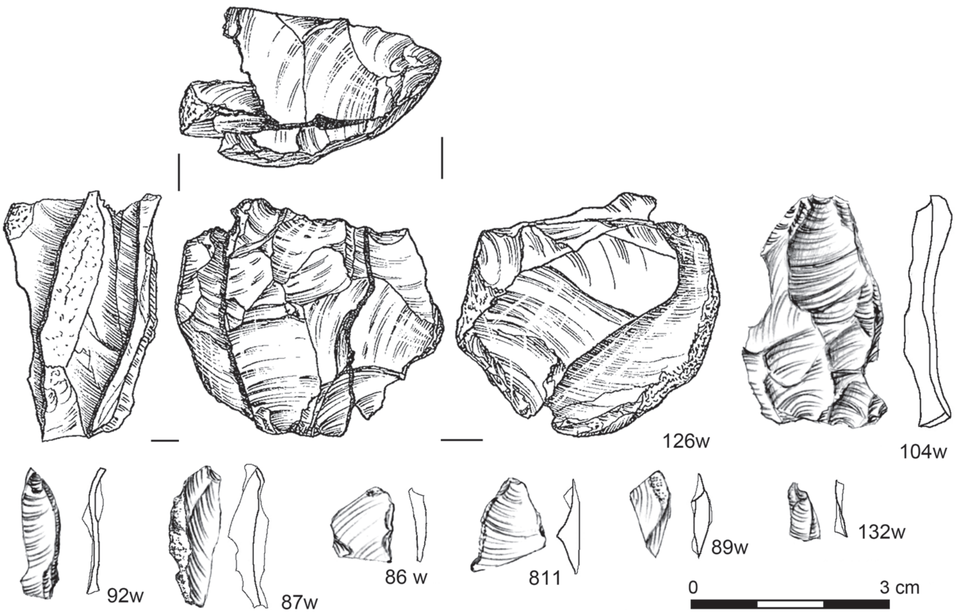

Fig. 3. The obsidian artifacts recovered from Rydno XIII/1959, Skarżysko-Kamienna district. Descriptions of each artifact appear in Table 1.

Drawn by E. Gumińska; 126w after A.J. Tomaszewski, H. Królik, E. Ciepielewska, B. Laprus-Madej, D. Mańka 2008, Fig. 2:20

Ryc. 3. Wytwory z obsydianu zarejestrowane na stanowisku Rydno XIII/1959, pow. skarżyski. Opis każdego z okazów znajduje się w tabeli 1.

Rys. E. Gumińska; 126w za A.J. Tomaszewskim, H. Królik, E. Ciepielewską, B. Laprus-Madej, D. Mańką 2008, ryc. 2:20

LABORATORY ANALYSIS: INSTRUMENTATION

Non-destructive analyses of the Rydno XIII/1959 obsidian artifacts were performed by the senior author on a QuanX-EC™ (Thermo Electron Corporation) EDXRF spectrometer equipped with a silver (Ag) x-ray tube, a 50 kV x-ray generator, digital pulse processor with automated energy calibration, and a Peltier cooled solid state detector with 145 eV resolution (FWHM) at 5.9 keV. The x-ray tube was operated at

Table 1. Description of the obsidian artifacts recovered from Rydno XIII/1959, Skarżysko-Kamienna district
Tabela 1. Opis artefaktów z obsydianu odkrytych na stanowisku Rydno XIII/1959, pow. skarżyski

Catalogue number	Description	Diameter (mm)	Length (mm)	Width (mm)	Thickness (mm)	Weight (g)	Illustrated
81w	Fragment of flake, with less than 10 per cent of cortex or other natural surface remaining; with punctiform platform	15	11,5	12	2	0,3	Fig. 3: 81w
86w	microflake	10,5	10,5	9	3	0,3	Fig. 3: 86w
87w	Secondary blade: 10–90 per cent of cortex or other natural surface remaining; with a flat platform prepared by striking off a single flake	21	21	8	5	0,7	Fig. 3: 87w
89w	microflake	13	13	6	2,5	0,1	Fig. 3: 89w
92w	Tertiary blade without distal section: less than 10 per cent of cortex or other natural surface remaining; with punctiform platform	19	19	6,5	1,5	0,2	Fig. 3: 92w
104w	Tertiary flake; with less than 10 per cent of cortex or other natural surface remaining; with a flat platform prepared by striking off a single flake; (originally refitted with core no. 126w)	36	35	22	5	3,3	Fig. 3: 104w
126w	Multiplatform core for flakes and blades; refitted with 3 pieces no. 126w, 45w and 53w; also no. 104w was originally refitted with core which can be seen on Fig. 3: 126w	40	34	40	17	20,8	Fig. 3: 126w
132w	microflake	9	8,5	5	1,5	Less then 0,1 g	Fig. 3: 132w

