vých akumulací na území Rakouska a jejich korelace s terasami na území Československa.

ten eine Reihe von Kenntnissen, durch die eine gegenseitige Korrelation und stratigraphische Einstufung der Terrassen ermöglicht wurden. Im vorliegenden Beitrag werden wichtigste Ergebnisse der Erforschung von Quartärablagerungen im Grenzgebiet Südmährens und der Westslowakei sowie der Untersuchung von Terrassenaufschotterungen auf dem Gebiet Österreichs und ihrer Korrelation mit den Flußterrassen auf dem Gebiet der Tschechoslowakei zusammengefaßt.

THE NOETSCH-VEITSCH-NORTH GEMERIC ZONE OF ALPS AND CARPATHIANS: CORRELATION, PALEOGEOGRAPHY AND SIGNIFICANCE FOR VARISCAN OROGENY

Franz Neubauer[1] — Anna Vozárová[2]
[1] Karl-Franzens-Universität, Institut für Geologie und Paläontologie, Graz, Austria
[2] Geologický ústav Dionýza Štúra, Bratislava, Czechoslovakia

Introduction

The correlation of basement zones between the Alps and Carpathians have strong significance for the definition of microplates involved in the Alpine orogen, and, naturally, for the evolution of the pre-Alpine basement. Late Paleozoic depositional sequences with strong shallow water affinities have a distinct significance among basement units because they contrast all other lithotectonic units in regard to the depositional environment, the age of deposition as well as to the age and degree of metamorphism.

Late Paleozoic deposits of a shallow marine environment occur within the North Gemeric Zone, e. g. at the locality Ochtina and related localities of the Western Carpathians, within the Veitsch nappe (Greywacke zone) and at Noetsch of the Eastern Alps (Fig. 1). The North Gemeric Zone and the Veitsch nappe are situated along the same structural zone which separates a strong metamorphosed basement in the footwall from weakly metamorphosed Early Paleozoic rocks in the hangingwall (see TOLLMANN, 1986, and references cited therein). The tectonic position of Noetsch in the Eastern Alps is rather obscure. It forms the core of a fault-controlled window below Mesozoic rocks of the Drauzug.

The aim of this paper is
— to correlate the individual formations of these three structural units,
— to evaluate their geodynamic evolution,
— to elucidate their significance for the Variscan geodynamic evolution of the Alpine and Carpathian belt.

Sections

1. Noetsch Group

SCHÖNLAUB (1985) redefined the sedimentary sequence from the locality Noetsch (Noetsch Group). The Noetsch Group consists of three formations, from the base to the top, of the Erlachgraben Fm., die Badstub-Breccia Fm. and the Noetsch Formation. The stratigraphic base of the Noetsch Group is not known up to now.

The Erlachgraben Formation is composed of sandy siltstones, and slates which are intercalated by up to ten metres thick conglomerate lenses. Some rich faunas including brachiopods, bivalves, corals and plants favour a shallow marine environment of deposition. The age of deposition is not known exactly. SCHÖNLAUB (1985) discusses a Late Visean and/or Early Namurian age.

The up to 400 m thick Badstub Breccia Formation is formed by a greenish breccia of a mysterious, strongly discussed origin and a marly siltstone („Zwischenschiefer"). The breccia bears predominantly components of a metamorphic origin (e. g., amphibolites, marbles and orthogneisses), and rare pelagic limestones of Late Visean age. The recent interpretation of SCHÖNLAUB (1985; see discussion in that paper) favours a volcanic origin for this breccia, an eruptive breccia. TEICH (1982) found a tholeiitic basaltic chemistry evaluating the major elements.

The 400—600 m thick Noetsch Formation is composed of grey slates, siltstones and conglomerates. Some localities are rich in fossils typical of a shallow marine environment, as like bivalves, gastropods, brachiopods, corals. The age of deposition is Namurian to Westphalian (?).

It is worth being noted that all three formations bear predominantly strongly metamorphosed components like amphibolites, marbles, orthogneisses. Unmetamorphosed plutonic rocks are rather rare (EXNER, 1983). KODSI and FLÜGEL (1970) described the light and heavy mineral content of the sandstones which suggest likewise a metamorphic source region. SCHÖNLAUB (1985) notes the occurrence of pelagic limestones with conodonts hardly older than the age of redeposition. These limestones contrast the sedimentary environment of the Noetsch Group. Own observations on components show the predominant existence of components strongly sheared during metamorphic conditions. The age of metamorphism of the metamorphic components is not known up to now.

