position of the calcites (in the Vesdre area) suggest precipitation from fluids with an oxygen isotopic composition varying between ≤ –3.5‰ and + 71.4‰ SMOW. The highly variable oxygen isotopic composition of the fluids, the low $\delta^{18}O$ value of –3. 5‰ SMOW and the intense waterrock interaction necessary to leach the metals imply that the original fluids had a meteoric origin. The envisaged fluid flow pattern is the migration of meteoric waters from the uplifted area to the south (Ardennes) towards the edge of the foreland basin.

MVT mineralizations are well known from the southern part of Poland (Krakow area) where they occur in Devonian and Triassic carbonates. They are also present further to the south in the Moravia area (CR). Ferroan calcite cements are also here associated with Pb–Zn sulphides in Tournaisian (Ostrava region) and Famennian (Brno region) limestones. A microtermometric study of the calcites and sphalerites suggests that similar fluids were active as in Belgium. The salinity of the fluids from which the sulphides and ferroan calcites precipitated ranges between 13eq. wt. % and 23eq. wt. % NaCl. However, precipitation generally took place at a lower temperature, i.e. between 40° and 80 °C. Sphalerite formed around 80 °C.

ASPECTS ON THE EVOLUTION OF THE RHENISH BASIN (EARLY DEVONIAN; RHEINISCHES SCHIEFERGEBIRGE; FRG)

J. STETS, A. SCHÄFER, P. WURSTER

Geologisches Institut der Universität Bonn, Nussallee 8, D – 53115 Bonn, FRG

During the Early Devonian, the Rhenish Basin which is a part of the Variscan Rhenohercynian belt was filled in by huge quantities of siliciclastic detritus. The sediments mostly consist of sands and silts, carbonates and clays are lacking. Consequently, the composition of the rocks was uniform throughout that time. Facies distribution and basin evolution were controlled by different facts. Thus, a basin analysis can be made using different aspects.

The sedimentological aspect. In the northern part of the Rhenish Basin, the sedimentary facies of the Siegenian to Emsian is predominantly of deltaic type. Here, paleoflow is directed towards the Southwest. In the central part, a fully marine subtidal environment was established by marked suspension sedimentation or even by turbidity currents. Up to the Early Emsian, this part of the basin was progressively filled in and overwhelmed by the deltaic type of sedimentation from the North. Near to the southern margin of the Schiefergebirge, a neritic to nearshore fully marine environment developed during the Siegenian. Paleoflow was mainly directed towards the Northwest. Thus, sedimentological research results in a conservative model for the Lower Devonian Rhenish Basin.

The geological aspect. Using sedimentological, petrographical and geological data, a transsect running North–South through the Schiefergebirge may demonstrate the basin evolution in Early Devonian time. From the northern margin of the Schiefergebirge, the sedimentary thickness prograded towards the centre of the basin. Sudden differences in thickness and facies are evident in the central and southern part and by this identify the influence of synsedimentary tectonics, the role of which is discussed. Towards the southern margin, thickness decreases again. By this, the basin is subdivided in a more or less stable and thick northern part, a highly mobilized central part and a rifted southern margin. Thus, the evolution of the basin and of its fill was balanced by differential but constant subsidence, by huge input of detritus from the hinterlands, and by eustatic sea–level changes. This evolution ended with the Upper Emsian "Emsquarzit". From now onward, the basin was subdivided into several subbasins and highs following preexisting structures. Rise of the sea level and tectonic mobilization of marginal parts in the South and North of the basin widened the sedimentation area considerably. Together with this, the clastic input diminished and calcareous sediments generated. In addition, volcanic activity increased up to the Early Carboniferous.

The geodynamic aspect. The development of the Rhenish Basin will be discussed under the auspices of the plate tectonics scenary of the Devonian using the hypotheses of A.BERTHELSEN, of W. FRANKE, and of P.A.ZIEGLER. During the Siegenian and the Early Emsian, the sedimentary basin was established on a continental crust within the Caledonian continent in the North and the Mid–German–Crystalline Rise (MCR) in the South. Beginning in the Late Emsian and up to the Early Carboniferous, a highly mobilized and partly oceanic crustal belt generated in the South of the Schiefergebirge at the today position of the Phyllite Zone. This constellation initiated and enabled the deformation during the Variscan orogeny at the end of the Early Carboniferous.