differing voltage and current settings to optimize excitation of the elements selected for analysis. In this case, analyses were conducted for the elements: rubidium (Rb Kα), strontium (Sr Kα), yttrium (Y Kα), zirconium (Zr Kα), niobium (Nb Kα), and barium (Ba Kα). Iron vs. manganese (Fe Kα/Mn Kα) ratios also were generated for each artifact, and x-ray tube current was scaled automatically to the physical size of each specimen.

X-ray spectra were acquired and elemental intensities extracted for each peak region of interest, then matrix correction algorithms were applied to specific regions of the x-ray energy spectrum to compensate for inter-element absorption and enhancement effects. Following these corrections, intensities were converted to concentration estimates by employing a least-squares calibration line established for each element from analysis of up to 30 international rock standards certified by the U.S. Geological Survey, the U.S. National Institute of Standards and Technology, the Geological Survey of Japan, the Centre de Recherches Pétrographiques et Géochimiques (France), and the South African Bureau of Standards. Further details pertaining to x-ray tube operating conditions, calibration, and element-specific measurement precision appear in R.E. Hughes (1994; 2010a).

LABORATORY ANALYSIS: RESULTS

Table 2 and Fig. 4 present trace element concentration values for the Rydno XIII/1959 obsidian artifacts that were large enough to generate reliable quantitative composition estimates. The Sr/Zr data for all five specimens plot within the range established for Carpathian 1a and 1b obsidians (C.N. Rosania, M.T. Boulanger, K.T. Biró, S. Ryzhov, G. Trnka, M.D. Glascock 2008, Fig. 2; M. Milić 2014, Table 6), erupted in the Tokaj-Eperjes Mountains of northeast Hungary and southeast Slovakia (Fig. 1).[5]

The other three obsidian specimens from Rydno XIII/1959 were too small and thin to generate x-ray counting statistics adequate for proper conversion from background-corrected intensities to quantitative concentration estimates (*i.e.*, ppm), so they were analyzed to generate integrated net count (intensity) data for the elements Rb, Sr, Y, Zr, Nb, Fe and Mn. After background subtraction, the intensities (counts per second) were converted to percentages. The counting data and derived ratios appear in Table 3, and the plotted values appear in Fig. 5. Source assignments were made by comparing the plots for various element intensity ratios determined on artifacts against the parameters of known source types identified in central Europe. Further discussion of this laboratory analysis protocol appears in a publication by R.E. Hughes (2010b). Integrated net peak intensity data (Table 3, Fig. 5) indicate that these three small flakes also were manufactured from Carpathian 1a/1b obsidian.

[5] As K.T. Biró, I. Pozsgai, A. Vladar (1986, p. 17) pointed out, the term "Carpathian" to denote these chemical varieties of obsidian is somewhat unfortunate, because Carpathian refers to the region (actually, the basin) were the obsidians occur and not to the actual geographic sources of the eruptions.

Table 2. Quantitative composition estimates for large obsidian artifacts from Rydno XIII/1959, Skarżysko-Kamienna district
Tabela 2. Szacunkowy udział pierwiastków śladowych w składzie dużych okazów z obsydianu ze stanowiska Rydno XIII/1959, pow. skarżyski

