

## Meliaticum in the Stratenská hornatina Hills

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**Abstract:** South of the Dobšiná Ice Cave in the Stratenská hornatina Hills below carbonate strata of the Silicicum of the Stratená nappe we established a formation of distal flysch character, Jurassic in age, which we have proved by radiolarians. On the basis of the age of this formation, its lithological character and presence of serpentinites occurring in equal position in close neighbourhood (Danková) we consider it as the Meliaticum.

**Key words:** Western Carpathians, Meliaticum, Jurassic, radiolarians.

### Introduction

The aim of the research project "Paleogeographic relationship of Hronicum and Silicicum" of 1995 was to contribute to the solving of the problem of the paleogeographic position of the Stratenská hornatina Mts. Mesozoic, by the analysis of its relationship to the Late Paleozoic of the Northern Gemicum, i.e. by analysing the continuity or discontinuity of the bed succession. This succession appears (see older geological maps, e.g. BAJANÍK et al., 1984) to be disrupted between the Lower and Middle Triassic. The analysis, or confirmation of the discontinuity in the bed succession was possible by a) studying the stratigraphy of the basal members of the carbonate body of the Middle-Upper Triassic, b) proving a tectonic discontinuity as the result of the determination of the occurrence of remnants of another tectonic unit on the above mentioned discontinuity plane.

### Definition of terms

To make it possible to solve the relationship of Hronicum and Silicicum, it is above all necessary to clarify the terms Hronicum and Silicicum. The reason of the special problem is that both terms represent a system of rootless nappes with unknown and unproved roots.

Such unclear position, besides Hronicum (Andrusov - BYSTRICKÝ & FUSÁN, 1973) of ultra-Veporic origin (most frequently a scar is considered between Veporicum and

Gemicum, e.g. BIELY & FUSÁN, 1967; ANDRUSOV, 1968) and Silicicum, formerly of the same origin, i.e. from the Ľubeník-Margecany Line (KOZUR & MOCK, 1973), at present mostly considered as of ultra-Meliatic origin (MAHEL, 1986; HÓK & KOVÁČ, 1995), which is clear only in the case of the Silica Nappe of the Slovenský kras area, may be assigned to several other tectonic units, e.g. the upper sub-Tatricum (ANDRUSOV, 1968), i.e. the Strážov, Nedzov and other nappes, further the Drienok Nappe, the Muráň Nappe, the Mesozoic of the Vernár belt and the Mesozoic of the north Gemicum syncline, which are mostly classified as Silicicum (MELLO, 1979; BIELY, 1989), and less frequently, some of them, as Gemicum (the Mesozoic of the north Gemicum syncline, which appears to be the cover of Northern Gemicum).

After proving that the Upper sub-Tatricum belongs to Hronicum (HAVRILA, 1993), criteria for distinguishing (lithologically) these terms became clearer (the criteria of the occurrence of Wetterstein and Schreyeralm limestones ceased to be used, the occurrence of Lunz beds acquired greater importance). The contours of Hronicum became more precise.

If a unit belongs to Silicicum remains the most difficult to determine. The only reliable criterion based on the definition of Silicicum, or of the Silica Nappe, is the superposition in relation to Meliaticum, e.g. ultra-Meliatic origin in the sense of later studies. This is fulfilled with any certainty only by the Silica Nappe of Slovenský kras, e.g. the tectonic unit lying on Meliaticum, assuming north-vergency of the Silica Nappe (MAHEL, 1986; HÓK & KOVÁČ, 1995), which has been lately evidently accepted to a greater extent.

Therefore, questionable remains only the classification of the Drienok Nappe, Muráň Nappe, the Mesozoic of the Vernár belt and the Mesozoic of the Northern Gemicum syncline, i.e. units classified so far as Silicicum.

The most questionable is the position of the Mesozoic of the Northern Gemicum syncline. It is either considered to belong to Silicicum (e.g. MELLO & MOCK in MELLO et al., 1975; MOCK in MIŠÍK et al., 1980), or to the cover of Gemicum. It however appears that there is a

possibility to solve its classification. The key is the occurrence of ultrabasic bodies (serpentinities) in the area of Danková, i.e. rocks which are at present included into Meliaticum and which we do not know to occur in another tectonic unit. Therefore, we focused our attention principally to this unit.

