



MATERIAL RESEARCH OF SELECTED GANDHARAN RELIEFS DEPOSITED AT THE NATIONAL GALLERY, PRAGUE, CZECH REPUBLIC¹

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Introduction

This study presents results of material research conducted on stone materials sampled from selected Gandharan reliefs deposited at the National Gallery (Prague, Czech Republic). The stone pieces (1–2 mm large) were delivered from museum restorers. Due to the limited amount of material, it was possible to conduct only X-ray diffraction measurements.

X-ray diffraction

X-ray diffraction (XRD) has been employed as the only analytical method to obtain data on mineralogical composition of studied objects. This method requires only small amounts of material in comparison to other analytical techniques.

The rock fragments were homogenised by powdering in an agate cup. The measurement was conducted on DRON–2.1 diffractograph (Institute of Geochemistry) with following measurement conditions: radiation $\text{CuK}\alpha$, secondary monochromator, degree range 3° – 60° 2Θ , step $0,05^\circ$ per 3 seconds, voltage 40 kV, current 20 mA. The raw data were processed using Bede ZDS 1.99 for Windows program (Ondruš 1997) employing diffraction pattern database PDF–2 (JCPDS 1999). The following ICDD cards have been used: 33-1161 (quartz), 34-0175 (muscovite), 24-1047 (paragonite), 29-0701 (clinocllore), actinolite (41-1366), anhydrite (37-1496), antigorite (44-1447), chloritoid (14-0344), talc (29-1493), gypsum (36-0432).

¹ Two pieces Nos. A 14 208 and A 18 182 (a loan to the National Gallery) belong to the collections of the Náprstek Museum and were published by Ladislav Stančo, in: Annals of the Náprstek Museum, 2001, No. 22, pp. 31–64.

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Table 1. Mineralogical composition of studied objects based on XRD data.

Sample	q	mu	par	cli	act	tal	ant	chlo
NpM A 14208	+	+	+					
NpM A 18182	+	+	+	+				
NG Vp 232-2132/1	+	+	+					
NG Vp 783-2132/5	+							+
NG Vp 784-2132/6				+	+	+		
NG Vp 1758-2132/6	+	+	+	+				
NG Vp 2615-2132/8					+	+	+	
NG Vp 3205-2132/11	+	+	+	+				
NG Vp 3206-2132/12	+	+	+	+				

q – quartz; mu – muscovite; par – paragonite; cli – clinochlore; act – actinolite; tal – talc; ant – antigorite; chlo – chloritoid.

Results

Based on the mineralogical composition studied by XRD analysis, the samples can be subdivided into three groups – quartz-muscovite-paragonite-clinocllore schists (samples NpM A 14208, NpM A 18182, NG Vp 232-2132/1, NG Vp 1758-2132/6, NG Vp 3205-2132/11, NG Vp 3206-2132/12), actinolite-talc-clinocllore-antigorite schists (samples NG Vp 784-2132/6, NG Vp 2615-2132/8), and quartz-chloritoid schists (sample NG Vp 783-2132/5).

Based on this analysis, it is not possible to state firmly if these groups represents different source localities or just single source locality with mineralogically different rocks. This should be confirmed by detailed petrographical study of potential source locality(ies) in the future. Comparing our results to the previously published data the studied samples can be of the same provenance as carbonaceous quartz-chlorite-muscovite-chloritoid schists quarried in Swat area, north-west Pakistan (Cribb et al. 1992 and references therein).

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References

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