References
Blundell, D. – Freman, R. – Mueller, St. (eds, 1992): A continent revealed. The European Geotraverse. 275 pp, (Cambridge University Press)
Ziegler, P.A. (1989): Evolution of Laurussia. A study in Late Paleozoic Plate Tectonis. 102 pp, (Kluwer Academic Publishers)

METAMORPHIC RIFT BASALTS AND DISMEMBERED OPHIOLITES OF AN EARLY PALEOZOIC OCEAN IN THE SOUTHERN BOHEMIAN MASSIF, AUSTRIA

H.P. STEYRER[1], F. FINGER[2]

[1] *Institut für Geologie und Paläontologie*

[2] *Institut für Mineralogie, Universität Salzburg, Hellbrunner Straße 34, A–5020 Salzburg, Austria*

Several types of metabasites have been recognized in the different horizons of the thick Variscan nappe pile of the southern Bohemian Massif (Steyrer and Finger 1992):

1. Remnants of alkaline to subalkaline rift basalts occur as strongly deformed dikes and dikeswarms in Cadomian and Pre–Cadomian basement (i.e. in the Dobra, Spitz and Bittesch Gneiss).
2. Chemically similar is a group of amphibolites which forms layers (basalt flows or sills) in association with shelf sediments in the Drosendorf unit. One of these amphibolites was dated by Friedl et al. (1993) at 358±6 Ma (protolith age).
3. An assembly of MORB–type amphibolites, gabbros and ultrabasic rocks in the RaabsMeisling unit can be interpreted as a dismembered ophiolite complex.
4. Amphibolites at the basis of the Gföhl unit are chemically quite variable, sometimes of the OIB type, but mostly of the MORB–type, some possibly display a minor influx of a subduction modified mantle source.

The regional distribution of the different types of metabasalts is consistent with the following tectonic model (see Figs.1 and 2).

Panafrican continental crust (represented by the Moravo–Silesian terrane and the Moldanubian Dobra and Spitz gneiss) underwent rifting in the Early Paleozoic and a passive plate margin developed (Drosendorf unit) – see Fig.1 b.

The rift system enlarged to an oceanic stage (Raabs–Meisling ophiolites).

The ocean closed due to subduction below a Variscan active continental margin terrane. A tectonic melange of rocks, including various types of metabasalts, were mixed together in this subduction zone (Gföhl unit).

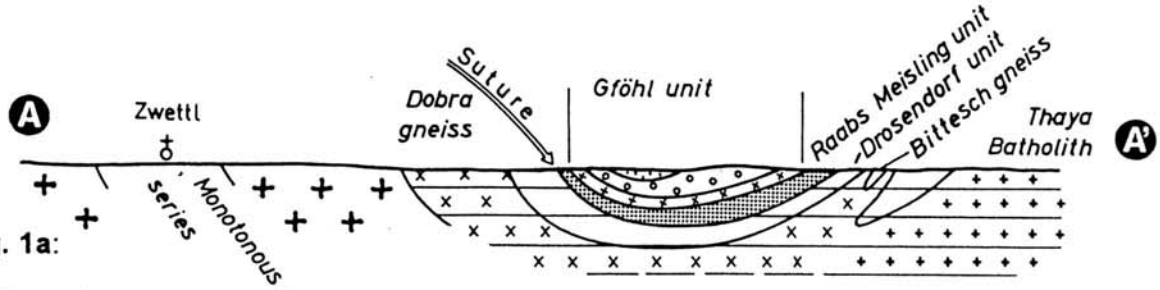

Fig. 1a: E-W section across the Southern Bohemian Massif (slightly modified after Matura 1977). Symbols as in Fig.2.

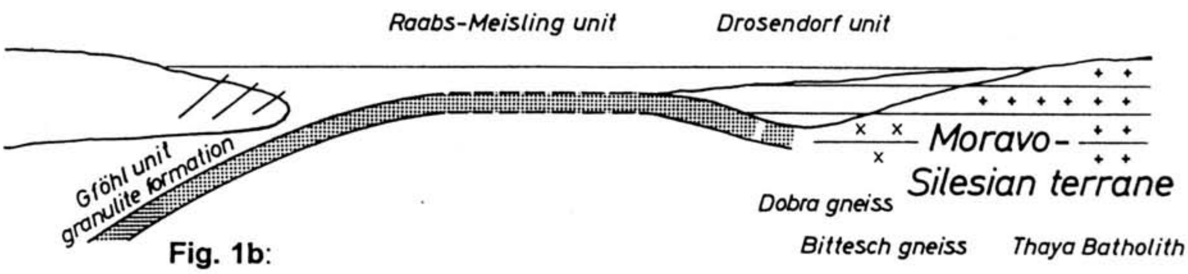

Fig. 1b: The inferred geological situation prior to the Variscan collision (Finger and Steyrer 1994)