### The problem of the classification of the Northern Gemicum syncline Mesozoic

The Mesozoic of the Northern Gemicum syncline, in view of the fact that it appears to be the cover of northern Gemicum, was in the past included into Gemicides (ZOUBEK, 1957; MAHEL, 1955, 1961, 1967). The reason for this was the proved gradual lithologic transition (without clear interruption) from the Permian to the Lower Triassic, well observable in the Smižany - 1 borehole (MAHEL & VOŽÁR, 1971; BAJANÍK & VOŽÁROVÁ, 1979), documented by the gradual change of sedimentary structures from river to shore (VOŽÁROVÁ in VOŽÁROVÁ, FEJDIOVÁ & SALAJ, 1993), the occurrence of intraformational clastic Permian material in the Lower Triassic (VOŽÁROVÁ in VOŽÁROVÁ & VOŽÁR, 1988), uranium mineralization passing from the Permian into the Lower Triassic (VOŽÁR, oral communication), equal maturity of Permian and Lower Triassic sediments (VOŽÁROVÁ in VOŽÁROVÁ, FEJDIOVÁ & SALAJ, 1993) and the same very low grade of metamorphism in the whole succession (very low metamorphism of the Permian has been proved by Šucha, oral communication by VOŽÁROVÁ).

The bed succession should continue uninterrupted into the Middle - Upper Triassic (MAHEL, 1955, 1967). However, the following facts contradict this statement:

1. Structural discordance between the clastic beds of the Lower Triassic and carbonates of the Middle - Upper Triassic, which is clearly suggested by older maps (KLINEC et al., 1976; BAJANÍK et al., 1984) in the whole North Gemicum Mesozoic belt, i.e. in the Stratenská hornatina Mts. and in Galmus, and even in the Muráň Nappe. In all of the above areas various members of the Middle-Upper Triassic bed succession are in contact with the Lower Triassic, which also does not everywhere have its upper carbonate part (upper Campilian). The most obvious is the discontinuity in Galmus and Murovaná skala, where carbonates of the Middle-Upper Triassic are lying immediately on the Early Paleozoic, implying very strongly that complexes of the Lower Triassic do not belong to the same tectonic unit as Middle-Upper Triassic ones.

2. The result of mapping and stratigraphic works of BYSTRICKÝ (1982), BYSTRICKÝ et al. (1982) from the area of Ládová (Ice) Cave, which proved that dark limestones with cherts assumed by MAHEL (1955) to be Anisian, are Upper Triassic (Carnian), proving thus paleontologically that the basal beds of the carbonate complex lying on the

paleontologically proved Lower Triassic, are Upper Triassic, and thus that it is not a continuous bed succession.

3. The discontinuity of the bed succession mentioned in the above points 1 and 2 is enhanced by the occurrence of serpentinites on this plane at Danková, i.e. in the overlier of the Lower Triassic and in the underlier of the carbonate complex of Stratenská hornatina Mts. (see the map of MAHEL, 1955; FEDOR, 1968). This position of serpentinites at Danková has been confirmed by KAMENICKÝ (1957), FEDOR (1968) and accepted further by HÁBER & HOVORKA (1981), JAROŠ, KRATOCHVÍL & ZLOCHA (1981) and HOVORKA (1985). Generally there is mentioned the sliced structure of the basic body at Danková and the tectonic restriction of the body (KORDIUK, 1941; KAMENICKÝ, 1951, 1957; FEDOR, 1968; JAROŠ, KRATOCHVÍL & ZLOCHA, 1981; HOVORKA, 1985). Serpentinities in the same position, with the same elongated shape and concordant with the general course of geological units, having the same sliced character and tectonic boundaries as well as contact effects, have been reported by KORDIUK (1941), KAMENICKÝ (1957), ANDRUSOV (1959), MAHEL (1967), JAROŠ, KRATOCHVÍL & ZLOCHA (1981), HOVORKA (1983) and MAHEL (1986) to occur elsewhere (Dobšíná, Jaklovce) in the North Gemicum belt. In the past, due to the fact that the ultrabasic bodies acquired the sliced structure along with the Lower Triassic beds, it was assumed that they belong to Lower Triassic complexes. Similarly, due to their alleged contact effect, Lower Triassic age was assigned to the basic volcanism. MAHEL (1957, 1967), due to the alleged thermal alteration of the overlying Anisian dolomites, suggested younger than Lower Triassic age. HOVORKA (1979, 1983) re-evaluated the thermal contact of the basic rocks and he mentioned that these are secondary reaction rims of rodingite type. After distinguishing the Meliata Series and the Silica Nappe (KOZUR & MOCK, 1973), the basic bodies of the southern belt became clearly a part of Meliaticum. Similar was the destiny of a part of bodies in the northern belt (Jaklovce - Margecany), where Jurassic age of the host rocks of the "Jaklovce Series" (MOCK in MIŠÍK et al., 1980) of the ultrabasics was proved by findings of belemnites and radiolarians (Mock et al., 1993, 1995).