2. Veitsch Group

The sedimentary sequences of the Veitsch nappe (Veitsch Group) are rearranged recently by NIEVOLL (1983), RATSCHBACHER (1984, 1987) and RATSCHBACHER and NIEVOLL (1984). RATSCHBACHER gives a new subdivision in three formations for the western part of the Veitsch nappe. The correlation with the eastern area of the Veitsch nappe bears some uncertainties (RATSCHBACHER and NIEVOLL, 1984). In the western Veitsch nappe, there are the Steilbachgraben Formation, the Triebenstein Formation and the Sunk Formation from bottom to the top. For the eastern Veitsch nappe, the Graschnitz Formation is introduced new by this paper (see below; see also FLÜGEL, HÖTZL and NEUBAUER, in press).

Recently, a highly metamorphosed basement slice (paragneisses and discordant aplitic veins (plagiogranitic composition) of the Prieselbauer Complex are found together with low grade metamorphosed sediments of the Veitsch Group (NEUBAUER et al., 1987). U/Pb zircon data (lower intercept age of paragneiss: 391 ± 2 Ma; upper intercept age of aplite: 363 ± 20 Ma) favour an intra-Devonian age of metamorphism and magmatism. But it is important to note, that the relationship between Prieselbauer slice and the Veitsch sediments is based on an interpretation because a mylonite zone separates actually both units.

The Steilbachgraben Formation (up to 230 m thick) consists of arkosic sandstones, shales and limestones which bear siliciclastic components. Tuffaceous rocks of basic composition are rare. Dolomite, magnesite and sulphates are intercalated between clastic sediments. Some shallow marine fossils like brachiopods, trilobites, gastropods and corals indicate a Late Visean age of deposition (HAHN and HAHN, 1977; NIEVOLL, 1983; RATSCHBACHER, 1987, and references cited therein).

The 10 to 300 m thick Triebenstein Formation consists of pure limestones bearing some corals and crinoids which indicate a Late Visean age of deposition. Greenschists of a tuffaceous and lava flow origin are intercalated within the

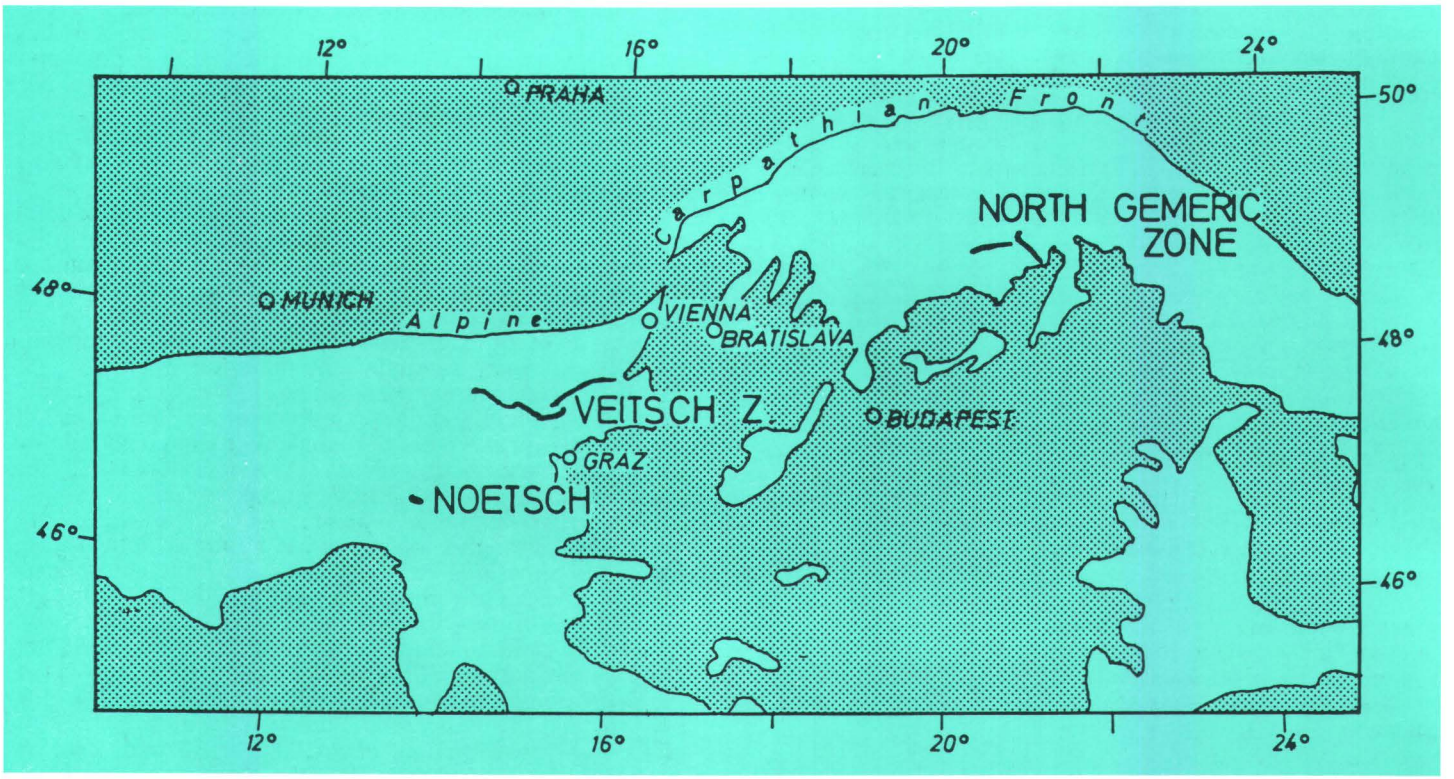

Fig. 1: The Noetsch-Veitsch-North Gemeric Zone within the Alpine-Carpathian belt.