Catalogue Number	Trace Element Concentrations							Obsidian Source (Chemical Type)	Illustrated
	Rb	Sr	Y	Zr	Nb	Ba	Fe/Mn		
86w	212 ± 4	66 ± 3	37 ± 3	68 ± 3	8 ± 2	443 ± 19	23.5	Carpathian 1	Fig. 3: 86w
87w	191 ± 4	60 ± 3	35 ± 3	64 ± 3	10 ± 2	467 ± 22	25.6	Carpathian 1	Fig. 3: 87w
89w	207 ± 4	63 ± 3	35 ± 3	59 ± 3	10 ± 2	401 ± 28	24.8	Carpathian 1	Fig. 3: 89w
104w	196 ± 4	61 ± 3	36 ± 3	62 ± 3	12 ± 2	458 ± 14	26.3	Carpathian 1	Fig. 3: 104w
126w	177 ± 4	56 ± 3	31 ± 3	56 ± 3	11 ± 2	475 ± 14	25.0	Carpathian 1	Fig. 3: 126w
U.S. Geological Survey Reference Standard									
RGM-1 (measured)	146 ± 4	104 ± 4	28 ± 2	219 ± 4	10 ± 2	799 ± 16	65.5	Glass Mtn., CA	
RGM-1 (recommended)[a]	149	108	25	219	9	807	nr	Glass Mtn., CA	

Explanation: values in parts per million (ppm) except Fe/Mn intensity ratios; ± – 2 σ expression of x-ray counting uncertainty and regression fitting error at 120–360 seconds livetime; nr – not reported; [a] – K. Govindaraju 1994.

Objaśnienia: wartości podane zostały w częściach milionowych (ppm), z wyjątkiem intensywności stosunku FE/Mn; ± – 2 σ zobrazowanie obliczenia recesji rentgenowskiej niepewności i regresji błędu na 120–360 sekund trwania; nr – nie zarejestrowano; [a] – K. Govindaraju 1994.

Table 3. Integrated net peak intensity data for small and large obsidian artifacts from Rydno XIII/1959, Skarżysko-Kamienna district
Tabela 3. Zawartość Net Count Rate Data dla małych i dużych okazów z obsydianu ze stanowiska Rydno XIII/1959, pow. skarżyski

Catalogue number	Element Intensities							Intensity Ratios						Obsidian Source (Chemical Type)
	Rb	Sr	Zr	Σ Rb, Sr, Zr	Rb%	Sr%	Zr%	Fe/Mn	Rb/Sr	Zr/Y	Y/Nb	Zr/Nb	Sr/Y	
81w	480	171	250	901	.533	.190	.278	25.7	2.8	2.3	2.9	6.8	1.6	Carpathian 1
92w	531	187	296	1014	.524	.184	.292	25.1	2.8	2.7	2.4	6.6	1.7	Carpathian 1
132w	378	133	199	710	.532	.187	.280	24.2	2.8	2.3	3.1	7.1	1.6	Carpathian 1
86w	427	153	244	824	.518	.186	.296	23.5	2.8	2.6	3.2	8.4	1.6	Carpathian 1
87w	369	133	218	720	.513	.185	.303	25.8	2.8	2.6	2.6	6.6	1.6	Carpathian 1
89w	386	136	195	717	.538	.190	.272	24.8	2.8	2.4	2.6	6.1	1.7	Carpathian 1
104w	388	140	215	743	.522	.188	.289	26.5	2.8	2.4	2.2	5.2	1.6	Carpathian 1
126w	333	121	186	640	.520	.189	.291	25.0	2.8	2.5	2.1	5.3	1.6	Carpathian 1

Explanation: elemental intensities (peak counts/second above background) generated at 30 seconds livetime. Three specimens listed a b o v e the dashed line are small artifacts, plotted in Fig. 5. Specimens listed b e l o w the dashed line are larger specimens plotted in Fig. 4 and, for comparative purposes, in Fig. 5.

Objaśnienia: natężenie pierwiastków (zliczono piki/sekundy powyżej tła) wygenerowano w czasie 30 sekund. Trzy okazy umieszczone powyżej przerwanej linii są niewielkie, wyniki umieszczono na ryc. 5. Okazy umieszczone poniżej przerywanej linii są większe, ich wyniki obrazuje ryc. 4, i dla celów porównawczych ryc. 5.