In view of the above facts it is logical to assign the serpentinite body from Danková (Čuntava) to Meliaticum, which would confirm the correctness of the classification of the Stratenská hornatina Mts. carbonates with a different tectonic unit (Silicicum) than the silica-clastics of the Lower Triassic (Gemicum).

### Results of field investigations

The field work was carried out in 1995 between the Besník saddle and Spišská Nová Ves. It was aimed at the confirmation of the above mentioned tectonic discontinuity between the carbonates of Stratenská hornatina

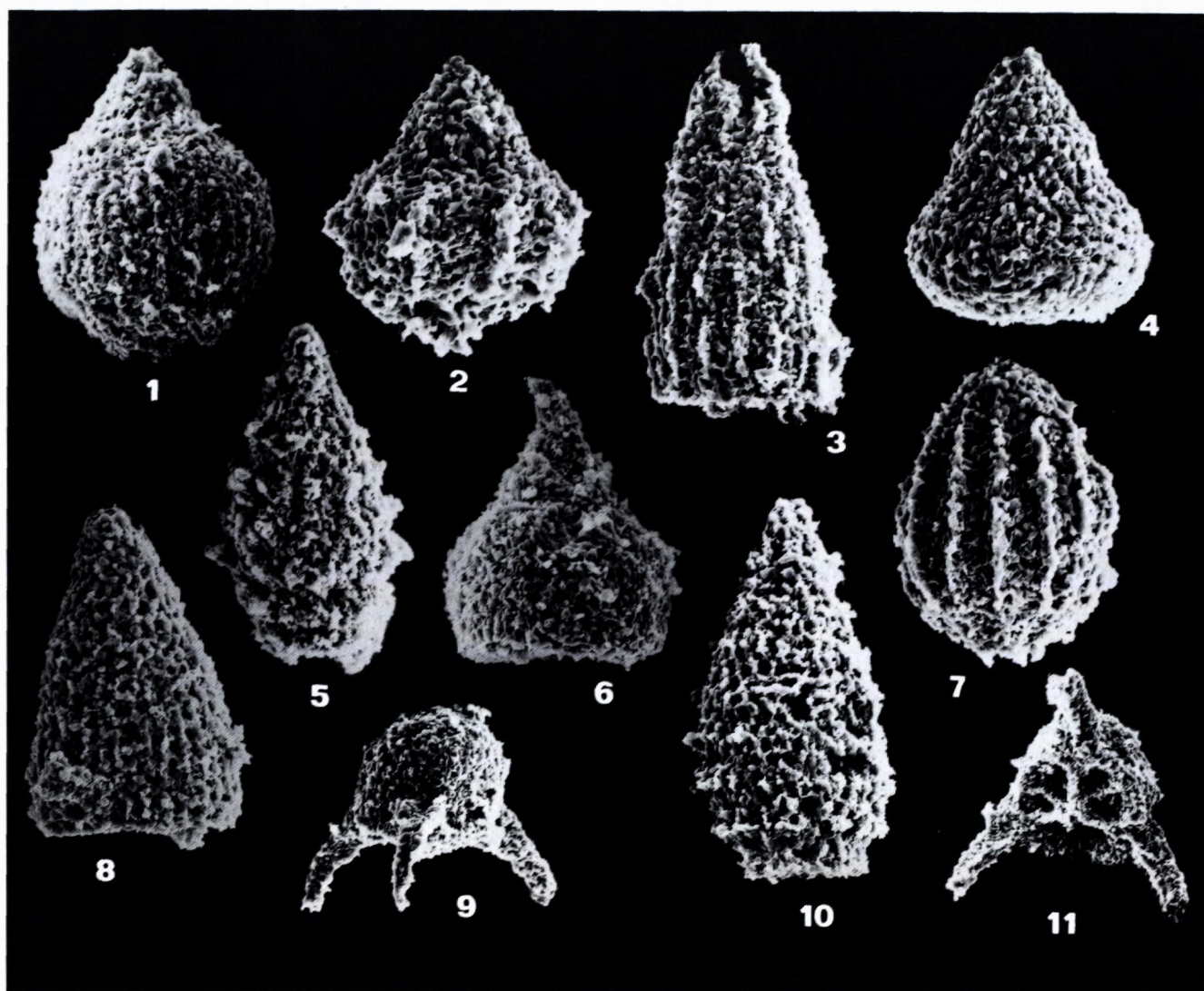


Fig. 1 *Tricolocapsa plicarum* YAO - 0049, 300 x; 2 - *Unuma latusicostatus* (AITA) - 0300, 300 x; 3 - *Transhsuum* sp. - 0298, 300 x; 4 - *Stichocapsa japonicum* YAO - 0291, 300 x; 5 - *Parvicingula dhimenaensis* ssp. A sensu BAUMGARTNER et al. 1995 - 0058, 300 x; 6 - *Eucyrtidiellum* sp. - 0059, 350 x; 7 - *Protonuma japonicus* MATSUOKA et YAO - 0296, 300 x; 8 - *Parahsuum* sp. - 0295, 300 x; 9 - *Saitoum* sp. - 0294, 250 x; 10 - *Parvicingula dhimenaensis dhimenaensis* BAUMGARTNER - 0287, 300 x; 11 - *Saitoum* sp. - oral view from Fig. 9 - 0293, 240 x

Mts. and the Lower Triassic lying below them. The effort was focused on: a) the confirmation of the stratigraphic break suggested by BYSTRICKÝ et al. (1982) and its generalisation. With this aim, samples were taken from the base of the carbonate succession, from basin and slope facies (especially dark clayey limestones with cherts and claystone beds classified by MAHEL' (1957) as Middle Triassic - Anisian) for biostratigraphic evaluation. Upper Triassic age has not been proved yet in the whole area, however, Middle Triassic rocks have not been found too; b) finding of bodies of Meliaticum occurring on the above mentioned tectonic discontinuity plane.

The field work could not confirm the occurrence of a continuous bed succession (with the exception of the