limestones in some sections. The thickness of these greenstones varies between 0.1 to aproximately 10 metres. About the chemistry and geodynamic significance of this volcanic episode is known nothing up to now.

The 50 to 150 m thick Sunk Formation is composed of cyclic carbonate and clastic deposits. A cyclus range from limestones at the base to shales, siltstones, sandstones and conglomerates suggesting a coarsening upwards trend. Graphite occurs together with conglomerates. As a rule, the clastic rocks of the Sunk Formation exhibit a dark pigment. Plant fossils of the Sunk Formation suggest a Westphalian A—C age (TENCHOV, 1980).

The Graschnitz Formation appears east of the locality Bruck/Mur. The boundary to the Sunk Formation is defined by the change from dark into reddish to yellow clastic rocks (NEUBAUER, 1983). The Graschnitz Formation consists of slates and siltstones which are intercalated by thin quartz breccias and fanglomerates. The presence of acid tuffaceous rocks containing phenocrysts of quartz and alkali feldspar as well as red-coloured quartz pebbles prefer a Permian age interpretation by lithostratigraphic comparison with other Permian sections of the Eastern Alps.

In contrast to the Noetsch Group, the clastic content of Veitsch Group rocks is dominated by nearly undeformed and unmetamorphosed plutonic rocks. Besides quartz pebbles, granite pebbles dominate the clastic spectrum. Heavy minerals suggest a similar source region (RATSCHBACHER and NIEVOLL, 1984).

3. North Gemeric zone

The filling of Late Paleozoic basins preserved in the Alpine structure of the North Gemeric zone reflects the final stages of the Variscan orogeny. The Late Paleozoic formations are represented by Early and Late Carboniferous volcanosedimentary complexes of the Dobšiná— and the Črmeľ Groups and by Permian continental sediments and volcanics of the Krompachy Group.

3.1 Dobšiná Group

The Dobšiná Group consists of four formations (from the bottom to the top): the Ochtiná, Rudňany, Zlatník and the Hámor Formations (BAJANÍK, VOZÁROVÁ and REICHWALDER, 1981).

The Ochtiná Fm. (about 1200 m thick) is in the western part of the Gemericum. Its stratigraphic basement is not known. The formation rests in a nappe position upon the lower tectonic unit — the deformed envelope series of the Veporic crystalline complexes. The lower part of the Ochtiná Fm. consists of a complex of cyclic, metamorphosed fine-grained conglomerates and sandstones with phyllite intercalations. The complex is overlain by phyllites alternating with fine-grained metasandstones and intercalations of metavolcanics and metavolcaniclastics (tholeiite basalts, their tuffs and tuffites). Minor bodies of magnesites and ultrabasic rocks occur sporadically. The Tournaisian-Visean age of the lower part of the Ochtiná Formation is indicated by sporomorphs (BAJANÍK and PLANDEROVÁ, 1985). A Visean sporomorph assemblage (PLANDEROVÁ, 1982) was found in a horizon with basic volcaniclastic material. The upper part of the Ochtiná Fm. consits of a horizon of magnesite spatially associated with heavy-bedded dolomites and black graphite slates. The Uppermost Visean-Serpuchovian age of the magnesite horizon is proved by conodonts (KOZUR, MOCK and MOSTLER, 1976). Clastic sediments of the Ochtiná Formation contain besides quartz, feldspar and scarce clastic mica grains also clasts of dark phyllites, metasandstones, lydites and sporadical aplite granites.

The Rudňany Formation is only preserved in the northwestern northern and eastern parts of the Gemericum. In the northwestern and northern parts of the Gemericum, the Rudňany Fm. overlies with an unconformity the low-grade metamorphosed Paleozoic rock complex of the Rakovec Group (former phyllite-diabase series) and the gneiss-amphibolite complex (the Klátov Group). In the eastern part of the Gemericum the Rudňany Fm. overlies

unconformably the low-grade metamorphosed Early Carboniferous rocks of the Črmeľ Group. The coarse-clastic Rudňany Fm. tends evidently to fining upwards. It consists of coarse-grained conglomerates, its upper parts comprise sandstone and slate intercalations. Its thickness shows extreme regional variability (10—150 m). The clastic material consists of metabasalts, their tuffs and tuffites, various types of phyllites, actinolite schists, metasandstones, hematite quartzites and phyllites, lydites, plagioaplites, granitic and tonalitic magmatic rocks, biotite-, two mica-, biotite-hornblende-, garnet-hornblende and injected gneisses, amphibolites.