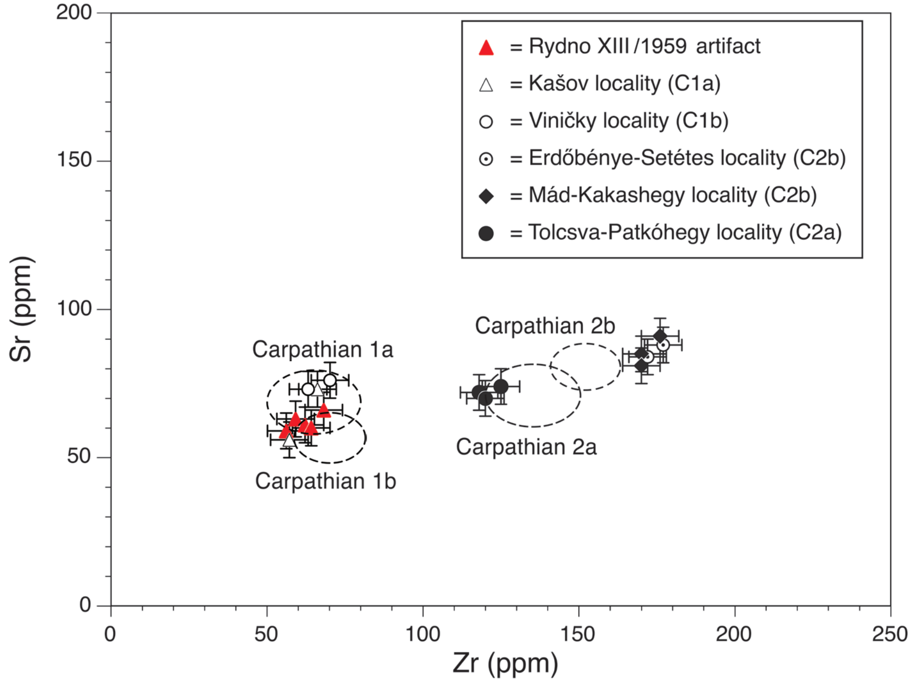

Fig. 4. Sr vs. Zr composition of large obsidian artifacts from Rydno XIII/1959, Skarżysko-Kamienna district, and geological obsidian samples. Red triangles plot values for artifacts from Table 2. Other symbols plot values to geological source specimens. Dashed lines for Carpathian 1a, 1b, 2a, and 2b obsidian after C.N. Rosania, M.T. Boulanger, K.T. Biró, S. Ryzhov, G. Trnka, M.D. Glascock (2008, Fig. 2).

Ryc. 4. Stosunek Sr do Zr w składzie dużych okazów z obsydianu ze stanowiska Rydno XIII/1959, pow. skarżyski, i w geologicznych próbkach obsydianu. Czerwone trójkąty odnoszą się do okazów zaprezentowanych w tabeli 2. Pozostałe symbole oznaczają próbki geologiczne. Przerywana linia dla Carpathian 1a, 1b, 2a i 2b wg C.N. Rosania, M.T. Boulanger, K.T. Biró, S. Ryzhov, G. Trnka, M.D. Glascock (2008, ryc. 2).

DISCUSSION AND CONCLUDING COMMENTS

Nearly 40 years ago, without benefit of instrumental analysis, R. Schild, M. Marczak and H. Królik (1975, pp. 124, 191, 223) wrote that the obsidian was "obviously imported from the Tokay area, Hungary, from a distance of 360 km." The geochemical data presented here provides solid empirical support for their conclusion. However, their conviction that "it is almost sure that the obsidian from the Tokay area found at Rydno XIII/1959 was acquired through the Early Danubian, Neolithic population which possibly, by that time, was also present in the Holy Cross Mountains area and just to the south-east of the range, on the Sandomierz loess mantle" (R. Schild, M. Marczak, H. Królik 1975, p. 225) cannot be evaluated with the meager data presently at hand, nor can we adjudicate B. Ginter's (1986, p. 74) suggestion that the obsidian found at the site was the result of exchange for chocolate flint or hematite.

