

Joanna KOSTYLEW¹, Ryszard KRYZA¹, Jan ZALASIEWICZ²

**MÉLANGE AT STANISŁAWÓW AND RZESZÓWEK IN THE
KACZAWA MTS (SUDETES, SW POLAND): PRELIMINARY RESULTS OF
NEW SEDIMENTOLOGICAL AND PETROGRAPHIC INVESTIGATIONS**

INTRODUCTION

Mélanges have been recorded in deep boreholes near Stanisławów in the Chełmiec unit and cropping out along the Kamiennik stream at Rzeszówiek in the Rzeszówiek-Jakuszowa unit of the northern part of the Kaczawa Mts. They have been interpreted as mudrocks subjected to gravitational redeposition within an oceanic trench (Haydukiewicz 1987; Baranowski et al. 1998) and subsequently subjected to deformation and metamorphism during further evolution of the Variscan accretionary prism (Haydukiewicz 1987; Baranowski et al. 1990, 1998; Collins et al. 2000; Kryza et al. 2001).

The Kaczawa mélanges resemble those from recent accretionary prisms; being strongly lithified and amenable to detailed study; they are of considerable research value. Their depositional age remains controversial, though scarce conodonts in a part of the Rzeszówiek profile suggest a Devonian - Early Carboniferous age (Haydukiewicz 1987). Our current investigations are part of a more extensive research project aiming at defining the spatial range of particular bodies of the Kaczawa mélanges, their sedimentological, petrographic and structural characteristics and, consequently, their age, origin and evolution.

METHODS AND SAMPLING

Our initial studies comprised logging and detailed sedimentological and petrographic description of selected drillcore segments from borehole 35/S near Stanisławów obtained from depths of 24.2-116.6 m (part of the “mélange association” according to Baranowski et al. 1998) and 914.2-916.0 m (the “metamudstone-d diabase association”; *op. cit.*). Heavy mineral analysis was carried out using parts of the core fragments (Tab. 1, samples D & E) and three samples of the most characteristic rock varieties in the Rzeszówiek section (Tab. 1, A, B & C). The grey muddy-siliceous slate (specimen C) was interpreted as a large block in the Różana mélange and dated by conodonts as Mid- to Upper Devonian; Haydukiewicz 1987). The heavy mineral concentrates

¹ Institute of Geological Sciences, University of Wrocław, ul. Cybulskiego 30, 50-205 Wrocław, Poland; joko@ing.uni.wroc.pl; rkryza@ing.uni.wroc.pl

² Department of Geology, University of Leicester, University Road, Leicester LE1 7RH, United Kingdom; jaz1@le.ac.uk

(grain-size fractions of 0.125-0.09 and 0.18-0.125 mm, 300 grains identified in each fraction) were analysed using the EDS microprobe technique at Wrocław University.

RESULTS AND CONCLUSIONS

Based on the detailed sedimentological logging which we began in the Stanisławów *mélange* using the core segments from the depth interval of 24.2-116.6 m in borehole 35/S, three facies types in the *mélange* may be distinguished:

- type 1: dark-grey and black mudstones with several twenty millimeters-thick interlayers of fine to medium-grained light sandstone, deposited by a small scale turbidity current (Bouma D-E) in an anoxic environment (Fig. 1);

- type 2: green coarse-grained sandstones with interleaved mudstones (interlamination on a mm/cm scale), deposited by small scale turbidity currents (Bouma D-E);

- type 3: gray medium-grained laminated mudrock (associated with type 2); the mudstones are interleaved with very fine-grained brownish sandstones with reddish mineral spots (probably after pyrite).

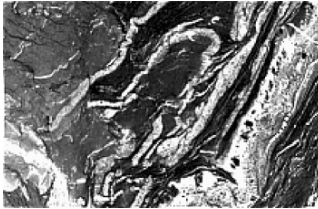


Fig. 1. Scanned thin section of *mélange* (type 1): dark-grey mudstone with strongly deformed and partly disintegrated layers of pale sandstone. Borehole 35/S, depth 24.5 m. The longer edge of photo is 40 mm.