Crystalline dolomite clasts occur sporadically. The clastic material is very similar to rock complexes of the basement of the Rakovec Group, the Črmeľ Group and of the gneiss—amphibolite complex (Klátov Group). The Westphalian A—B age of the Rudňany Fm. is proved by macrofauna and macroflora (RAKUSZ, 1932; VACHTL, 1938; NĚMEJC, 1946).

The Zlatník Formation (max. thickness 400 m) overlies the Rudňany Fm. It is mostly preserved in the northern part of the Gemericum (around Dobšiná-Rudňany) and consists of a rather monotonous complex of slates and fine-grained metasandstones with basic volcaniclastic layers and thin tholeiite basalts. In the lower part of the Zlatník Fm. sporadical carbonate bodies contain plentiful macrofaunas (loc. Dobšiná). The fauna is indicative of the Westphalian C—D age (RAKUSZ, 1932) or the uppermost Westphalian B age (BOUČEK and PŘIBYL, 1960). The macroflora indicates the Westphalian A—B (NĚMEJC, 1953). The conodonts are indicative of the Westphalian A (KOZUR and MOCK, 1977). A complex of dark phyllites and light crystalline limestones with interbeds of basic volcaniclastic material (the Dúbrava beds in the sense of FUSÁN, 1959) overlying the Ochtiná Fm. at the locality Ochtiná and partly SW of the locality, is also correlated with the Zlatník Fm.

Cyclical paralic sediments denoted as the Hámor Formation (150—370 m thick) represent the youngest formation of the Dobšiná Group. Sedimentary cycles composed of conglomerates, sandstones and slates contain local anthracite coal sheds. The Hámor Fm. was dated Westphalian D — Stephanian A (ILAVSKÁ, 1964) according to a sporomorph assemblage. Clastic material of the Hámor Fm. conglomerates contains various types of phyllites, metaquartzites, lydites, scarce granitoids and acid volcanics. Because of pre-Permian erosion and Alpine tectonic reduction, the Hámor Fm. is only preserved in relics.

3.2 Črmeľ Group

The Črmeľ Group is the lithological and stratigraphical equivalent of the lower part of the Ochtiná Fm. in the eastern part of the Gemericum. The Črmeľ Group mostly consists of low-grade metamorphosed sediments, basic volcaniclastics and sporadical acid volcaniclastics. The basal part of the Črmeľ Group tends to fining upwards and consists of a complex of medium— to fine-grained metasandstones alternating with phyllites, and sporadical acid volcaniclastics. The major part of the Črmeľ Group is formed by cyclical fine-grained metasediments associated with basic volcanics and volcaniclastics (tholeiites s. l. according to BAJANÍK in BAJANÍK et al., 1986). The intensity of volcanism decreases towards the upper part of the Črmeľ Group to be replaced by thin lenses of carbonates (partly alterated to magnesites) and occasional lydites. The top parts of the entire complex display coarsening of sediments again.

Sediments and volcanics of the Črmeľ Group underwent Variscan metamorphism (Sudetian phase). The grade of their metamorphism corresponds to the lower part of the greenschist facies of the low-pressure type (SASSI and VOZÁROVÁ, 1987).

The Črmeľ Group was dated as Tournaisian-Visean on the basis of a sporomorph assemblage (BAJANÍK, VOZÁROVÁ and SNOPKOVÁ, 1986).

When reconstructing the evolution of Carboniferous formations in the North-Gemeric zone we must consider at least two prominent breaks in sedimentation. The bed sequence is devoid of the Namurian B—C sediments and of the most part of the Stephanian sediments. Various lithological members of Carboniferous sequences of the Dobšiná and Črmeľ Groups are uncorformably overlain by Permian basal sediments of the Krompachy Group. They are represented by violet-red alluvial, polymict conglomerates. Radiometrical dating of a volcanogenic horizon overlying the basal conglomerates indicate the Upper Autunian-Saxonian age $^{206}Pb^{238}U$ — 263 Ma; $^{207}Pb/^{235}U$ — 274 Ma; NOVOTNÝ and ROJKOVIČ, 1981).

Data concerning the age of metamorphism of rock complexes from the basement of the Rudňany Fm. are most frequently indicative of the Devonian /Carboniferous boundary (CAMBEL et al., 1980; KANTOR, 1980 — K/Ar method; gneisses and amphibolites of the Klátov Gr.).