Glac Nappe), but in spite of this, the expected bodies of Meliaticum could not be found as well, with the exception of the above mentioned serpentinites at Danková (where, however, no other members of the Meliaticum olistostrome could be found), and with the exception of a lenticular body, whose content could be assigned to Meliaticum, occurring 1.5 - 2.0 km ESE of the serpentinites of Danková, i.e. 0.5 km SE of the elev. p. Ondrejisko, or 0.5 km E of the elev. p. Strmá pír'. This body was known already to MAHEL' (1957, 1967), who described it in the following way: "In the western part of the mountain range, layers of dark-grey and black clayey, sometimes slightly sandy shales covered by tiny mica flakes, and layers of dark grey quartzose shales to quartzites with

abundant pyrite, are found in a varied, predominantly red-violet complex". He classified the body as Lower Triassic, belonging to the North Gemericum unit.

The field work revealed that the body consists mostly of black-grey, frequently spotted, totally calc-free, strongly quartzified pelites - pelagites (shales), with fine mica, angular grey silicite clasts, further with layers of sandy pelites to fine-grained quartz sandstones, with abundant mica (i.e. of lithofacies of distal flysch character), with layers of light-grey-green, highly-clayey radiolarites. This succession is facially similar to the succession from Florianikogel in Northern Limestone Alps (Meliaticum), and to the succession from Honce. The pelites are macro- and microfacially similar to shales of the Meliaticum Jurassic on the type locality. The pelites and radiolarites contain radiolarians, which were evaluated by Dr. Ožvoldová.

The association (see Pl. 1) contained predominantly radiolarian cores (exclusively naselarians), the test walls were preserved more rarely.

Relatively abundant was the species *Tricolocapsa plicarum* YAO. *Tricolocapsa conexa* MATSUOKA, which was the most abundant species in association from Meliata, has not been preserved.

