Carbonate mineralisation in **Permian rocks of Gemer**

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Carbonate mineralisation in Permian rocks of the Gemericum unit

Carbonates in the Permian rocks of the Gemericum are regionally distributed. Investigated rocks contain mainly the ankerite (Fe-dolomite) - siderite mineral assemblage, carbonates of calcite - dolomite association occur only in pelitic rocks.

Carbonates mostly form single grains or nests disseminated in the surrounding rock, but they can form concretions and septaria of various shapes and sizes. They also exceptionally form clasts. Secondary carbonates form veins of small thickness.

Key words: Carbonates and their quantity and shape, Permian rocks, Gemericum, Western Carpathians

Carbonate, siderite-ankerite veins with accompanying mineralisation occurring in Permian sediments are known from many locations. Our contribution deals with the occurrence of carbonates in Permian conglomerates, pelitic-psammitic and evaporitic rocks of Gemericum.

Occurrence of carbonates in Permian **conglomerates**

When siderite was found in Permian clastic sediments during the study of the Rudnany deposit and boreholes in this area, we were interested in whether carbonates also occur in Permian conglomerates in places where iron is known to occur.

Conglomerate samples were taken from 15 locations (Fig. 1) classified stratigraphically between polymictic basal conglomerates and breccias of the Knol Formation of the Permian Krompachy Group of the (Bajaník , and Vozárová, 1983). The carbonate content was determined by the manometric method in 94 conglomerate samples from surface outcrops and in several dozen other conglomerate samples, mainly from the RHV-1 and RHV-2 boreholes.

Based on this study, it can be concluded that the siderite-ankerite mineral association is regionally widespread in Permian conglomerates and is not limited to the vicinity of vein systems, although it is not common in the vicinity of vein systems.-ankerite mineral association is regionally widespread in Permian conglomerates and does not occur only in the vicinity of vein systems, although an increased concentration of carbonates, especially siderite, can be observed in areas where vein forms occur in the Rudnian and Záhura regions (Fig. 2). We did not find any cases where siderite-ankerite mineralisation was absent in Permian conglomerates, although in some places it was only very faintly represented. The ankerite content ranged from 0 to 25.08%, with an average content of 1.5% and a frequency of occurrence of 46.8%. The siderite content ranged from 1.6 to 45.09%, the average was 3.5%, and the frequency of occurrence reached up to 85%. If vein forms were not taken into account, the representation of ankerite and siderite at individual locations, as well as in boreholes, is quite regular.

On the other hand, in Permian conglomerates, there is a complete lack of association between carbonate minerals calcite and dolomite. Its occurrence was recorded only in three localities (Lániho Huta, Závadka and Zápač), where calcite was represented in red clasts of clay shale. Its frequency of occurrence in the entire sample set was only 5.32 No. However, the presence of limestone clasts indicates that Permian conglomerates should not have been hydrothermally sideritised after their formation.

In most Permian conglomerates, it is not possible to determine the form of siderite-ankerite mineralisation.

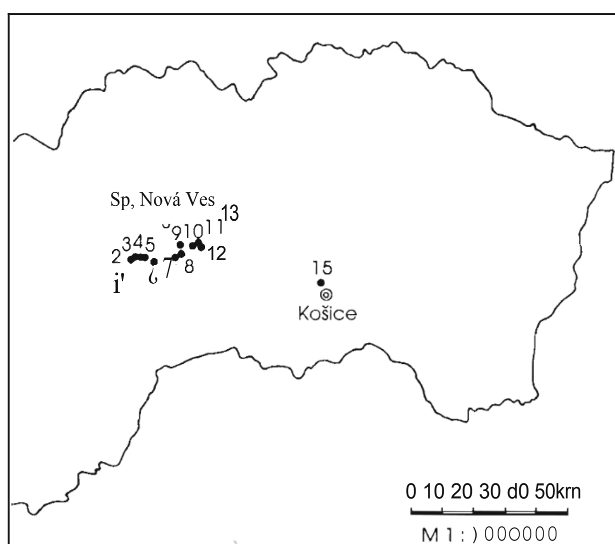


Fig. 1. Situation map of Permian conglomerate sampling. 1 - Laniho huta, 2 - Dedinky, 3 - Bielc Vody, 4 - Havrania dolina, 5 - Vefkd Knola, 6 - Hnilćík, 7 - Za vadka, 8 - Bindt, 9 - Markuśovcc, 10 - Rudňany, 11 - Zdpač, 12 - Poráč, 13 - Krompachy, 14 - Záhura, 15 - Jahodňa.
Fig. 1. Location of the sampling places with the Perriiian conglomerates.