In the eastern part of the Gemericum, the Rudňany Fm. overlies unconformably the low-grade metamorphosed rock complex of the Črmeľ Group. Its age is Tournaisian-Visean. The Rudňany Fm. conglomerates contain pebbles of low-grade metamorphosed rocks from the Črmeľ Group. So the Lower Carboniferous formations of the North-Gemeric zone must have been metamorphosed in final phases of the Variscan orogeny under the condition of low temperature and low pressure. The grade of metamorphism of the Ochtiná Formation in the western part of the Gemericum is analogous, i. e. the lower part of the greenschist facies of the low-pressure type (SASSI and VOZÁROVÁ, 1987).

Discussion

Sedimentary formations of the Noetsch and Veitsch Groups in the Eastern Alps, and sedimentary formations of the Črmeľ and Dobšiná Groups in the North-Gemeric zone of the West Carpathians display following common features:

1) an approximately equal age,

2) marine shallow-sea depositional environments relatively well defined by fauna,

3) syngenetic basic volcanism, prominent in West-Carpathian Carboniferous formations (because they are better preserved) showing the character of tholeiite basalts of the orogenic type (VOZÁR in VOZÁROVÁ and VOZÁR, 1988),

4) clastic detritus originating from metamorphic and magmatic rocks as well as from low-grade metamorphosed or almost nonmetamorphosed volcanics and sediments,

5) general upward coarsening of clastic facies, associated with gradual shallowing and transition into paralic and continental depositional environments,

6) Permian continental volcanosedimentary formations (overlying unconformably the Carboniferous complexes of the North-Gemeric zone of the West Carpathians),

7) the basement whose metamorphism is radiometrically dated as Devonian or Devonian-Carboniferous.

8) In the Eastern Alps, the zone of Early Carboniferous shallow water sedimentation is contrasted by flysch-like deep water deposits in the south and a metamorphic-batholithic belt situated in the north. A similar configuration occurs in the Western Carpathians. For both, Carpathians and Eastern Alps, this zonation is explained in terms of terranes or microplates (VOZÁROVÁ and VOZÁR, 1988; FRISCH and NEUBAUER, 1989; NEUBAUER, 1988) which were differentiated after their basement evolution and evolution in Early Carboniferous times.

Bed complexes of Carboniferous formations are generally better preserved in the North-Gemeric zone of the Western Carpathians. Although they are incorporated in the Alpine nappe structure in this area, their basement and their relation to overlying Permian complexes may be defined almost completely. The complexes have been interpreted as remnants of depositional basin fillings, associated with the collision type orogeny (VOZÁROVÁ and VOZÁR, 1988). De-