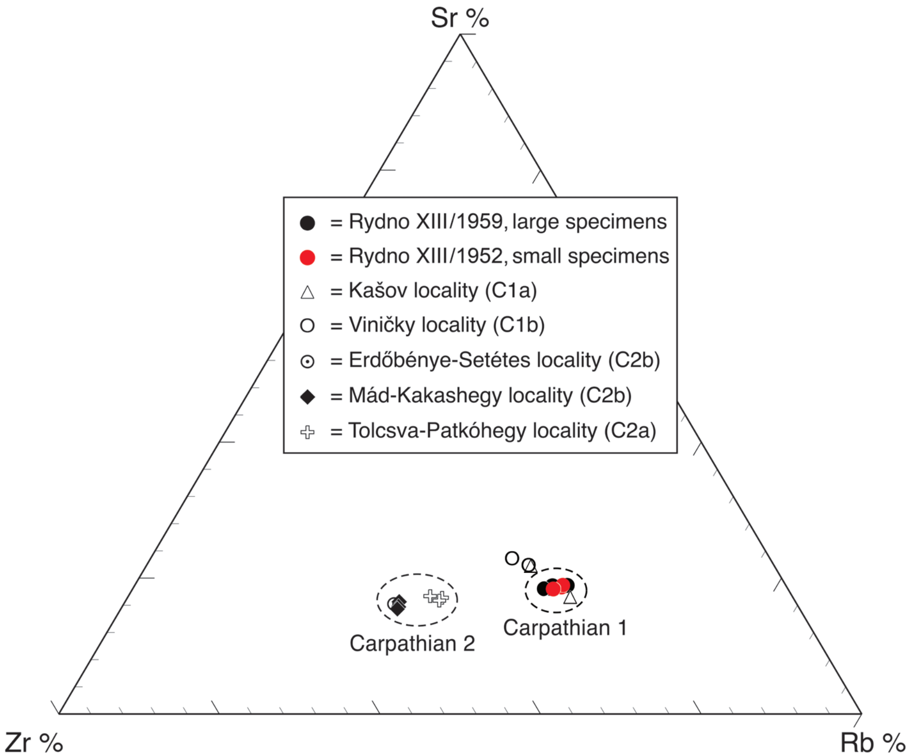

Fig. 5. Ternary diagram plotting Rb/Sr/Zr integrated net peak intensity data for obsidian artifacts from Rydno XIII/1959, Skarżysko-Kamienna district, and geological obsidian samples. Black and red dots plot artifact data from Table 3. Other symbols plot values for geological source specimens.

Ryc. 5. Trójskładnikowy diagram występowania Rb/Sr/Zr prezentujący sieć intensywności danych dla obsydianu ze stanowiska Rydno XIII/1959, pow. skarżyski, i dla geologicznych próbek. Czarne i czerwone kółka wskazują dane dla artefaktów zaprezentowanych w tabeli 3. Pozostałe symbole oznaczają próbki geologiczne.

R. Schild, M. Marczak, and H. Królik (1975) considered the small quantity of obsidian recovered from Rydno XIII/1959 "insignificant" from an economic point of view, but it may not have been unimportant from a social standpoint. M.W. Helms (1988) noted the pervasive, cross-cultural recognition of the "exotic" (*i.e.*, non--local) among human groups (see also J. Taffinder 1998 and A.L. van Gijn 2010), and K.T. Biró (1984, p. 36) noted this specifically with respect to obsidian in the Hungarian Palaeolithic. Consequently, we suggest, as other have (*e.g.*, L. Kozłowski 1923, pp. 109–100; J. Lech 1997, p. 635; Z. Sulgostowska 1986, p. 310; *eadem* 2005, pp. 39, 98, 141, 168, 173, 176, 335; M. Szeliga 2009, pp. 305, 324) that the conveyance of non-local obsidians, like the one reported here from Rydno XIII/1959 from Late Mesolithic times, carried socially significant "bits of information" far greater than their actual numbers. The visual distinctiveness of the volcanic glass may have served as a material correlate of social identity, emblematic of marriage and kinship ties, exchange relationships, and – perhaps – aspects of social ranking. All these possibilities remain to be investigated in Polish prehistory using obsidian provenance analysis. The authors look forward to continuing instrumental analysis of obsidian from well-dated archaeological contexts in Poland, in the hope of identifying contrasts and continuities in its temporal, spatial and functional usage.

Acknowledgments

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Abbreviations

„WA" — „Wiadomości Archeologiczne", Warszawa.
„JAS" — „Journal of Archaeological Science", Waltham, Massachusetts, United States.