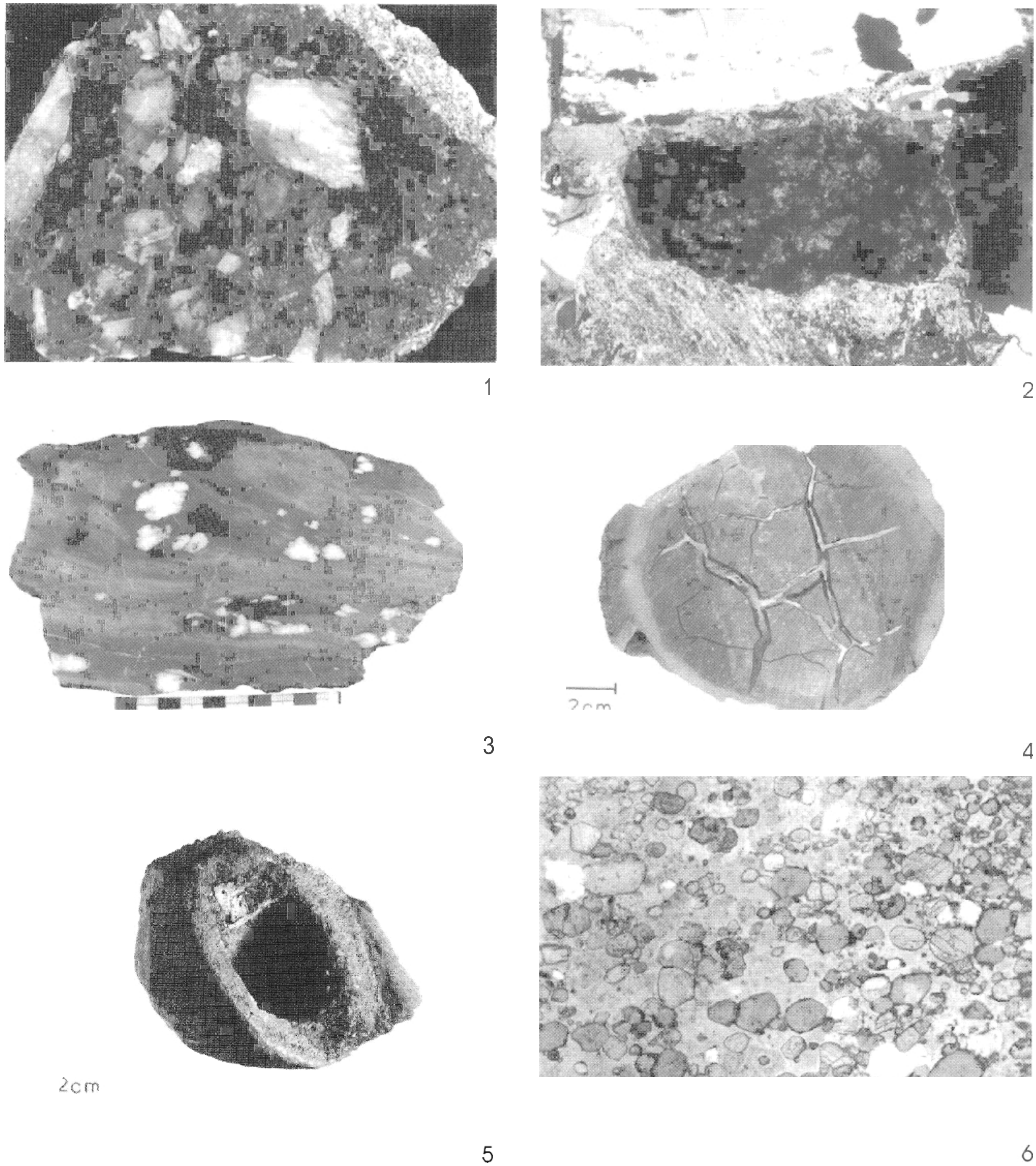


Table 1. 1 - Permian conglomerate with coal clasts, Location: Ry-42J546 borehole; 2 - Intensively limonitised siderite clasts in Permian clastic rocks, diastonically compressed by the surrounding material. Location: RHV-2/52J borehole. Nikoly X, vol. 11x; 3 - Calcite concretions in purple shales. Location: Kolinovce; 4 - Fe dolomite concretion from the Porac locality; 5 - Pelosiderite concretion from the Rakos' locality; 6 - Partially rounded carbonate clasts in anhydrite. Location: Biele Vody, Nikoly JJ, zv. 43x.