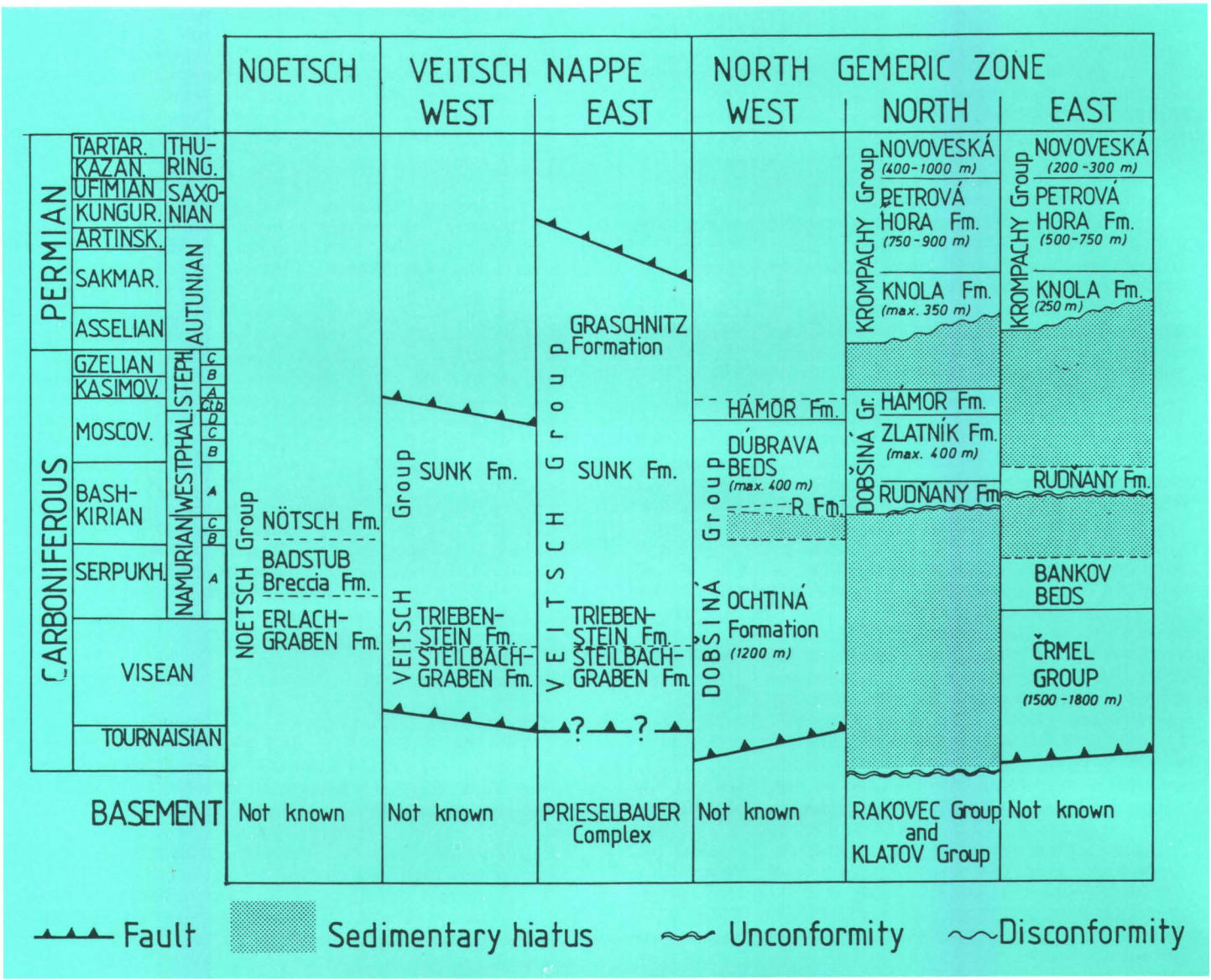

Fig. 2: The lithostratigraphic frame of sections of the Noetsch-Veitsch-North Gemeric Zone. For location of sections, see Fig. 1.

vonian metamorphism of the basement in both areas compared, and detritus originating from geotectonically different source areas — continental microplates and orogenic zone — are significant for the reconstruction of the evolution of the entire depositional zone.

Conclusions

Shallow-sea Carboniferous depositional formations of the Noetsch and Veitsch Groups of the Eastern Alps, and of the North-Gemeric zone in the West Carpathians represent remnants of depositional basins bordering the Variscan suture zone. Their origin was closely associated with the evolution of the entire orogenic zone. Tournaisian-Visean basins in the West Carpathians (the Črmeľ Group and the lower part of the Ochtiná Fm.) had the character of a remnant basin. The basinal filling was refolded and slightly metamorphosed (VOZÁROVÁ and VOZÁR, 1988). Upper Visean-Namurian and Westphalian peripheral basins bordered the new-formed suture zones. The basins are characterized by a shallow-sea depositional environment, variegated lithofacies and frequent breaks in sedimentation.

The final phase of the Variscan orogeny, characterized mainly by intense fault tectonics and gradual consolidation trend in the entire orogenic zone, resulted in Permian continental volcanosedimentary formations followed by Permian — Triassic evaporite formations.

Acknowledgements

The first author (F. N.) thanks the collegues from the Dionýz Štúr Institute of Geology for the impressive guidance through the Slovakian Ore Mountains.

References

BAJANÍK, Š. and PLANDEROVÁ, E. 1985: Stratigrafická pozícia spodnej časti ochtinského súvrstvia gemerika medzi Magnezitovcami a Magurou. Geol. Práce, Správy 82, Bratislava, 67—76.

BAJANÍK, Š., SNOPKOVÁ, P. and VOZÁROVÁ, A. 1986: Litostratigrafia črmeľskej skupiny. Reg. geol. Záp. Karpát, Správy o výskumoch, 21, Geol. Úst. D. Štúra, Bratislava, 65—68.

BAJANÍK, Š., VOZÁROVÁ, A. and REICHWALDER, P. 1981: Litostratigrafická klasifikácia rakoveckej skupiny a mladšieho paleozoika v Spišsko-gemerskom rudohorí. Geol. Práce, Správy 75, Geol. Úst. D. Štúra, Bratislava, 27—56.

