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INTRODUCTION TO PETROLOGY OF SEDIMENTARY VEINS IN THE BATHONIAN DEPOSITS (CZĘSTOCHOWA REGION, CENTRAL POLAND)

Abstract: Sediment filled veins from Bathonian siltstones were investigated. Petrologic composition and structural context of veins were analysed. Origin of veins is connected to formation of normal fault system. The majority of granular material in vein fillings is derived from erosion of wall of host rock.

Keywords: veins, sedimentary filling, Częstochowa

INTRODUCTION

Four, sediment filled veins in the Bathonian siltstones from Gnaszyn brick-pit, (about 10 km west of Częstochowa) have been described. In this paper author concerns with the structure and petrology of the sedimentary filling of veins and proposes a mechanism of their formation.

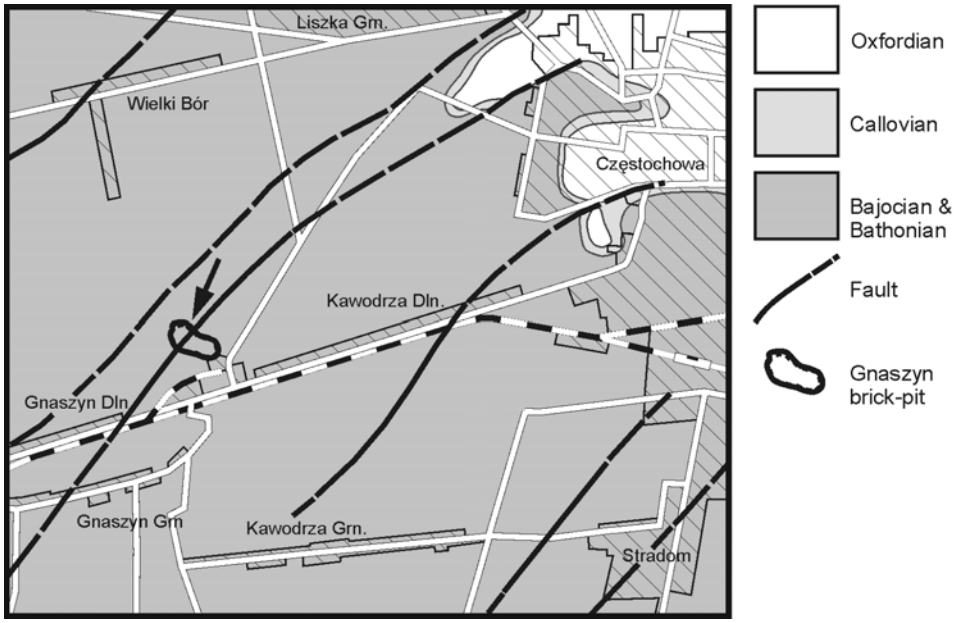

Fig. 1. Geological map westward of Częstochowa. After Mossoczy 1949, simplified.

GEOLOGICAL SETTING

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The study area located west of Częstochowa (Fig. 1) belong to the easternmost part of foresudetic monocline. This area is cut by parallel and sub-parallel system of normal faults (Mossoczy 1949) which origin is suggested to be due to sudetic block uplift in the Tertiary.

The Bathonian sediments are dark-grey, homogenous fine, siltstones, rarely claystones, which are exploited for brick making. Horizons of siderite nodules are the only local correlation levels. Numerous ammonites (Matyja, Wierzbowski 2000; Matyja, Wierzbowski 2003) and other macro- and microfossils (Gedl et. al. 2003) can be found in the studied sediments.

Siltstones contain fine grains up to 0,5 mm and clayey matrix. Most of the grains are angualr quartz. Monocrystalline and non-undulatory quartz grains composes 84-88%, undulatory quartz composes about 7%, and polycrystalline quartz composes 1-2% of the total grain volume. Mica and feldspar compose 3-5% and 1% of total grain volume respectively. The texture of the siltstone is mud-supported.