The rocks from the depth of 914.2-916.0 in the same drill core comprise mainly fine- to medium-grained bedded green sandstones (Bouma B-D). The beds vary in thickness from several to under a hundred cm, and are separated by thin (millimeter-size) interlayers of dark mudstone. The two segments of the drillcore, from very different depths, display some structures indicative of soft-sediment deformation (cf. Collins et al. 2002). No trace or body fossils have been noticed in any of the rocks examined by us.

The heavy mineral compositions of the two grain fractions investigated do not differ much. The two *mélange* matrix samples (Tab. 1. A, D) show a considerable amount of pyrite and dark micas (strongly altered biotite). The same components are abundant in the medium-grained green sandstones from Stanisławów (Tab. 1. E). This may be an argument (apart from the textural similarities noted above) for close affinity of some rock types within the “older stratigraphic succession” and the *mélanges*. Two other samples from the Kamiennik stream section (Tab. 1. A, C) contain, very characteristically, Fe-Mg-Mn carbonates (up to 81% in sample C). Further mineralogical and geochemical investigations, focused on more detailed characteristics of the mineral phases, may provide useful constraints for deciphering the origin of these intriguing rocks.

Table 1. Heavy mineral assemblages in studied samples (fraction 0.125-0.09 mm) in vol.%.

Sample	Apatite	Zircon	Ca-Mg-Fe carbonates	Fe-Mg-Mn carbonates	Dark micas	Pyrite	Chalcopyrite	Rutile	Other
A	Muddy mélange matrix (Kamiennik)	1	-	-	5	76	17	-	1
B	Sandstone olistolith (Kamiennik)	31	28	-	-	1	20	2	17
C	Grey muddy-siliceous slate (Kamiennik)	-	-	-	81	8	2	4	5
D	Mélange from Stanisławów (type 1, borehole 35/S, 24.2-5m)	2	1	-	-	12	84	-	1
E	Medium-grained green sandstone from Stanisławów (borehole 35/S, 915.2-4m)	7	3	14	-	11	60	-	5

Acknowledgements: Joanna Kostylew acknowledges financial support from the University of Wrocław internal project no. 2022/W/ING/02.

REFERENCES

- BARANOWSKI Z., HAYDUKIEWICZ A., KRYZA R., LORENC S., MUSZYŃSKI A., SOLECKI A., URBANEK Z., 1990: Outline of the geology of the Góry Kaczawskie (Sudetes, Poland). *Neues Jb. Geol. Paläont. Abh.*, 179: 223-257.
- BARANOWSKI Z., HAYDUKIEWICZ A., KRYZA R., LORENC S., MUSZYŃSKI A., URBANEK Z., 1998: Litologia i geneza zmetamorfizowanych skał osadowych i wulkanicznych jednostki Chełmca (Góry Kaczawskie). *Geologia Sudetica* 31: 33-59.
- COLLINS A. S., KRYZA R., ZALASIEWICZ J., 2000: Macrofabric fingerprints of Late Devonian-Early Carboniferous subduction in the Polish Variscides, the Kaczawa complex, Sudetes. *Journal Geol. Soc. London*, 157: 283-288.
- HAYDUKIEWICZ A., 1987: Melanże Gór Kaczawskich. *Przewodnik 58 Zjazdu Pol. Tow. Geol., Wałbrzych, 17-19 września 1987*: 106-114.
- KRYZA R., ZALASIEWICZ J., MERRIMAN R. J., COLLINS A. S., KEMP S. J., 2001: Mudrocks fabrics and mineralogy – clues to evolving conditions within the Variscan accretionary prism: Kaczawa Mountains, SW Poland. *ESF EURO-PROBE Meeting, Ankara, 30.09–2.10.2001, Abstracts*, p. 36.