BOUČEK, B. and PŘIBYL, A. 1960: Revision der Trilobiten aus dem slovakischen Oberkarbon. Geol. Práce, Správy 20, Geol. Úst. D. Štúra, Bratislava, 5—50.
CAMBEL, B., BAGDASARJAN, G. P., VESELSKÝ, J. and GUKASJAN, R. CH. 1980: To problems of interpretation of nuclear-geochronological data on the age crystalline rocks of the West Carpathians. Geol. Zborn. Geol. carpath., 31, 1—2, Bratislava, 27—48.
EXNER, C. 1983: Petrographie von Gneisgeröllen im Karbon von Nötsch (Kärnten). Jb. Geol. Bundesanst., 126, Wien, 215—217.
FLÜGEL, H. W., HÖTZL, G. and NEUBAUER, F. (in press): Geologische Karte der Republik Österreich 1:50 000. Blatt 134, Passail. Wien (Geologische Bundesanstalt).
FRISCH, W. and NEUBAUER, F. 1989: Pre-Alpine Terranes and Tectonic Zoning in the Eastern Alps. Geol. Soc. Amer. Spec. Publ., 232, Boulder, 99—100.
FUSÁN, O. 1959: Poznámky k mladšiemu paleozolku gemerid. Geol. Práce, Zošit 55, Geol. Úst. D. Štúra, Bratislava, 171—181.
HAHN, G. and HAHN, R. 1977: Trilobiten aus dem Unterkarbon der Veitsch (Steiermark, Österreich). N. Jb. Geol. Paläont. Mh., Stuttgart, 137—143.
KANTOR, J. 1980: To the problem of the metamorphism age of amphibolites in the Rakovec Group of the Gemeric from the Klatov-Košická Belá. Geol. Zborn. Geol. carpathica, 31, 4, Bratislava, 451—456.
KODSI, M. G. and FLÜGEL, H. W. 1970: Lithofazies und Gliederung des Karbons von Nötsch. Carinthia II, 160/80, Klagenfurt, 7—17.
KOZUR, H., MOCK, R. and MOSTLER, H. 1976: Stratigraphische Neueinstufung der Karbonatgesteine der unteren Schichtenfolge von Ochtiná (Slovakei) in das oberste Vise-Serpukhovian (Namur A). Geol. Pal. Mitt., 6, 1, Innsbruck, 1—29.
KOZUR, H. and MOCK, R. 1977: Erster Nachweis von Conodonten in Paläozoikum (Karbon) der Westkarpaten. Časopis pro min. a geol., 22, 3, Praha, 299—305.
NĚMEJC, F. 1974: Přispěvek k poznání rostlinných nálezů a stratigrafických poměrů v permokarbonu na Slovensku. Rozpr. II. tř. Čs. akad. Věd, 56, 15, Praha, 1—34.
NEUBAUER, F. 1983: Bericht 1982 über geologische Aufnahmen im Rennfeld- und Gleinalmkristallin und in der Grauwackenzone auf Blatt 134 Passail. — Verh. Geol. Bundesanst., 126, Wien, 315—316.
NEUBAUER, F. 1988: The Variscan orogeny in the Austroalpine and Southalpine domains of the Eastern Alps. Schweiz. Miner. Petr. Mitt., 69/3, Zürich, 339—349.
NEUBAUER, F., FRISCH, W. and HANSEN, B. T. 1987: New data on the evolution of the Austroalpine basement: A U/Pb zircon study. Terra cognita, 7, Straßbourg, 96.
NIEVOLL, J. 1983: Stratigraphische und strukturgeologische Untersuchungen in der Grauwackenzone bei Veitsch (Steiermark). Unpubl. Thesis Univ. Graz, Graz, pp. 150.
NOVOTNÝ, L. and ROJKOVIČ, I. 1981: Uránové zrudnenie v Západných Karpatoch. In.: „Vážnejšie problémy geol. vývoja a stavby Československa". Zborn. ref. z konf. v Smoleniciach 1979. Geol. Úst. D. Štúra, Bratislava, 327—347.
PLANDEROVÁ, E. 1982: The first find of Visean microflora in Gemerides in Slovakia. Záp. Karpaty, sér. Paleont. 8, Geol. Úst. D. Štúra, Bratislava, 97—99.
RAKUSZ, Gy. 1932: Die oberkarbonischen Fosilien von Dobšiná und Nagyvisnyó. Geologica Hung. Ser. Paleont. 8, Budapest, 1—219.
RATSCHBACHER, L. 1984: Beitrag zur Neugliederung der Veitscher Decke (Grauwackenzone) in ihrem Westabschnitt (Obersteiermark, Österreich). Jb. Geol. Bundesanst., 127, Wien, 423—453.
RATSCHBACHER, L. 1987: Stratigraphy, tectonics and paleogeography of the Veitsch nappe (Graywacke zone, Eastern Alps): A rerrangement. In: FLÜGEL, H. W., SASSI, F. P. and GRECULA, P., Pre-Variscan and Variscan events in the Alpine-Mediterranean mountain belts. Mineralia Slovaca — Monography, Bratislava (Alfa), 407—414.
RATSCHBACHER, L. and NIEVOLL, J. 1984: Die Aussagekraft von Schwermineraldaten aus der Veitscher Decke (Steiermark, Österreich). Jb. Geol. Bundesanst., 127, Wien, 455—469.
SASSI, F. P. and VOZÁROVÁ, A. 1987: The pressure character of the Hercynian metamorphism in the Gemericum (West Carpathians, Czechoslovakia). Rend. d. Societa Italiana di Min. e Petr., vol. 42, Milano, 73—81.
SCHÖNLAUB, H. P. 1985: Das Karbon von Nötsch und sein Rahmen. Jb. Geol. Bundesanst., 127, Wien, 673—692.
TEICH, Th. 1982: Zum Chemismus der Badstubbrekzie im Unterkarbon von Nötsch in Kärnten. Carinthia II, 172/92, Klagenfurt, 91—96.
TENCHOV, Y. 1980: Die paläozoische Megaflora von Österreich. Verh. Geol. Bundesanst., 1980, Wien, 161—174.
TOLLMANN, A. 1986: Geologie von Österreich. Band III Gesamtübersicht. Wien, pp. 718.
VACHTL, J. 1938: O karbonu mezi Dobšinou a Kotrbachy (Slovenské rudohoří). Sbor. SGÚ, 12, Praha, 33—65.
VOZÁROVÁ, A. and VOZÁR, J. 1987: West Carpathians Late Paleozoic and its development. In: FLÜGEI, H. W., SASSI, F. P. and GRECULA, P., Pre-Variscan and Variscan events in the Alpine-Mediterranean mountain belts. Mineralia Slovaca — Monography, Bratislava (Alfa), 469—487.
VOZÁROVÁ, A. and VOZÁR, J. 1988: Late Paleozoic in West Carpathians. Geol. Úst. D. Štúra, Bratislava, 1—314.