ORIENTATION AND SIZE OF VEINS

Four veins found in Gnaszyn brick-pit are parallel to each other and their azimuth of strike is parallel to azimuth of the fault found nearby (Fig. 2). Veins are cutting siltstones as well as associated siderite nodules. Along the surfaces of two veins a slight movement ranging from 10 to 90 cm can be recognised, and along surface of one vein there is no movement observed.

Veins are 5 to 20 cm thick, and their lateral extension range from 10 to 50 meters.

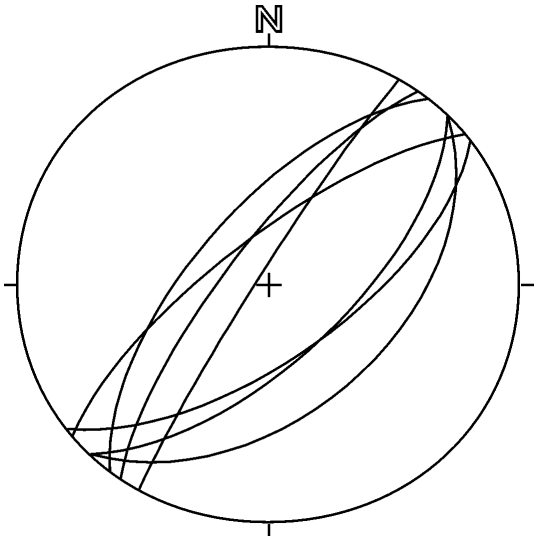

Fig. 2. Diagram of position of veins: intersection of vein surface, lower hemisphere projection. Laterally extended veins are represented by two independent intersections.

SEDIMENTARY FILLING OF VEINS

Two petrologic types of deposits in the vein fillings are recognised. First one is grey, fine lime sandstone. Grains are composed of almost entirely of angular quartz. Most of grains are monocrystalline and non-undulatory quartz (84-85%), undulatory quartz composes about 8-11%, and polycrystalline quartz composes 2-3% of total grain volume. Mica and feldspar compose about 2% and 1% of total grain volume respectively. Size of grain range from 0,1 mm to 0,5 mm. Grains are cemented by calcite of crystals up to 0,1 mm and partly by clayey matrix. The fabric of the sandstone is usually grain supported.

The second type of the sedimentary filling of veins is palisade calcite cement, perpendicular to the walls of sedimentary veins. Usually this type is composed of pure calcite crystals 1-2 mm width and up to 6 mm long. In many cases conservation of sharp crystals terminations by sandstone filling are observed. Sometimes grains of quartz overgrown by single calcite crystal can be found. Palisade cements are thicker in places where veins cut siderite nodules than where it cut siltstones.

Up to five recognisable stages of a vein filling can be composed of these two petrologic types.

ORIGIN OF QUARTZ GRAINS IN THE VEIN FILLINGS

Mineral composition of grains, especially quartz is usually used for recognition of provenience of detrital material (Basu et. al. 1975, Dickinson et. al. 1983). Restrictions concerning grain size and redeposition does not allow present author to speculate about provenience of the detrital material. However comparison between grains of the vein filling and coarse grains of the host rock can show striking similarities. Vein fillings are composed of grain material similar to coarse grains of siltstone of host rock, but are slightly depleted in mica. It can be suggested that the majority of grain material in sedimentary fillings of studied veins is derived from erosion of wall of host rock in the fissure.

MECHANISM OF FORMATION OF VEINS

Formation of veins is due to tectonic activity connected to development of fault system in Częstochowa region. Brittle deformations may have developed in siltstones only under low overload conditions (Maltman 1988).

Initial fissures were filled by palisade calcite cement growing syntaxial, simultaneously to fissure opening. The further opening of fissures caused increase of current flow within voids. Currents eroded walls of fissures removing fine grains (clay minerals, fine quartz and mica). The coarse grains formed residuum subsequently cemented by calcite.

Many alternations of the sandstone internal sedimentand calcite cement in the sedimentary filling of veins suggest that fissures were opened several times and the process of formation of veins was multi-stage process.

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