PI. 1. 1 - Permian conglomerate with carbonate clasts. Location: drillhole **Ry-42/546;** 2 - The siderite clast in Permian conglomerate is intensively altered by limonite and partially replaced by surrounding rock. Location: drillhole RHV-2J325. Nicols X, magnif. 11x; 3 - Calcite concretion. Locality: Kolinovce; 4 - Fe-dolomite concretion. Locality: Rudhany, Pordc; 5 - Argillaceous iron ore concretion. Locality: Rakos; 6 - The partly rounded carbonate grains in anhydrite. Locality: Biele Vody. *Nicol JJ,* magnif. 43x. .

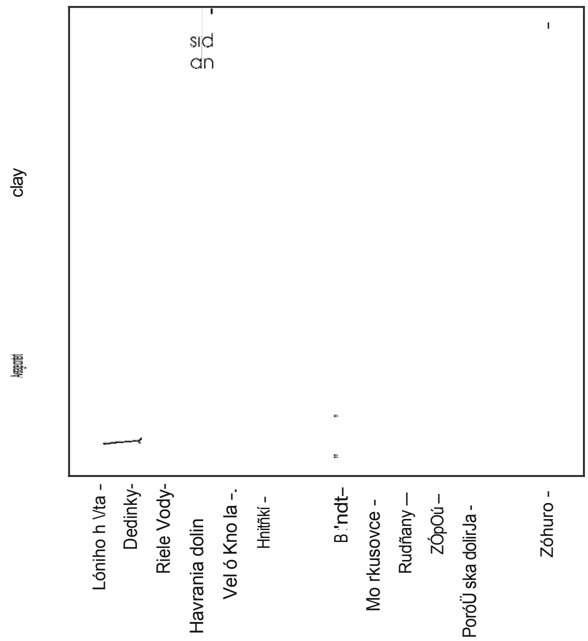


Fig. 2. Representation of tihlićitans in Permian conglomerates (the thicker areas are locations with vein carbonates)
Fig. 2. The average content of carbonates (siderite, ankerite) in Permian conglomerates (locations with vein carbonates are marked in red).

This is because these carbonate minerals are usually very intensively limonitised. The presence of chert-like siderite nodules in Permian conglomerates has only been detected in isolated cases, e.g. in boreholes Ry-42J546 and RÍ-ìV-2 (Table I, Figs. 1, 2). The nodules are poorly developed, poorly sorted and occur either as part of a crinoid vein or independently.

The occurrence of these rocks in pelitic and psammitic rocks

The car in psammitic rocks and in pclitic-psarnitic rocks has a clear advantage in terms of the aiiikcri-to•vc›-siderite association. The content of dolonite and nkerite in the Kol inovcc locality ranged from 1 to 26.3%, while the content of siderite was significantly lower, reaching a maximum of 1.6% and only 0.9% in the pricirerc f›o1. In contrast ‹ d prcclclaăclzajćccho jo v torn tc› type of rock vÿraznc jšie zastúpcná aj ulilićitancva kaicitovo-Óoloiaaitox'á association. This association is particularly prominent in the Fia lov}vcfi, žaiesćitvcli brid-liciach zarad'ovai‹vch ‹lo pctr‹avc›laorského suvrstvia (F›a-jarnd and Voz arova, 19Si*â. In the Koliriov‹:e locality near Kroii-pachoc, Calc it u p›ori ybova1 reached up to 62 No and in the p›rie mere bc›l up to S,*9 %.* At this site, there are also separate smaller deposits and clusters consisting mainly of calcite (Fig. 1, c›bl'. 3).

Uhiič itany in pcstryc! purple and grey slates periríu w/stup*jći ćasto v roz¡›tÿ'lci"icj. vo!'nym okom ncvidi-tcfncj forme. The most typical form of occurrence is carbonate concretions, a detailed description of which can be found in the example of the Poráče locality in the work of Turan and Turanová (1954).

From a mineralogical point of view, both the coricrêcia and septaria reflect the composition of the surrounding environment in which they occur. Fe dolomite-ankerite concretions and septaria completely dominate (Table I, Fig. 4), but siderite (pelosiderite) concretions are also common, occurring mainly in the Rákoš deposit (Table I, Fig. 5). In addition to carbonate concretions, pyrite concretions are also common, and tourmaline concretions are less common.

Concretions and septaria can be said to be products of diagenesis. It is difficult to accept the opinion of Miškovica and Varćek (1982) that they are a manifestation of hydrothermal activity, as well as the view of Drnzíková and Nlandăková (lS6l, in Abonyi, 1961), who consider the siderite concretions from Rákoś to be tectonically formed clastics.