Abstrakt

Mladopaleozoická sedimentácia z výskytov v oblasti Nötsch a Veitsch vo Východných Alpách je zrovnávaná s obdobnými sedimentačnými podmienkami z oblasti Ochtinej, príp. ostatných ekvivalentných častí severogemeridnej zóny v Západných Karpatoch. Uvažovaný je jednotný plytkomorský sedimentačný priestor s morskou molasovou sedimentáciou, s narastajúcimi ríftmi (alebo časťami s vývojom plytkovodných organizmov), ktoré boli prekrývané vrchnokarbónskymi, regresívnymi deltovými, deltovo-riečnymi sedimentárnymi fáciami a miestami i permskými fanglomerátmi. Pre jednotlivé časti tohoto sedimentačného priestoru bol diskutovaný devónsky metamorfný podklad. Toto sedimentačné prostredie charakterizuje sutúru medzi dvoma rozdielnymi mikroplatňami, menovite medzi metamorfovanou vnútornou zónou variskeho orogénu a vonkajšou zónou so spodnokarbónskou hlbokovodnou sedimentáciou.

Zusammenfassung

Die jungpaläozoischen Ablagerungen von Nötsch, Veitsch der Ostalpen werden mit solchen von Ochtiná und vergleichbaren Abfolgen der Nordgemeriden der Westkarpaten korreliert. Ein einheitlicher mariner Flachwasserraum mit mariner Molassesedimentation und dazwischen sich aufbauenden Riffen (oder Tells mit Flachwasserorganismen) wird postuliert, die von oberkarbonischen regressiven Delta- und Flußablagerungen und von vermutlich permischen Fanglomeraten überlagert werden. Ein devonisch metamorphosiertes Fundament von Teilen dieses Ablagerungsraumes wird diskutiert. Dieser Sedimentationsraum charakterisiert die Sutur zwischen zwei verschiedenen Mikroplatten resp. Terranes, nämlich einer metamorphen Internzone des variszischen Orogens und einer Externzone mit unterkarbonischen Tiefwassersedimenten.

BIOSTRATIGRAPHICAL EVALUATION OF WEAKLY METAMORPHOSED SEDIMENTS OF WECHSEL SERIES AND THEIR POSSIBLE CORRELATION WITH HARMÓNIA GROUP IN THE MALÉ KARPATY MTS.

Eva Planderová[1], Alfred Pahr[2]
[1] Eva Planderová, Geol. ústav Dionýza Štúra, Bratislava, Czechoslovakia
[2] Alfred Pahr, Geol. Bundesanstalt, Wien, Austria

Introduction (A. Pahr)

The Wechsel mountain group in the Central Eastern Alps has aroused the attention of geologists for a long time. The reason for this may have been a particular rock assemblage and problems with its tectonic position.

After the fundamental works by H. Mohr (1911—1919) detailed studies by Faupl, Vetters, Huska, Halbmayer, Lemberger (1968—1970) have brought about important new results. Mohr's litho-stratigraphic division of the Wechsel rocks into (top to bottom) Wechsel schists and Wechsel gneiss (with the Permoskythian transgression on top) could be improved by the studies of P. Faupl (1970). His new division (Fig. 1) shows the sequence of the Wechsel gneisses at the bottom, followed by the Underlying (= Liegende) and the Overlying (= Hangende) Wechsel schists, and then, after a gap, by the ABP- (= Arkose-Breccia-Porphyroid) series (= Rotliegendes) and the Semmering quartzite (Skythian).

Recent conclusions concerning the tectonic position of the Wechsel unit have shown it as a deeper part of the Lower Austro-Alpine nappe system after a variety of attempts to find its right position in the tectonic scheme of the Eastern Alps (Fig. 2). This was possible after it had turned out that the Wechsel nappe is not restricted to the Wechsel mountain group proper but is widely spread under the overthrusted Grobgneis nappes of the Central Alpine