methods were used. Palynomorphs and conodonts provide a detailed zonation of the Paleozoic units. Resedimented acritarchs furthermore enable us to date the sediments in the source region. Source rock analysis by the aid of light minerals quantitatively uses the complete petrofabric and petrologic information stored in the clasts of sandstones and conglomerates. Genetic conclusions were drawn from the Hercynian debris back through the tectono – metamorphic history and down to the origin of the source rocks. Two areas of different parent rocks must be distinguished during the Lower Devonian. First the continental shelf of the Old Red landmass provided clastic detritus of proximal sandstone facies to the NW and distal shale facies to the SE. Sediments show a relatively uniform composition in the distal Rhenish facies.

Secondly a sedimentary mélange was formed by olistostromes including olistoliths, conglomerates and sandstones intercalated between and mixed with Old Red derived shales. Components of the olistostromes clearly show a Barrandian origin. Source rocks were sandstones of all kinds of grain size, Silurian and Devonian limestones, basic volcanics and highly differentiated sills with ultramafic, mafic and granophyric layers. Normal faulting released gravity slides with sedimentary structures indicating transport from the east. These petrological and tectonic observations from the synorogenic sediments prove an extensional regime of early rifting in their source region. Since no other plutonic or metamorphic clasts occur, no Mid–German Crystalline Rise did supply sediments during the Lower Devonian from the south.

VARISCAN DEFORMATION PHASES IN SOUTHERN SPITSBERGEN

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Frequent sedimentary breaks associated with erosional unconformities and coarse–clastic character of many Carboniferous and Permian deposits in Spitsbergen are the evidence of tectonic instability, following destruction of Caledonian Foldbelt at transition to platform conditions. Three major unconformities related to Variscan deformation phases are recognizable in southern Spitsbergen: (1) the Devonian/Carboniferous unconformity; (2) the Early/Middle Carboniferous unconformity, and (3) the Early/Late Permian unconformity. None of these phases resulted in large–scale folding and thrusting, the tectonic deformation being the effect of strike–slip transpression and/or block faulting.

(1) The Devonian/Carboniferous unconformity is expressed as a long hiatus, from Middle Devonian through lowermost Carboniferous, confined to the southern termination of the Devonian Graben. Continental deposits of the Adriabukta Formation (Upper Tournaisian–Upper Visean, Birkenmajer & Turnau, 1962) begin with a thin conglomerate resting directly upon the Marietoppen Formation (Siegenian–Emsian, Old Red Sandstone Facies, Birkenmajer, 1964). An angular unconformity probably existed between these two units, but was subsequently obliterated by mid–Carboniferous and Tertiary folding. The Devonian/Carboniferous unconformity and hiatus relate to Late Devonian (post-Late Givetian – pre–Early Tournaisian) Svalbardian diastrophism (Vogt, 1928). In south Spitsbergen, it affected mainly the eastern flank of the Devonian Graben (a southward prolongation of the Balliolbreen strike–slip fault, Harland et al., 1974) which was upthrown and subjected to deep erosion that exposed Proterozoic basement of the removed Devonian clastics (Birkenmajer, 1981).

(2) The Early/Middle Carboniferous unconformity was a result of strong folding, associated with slight metamorphism, of Lower Carboniferous clastics (Adriabukta Formation) together with their Devonian and pre–Devonian basement rocks, and as westward thrusting of the eastern flank of the Devonian Graben (i.e. the Adriabukta Formation and its Proterozoic basement rocks) over the autochthonous rocks in the graben. This deformation, called the Adriabukta phase (Birkenmajer, 1975), correlates with the Erzgebirge phase of Variscan orogeny (Birkenmajer, 1964). It could be an effect of compression/transpression resulting from strike–slip displacement along the eastern flank of the Devonian Graben in Spitsbergen. Erosion and deep weathering of the folded Adriabukta Formation followed suite. It resulted in development of red–stained regolithic zone that cuts through steeply dipping rocks of the latter formation, already prior to deposition of Mid–Carboniferous coarse clastics (red beds) of the Hyrnefjellet Formation (Birkenmajer, 1964, 1984a).

(3) The Early/Late Permian unconformity, related to the Saalic phase of block–faulting and uplift (Birkenmajer, 1964) is expressed as a low–angle regional unconformity between the Treskelodden Formation (continental to shallow–marine, mixed deposits, Upper Carboniferous to Sakmarian) and

the Kapp Starostin Formation (Hovtinden Member, brachiopod cherty limestone with conglomerate at base, Kazanian). The hiatus is longest (Artinskian – Kungurian) at Hornsund, shortening and eventually disappearing northward, in Torell Land. It was a result of block–faulting and uplift along the eastern flank of the Hornsund High. This block, built principally of folded Ordovician, Cambrian and Proterozoic rocks of the Caledonian orogen, was first uplifted and subjected to deep erosion and planation already during the Svalbardian phase (Late Devonian), then it was covered by Lower Carboniferous clastics, lifted up again, eroded and planated once more during the Adriabukta phase (Mid–Carboniferous), and repeatedly warped during the Upper Carboniferous and Lower Permian (Asturic and Saalic phases, respectively). From its active eastern flank, built by the Devonian rocks, and from its Lower Carboniferous cover, were derived a major part of clastics supplied to the Mid–Carboniferous through Lower Permian Hyrnefjellet and Treskelodden formations (Birkenmajer, 1984a, b). The Hornsund High block lowered as a result of regional tension and was covered by short–lived Late Permian marine transgression (Kapp Starostin Formation, Hovtinden Member, Kazanian). Then it was lifted up again at the Permian/Triassic boundary (sedimentary break) to subside again at the onset of the Early Triassic marine transgression (Vardebukta Formation, Birkenmajer, 1977).

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STRUCTURAL SUCCESSIONS IN THE SAXOTHURINGIAN ZONE OF THE HERCYNIAN OROGENIC BELT: A BASIS FOR A MODEL OF GEOTECTONIC EVOLUTION

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Features indicative of an extensive polyphase deformational sequence and of polyphase metamorphism that are consistently displayed in the metamorphic rocks of the Bohemian Massif provide a structural basis for establishing a model for the geotectonic evolution of the Hercznian orogenic belt in Central Europe as well as for testing other models based largely on the distribution of litho-stratigraphic and tectonostratigraphic units. In the Saxothuringian zone of the southern Fichtelgebirge mutual relationships of structures seen at outcrop in interbanded pelitic – semipelitic – psammitic assemblages (e.g. at Cheb) form the basis for establishing structural successions using folded folds and folded schistosities – cleavages – lineations whose geometrical and time relations to the various fold sets are evident. The various local structural successions can be integrated into a regionally applicable deformational sequence of successive phases of fold formation to which phases of metamorphic reconstitution and neosome emplacement can be linked.

Corresponding, but differently expressed, sets of successively–formed folds are shown in the much more competent quartzites and psammitic schists of Vysoký Kámen adjacent to the border of the Czech Republic with Germany 7.5 km WSW of Kraslice. The mutual relationships of observed structures permit the erection not only of a structural succession of fold formation, but also of a suc-