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POCHODZENIE OBSYDIANU Z PÓŹNOMEZOLITYCZNEGO STANOWISKA RYDNO XIII/1959, ŚRODKOWA POLSKA

Streszczenie

Prawie sto lat temu Stefan Krukowski (1920; 1922) odnotował obecność wytworów z obsydianu na stanowiskach z ziem polskich. Natomiast wschodnioeuropejskie złoża obsydianu opisane zostały dopiero wiele lat później (O. Williams, J.G. Nandris 1977). Dotychczas, przy użyciu różnych metod, wykonano wiele analiz składu chemicznego obsydianu pochodzącego z różnych znaleziska (m.in. K.T. Biró, I. Pozsgai, A. Vladar 1986; K.T. Biró, G. Bigazzi, M. Oddone 2000; Z. Kasztovszky, K.T. Biró, A. Markó, V.T. Dobosi 2008; M. Oddone, P. Márton, G. Bigazzi, K.T. Biró 1999; C.N. Rosania, M.T. Boulanger, K.T. Biró, S. Ryzhov, G. Trnka, M.D. Glascock 2008).

Na stanowiskach paleolitycznych i mezolitycznych z ziem polskich rzadko spotykane są wytwory z obsydianu (J.K. Kozłowski 1973, s. 15; B. Ginter 1986; R. Schild, H. Królik, A.J. Tomaszewski 1997; Z. Sulgostowska [1985]1990; taż 2005, s. 32–33; taż 2006; M. Szeliga 2002). Natomiast ich udział wzrasta w neolicie (J. Lech 1987; 1997, s. 628; M. Szeliga 2009).

Stanowisko Rydno XIII/1959 (Grzybowa Góra, pow. skarżyski; ryc. 1) odkryte zostało przez S. Krukowskiego, a następnie badane przez R. Schilda i S.K. Kozłowskiego w 1959 r. Jest ono datowane na późny mezolit (cykl wiślański). W trakcie badań archeologicznych zarejestrowano 10 wytworów z obsydianu (tabela 1; ryc. 3), które wystąpiły na przestrzeni całego wykopu archeologicznego pośród materiału krzemiennego (ryc. 2).

Wytwory te po raz pierwszy poddane zostały niedestrukcyjnej analizie metodą energy dispersive x-ray fluorescence (EDXRF). Uzyskane w ten sposób widmo rentgenowskie obrazuje natężenie pierwiastków śladowych ekstrahowanych z każdego okazu.

W tabeli 2 i na ryc. 4 prezentowane są zawartości pierwiastków śladowych obecnych w wytworach obsydianowych z Rydna XIII/1959, które były na tyle duże, że można było uzyskać wiarygodne wyniki. Stosunek Sr/Zr w składzie chemicznym obsydianu wszystkich pięciu okazów odpowiada zasięgom ich obecności w próbkach geologicznych obsydianu typu Carpathian 1a i 1b (C.N. Rosania,

M.T. Boulanger, K.T. Biró, S. Ryzhov, G. Trnka, M.D. Glascock 2008, ryc. 2; M. Milić 2014, tabela 6) występujących w rejonie Gór Tokajsko-Slańskich w północno-zachodnich Węgrzech i południowo-wschodniej Słowacji (ryc. 1).

Pozostałe trzy okazy były nie dość duże, aby wygenerować widmo rentgenowskie. Zostały poddane analizie na obecność następujących pierwiastków śladowych: Rb, Sr, Y, Zr, Nb, Fe i Mn. Dane te zostały zaprezentowane w tabeli 3 i graficznie na ryc. 5. Uzyskane wyniki wskazują, że również małe okazy zostały wykonane z obsydianu Carpathian 1a/1b.

Prawie 40 lat temu R. Schild, M. Marczak i H. Królik (1975, s. 124, 191, 223) wskazali, że obsydian z Rydna XIII/1959 pochodzi z rejonu Tokaju (Węgry) i został przetransportowany na dystans 360 km. Uzyskane wyniki prezentują solidne poparcie dla tej tezy. Kwestią nierozstrzygniętą pozostaje znaczenie tych wytworów dla wspólnot późnomezolitycznych. Skłonni jesteśmy rozważać ich obecność w kategoriach społeczno-kulturowych.

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