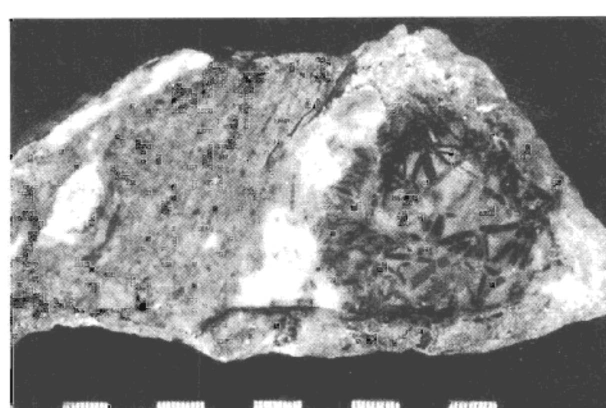
Carbonates binding to evaporites

In evaporites stratigraphically classified as Upper Permian and Lower Triassic (Bystric , and Fusán, 1°6 ì; Mahef and Vozár, 1973), carbonates are represented mainly by transitional members of the isomorphous series of magnesite-siderite with a minor representation of calcite. However, the presence of magnesite is also noteworthy. Turan and Vančova (1976) dealt with this issue in more detail.

A characteristic feature of carbonates associated with evaporites is their low abundance throughout the entire profile of sulphate horizons. The carbonates are low in carbon, most often ranging between 5 and 10%, and rarely exceeding this limit, but at a thickness of 50 m of sulphate horizons, this is an impressive amount of Fe carbonate.

Carbonates occur in various forms. Most often, they are individual grains or clusters of grains (Tabs. ì, Fig. 6). Rarely, idiomorphic grains developed from magmatic grains are also found, associated with magnesium-rich pyroxenes (in Trcllićku, 195S; fig. ?›).

The characteristics of the minerals found in evaporites and their spatial distribution are as well as from their structural features, which indicate the presence of clastic sediments. The origin of Fe-rich carbonates in evaporites can be explained as the result of the precipitation of Ca sulphates from the original solution, which was bound to the substrate.



O*øi . ó. ñii Iuky x:it inagiiczi:ii v :mi smite. Lot lita: Grcila, ñ‹i›'ü śi‹:ii i-i. Fig. 3. The magnesite nests in arihydrite. Lc›ca1ity: Circ:!a, Nová stólña.

calcium, and the tyin from the parent rock was relatively enriched with Mg, or Fe, and in the presence of CO_2 they then precipitated carbonate minerals rich in Mg and Fe.

Conclusion

In all types of Permian rocks studied, carbonates are represented regionally, with the dominant occurrence being the uncarbonate ankerite-(Fe dolomite)-siderite association. Carbonates of the calcite-dolomite association were more significant only in Permian pelitic rocks.

Carbonates occur in rocks: a) in a dispersed form (individual crystals and aggregates of carbonates), b) in the form of concretions and septaria, c) in the form of veins as a result of tectonometamorphic processes, and d) exceptionally also in the form of clasts.

Carbonates occurring in forms a, b and d can most likely be considered syngenetic-diagenetic, while vein carbonates can be considered cpigenetic.

Literature

Abonyi, A. 1961: Final report and calculation of reserves of the Ràkoš - Hg deposit. Manuscript - GP Žilina, Rožňava plant and Geofond Bratislava.

Bajaník, Ś. & Vozarovd, A. (Eds.) 1983: Explanatory notes to the geological map of the Slovak Ore Mountains, eastern part, 1:50,000. *G **ÛDS** Bratislava, 1 - 223.*

Bystríc, J. & Fusa'n, 0. 19ò1: On gypsum-aridrite deposits in the Slovak Karst. *Geol. Prù• k., 3, 8, 225 - 227.*

Mahef, M. & Vozdr, J. 1973: Geological and lithological characteristics of structural boreholes SM-I, SM-II (Smižany). *Regional geology **of** the **Western** Carpathians, 1st ed. G PDF Bratislava, 1 - 81.*

Mis'kovic, J. & Varček, C. 1983: Zru‹lnené konkrécie ako charakteristicky zjav v gemeridnom perrne. *In: Gubač, J. (Ed.) 1983: Vpl yv geologickêho prostredia na zrudnenie. GÛDS Bratislava, 235 - **242.***

Trdlička, Z. 1959: Contribution to the mineralogy of Slovak magnesite. *Geol. Práce Zoš., 5d, Bratislava, 165 - 200.*

Turan, J. & Turanovd, L. 1984: Carbonate Concretions in Permian Variegated Sandy Shales from the Rudńany Region (Spiśsko-gemerské rudohorie Mts., Western Carpathians). *Acta geol. geogr. Univ. Conien., Geol., 40, 107 - J24.*

Turan, J. & Vančová, L. 1976: Occurrences of gneiss in evaporites of the Western Carpathians. Zăpad. *Karpaiy, Sër. Mineral. Petrogr. C!eochëin. Lož., 2, 95 - 149.*