From other identifiable forms were found: *Eucyrtidiellum* sp., *Parahsuum* sp., *Parvincingula dhimenaensis dhimenaensis* BAUMGARTNER, *Parvincingula dhimenaensis* ssp. A sensu BAUMGARTNER et al., 1995, *Protunuma japonicus* MATSUOKA et YAO, *Saitoum* sp., *Stichocapsa japonica* YAO, *Transhsuum* sp., *Unuma latosicostatus* (AITA).

The species *Protunuma japonicus* begins the occurrence in UAZ 7, which is of the range Upper Bathonian to Lower Callovian (BAUMGARTNER et al., 1995), the species *Tricolocapsa plicarum*, *Stichocapsa japonica* and *Parvincingula dhimenaensis* ssp. A sensu BAUMGARTNER et al., 1995 terminate occurrence in UAZ 8, which is of the range Middle Callovian - Lower Oxfordian (ibidem). It results that the association represents the stratigraphic range of UAZ 7 - UAZ 8 - Upper Bathonian to Lower Oxfordian (ibidem).

Problematic is, however, the occurrence of the species *Unuma latosicostatus* (AITA), the stratigraphic range of the occurrence of which is UAZ 2 - UAZ 5 - Upper Aalenian to Lower Bathonian according to BAUMGARTNER et al. (1995). Probably it is necessary to shift the last occurrence of this species to a younger age.

This lenticular body, on the basis of recent investigations considered to belong to Meliaticum, is lying above quartzites and rauwackes of the Foederata Series. Above the body there are varied red-violet sandstones (Seisian - Lower Campilian), clayey limestones and predominantly grey - greenish-grey shales (Upper Campilian), further Triassic dolomites (age not determined in greater detail), light, metamorphosed Triassic limestones (age not determined in greater detail), light weakly metamorphosed micro-crystalline limestones with crinoid detritus to cri-

noid limestones, finger-like (laterally) alternating with grey to yellow-grey well-bedded, clayey weakly metamorphosed limestones with claystone layers of ochre colour and with cherts, reminding of Pötschen limestones. From the both last mentioned members of the succession, Norian conodonts were obtained near the elev. point Ondrejisko and in Spišský potok determined by Havrila and Pevný: *Metapolygnathus abneptis* (HUCKRIEDE), *M. spatulatus* (HAYASHI), *M. bidentatus* (MOSHER), *M. posterus* (KOZUR - MOSTLER), *Gondolella steinbergensis* (MOSHER). A part of these weakly metamorphosed rocks was in the past assigned to the Foederata Series.

It may be said that the lithology, age and geological position allows to assign the black pelites occurring SE of Ondrejisko to Meliaticum.

This, at north-vergency of the tectonic units (nappes, slices) would mean clearly that the Stratská hornatina Mesozoic belongs to Silicicum.

## Summary

The complex of black shales and grey-green radiolarites (and serpentinites from Danková) occurring SE of Ondrejisko, which had been originally classified as Lower Triassic, was on the basis of proved Jurassic age assigned to Meliaticum.

On the basis of this and of the geological position of rocks assigned to Meliaticum elsewhere in the North Gemericum syncline (Dobšiná, Kurtova skala, Jaklovce, Veľký Folkmár and also Radzim) above Lower Triassic sediments and below light limestones of ? the Middle-Upper Triassic it may be assumed that: sediments of the Lower Triassic belong to the Gemericum cover and ? Middle-Upper Triassic carbonate masses of the Stratská hornatina Mts. and of the tectonic outliers of Radzim, Dobšiná, the Jaklovce - Košická Belá area, are a partial nappe of Silicicum.

Therefore we may assume a similar succession of tectonic units as in Slovenský kras to exist in the northern part of Gemer.

The geological position of the Stratská hornatina Meliaticum, in view of its occurrence above the Foederata Series SE of Ondrejisko, appears to be ambiguous and there is a possibility to regard it as the Jurassic of the Foederata Series. This is contrary to the geological position of Meliaticum, or the "Jaklovce Series", in the broader region (Radzim, Dobšiná, Jaklovce-Košická Belá), where it occurs always above Gemericum, as well as the lower metamorphic grade (evaluated macroscopically, and, preliminarily, also according to illite crystallinity by Dr. Šucha).

On the basis of the work by MANDL - ONDREJČKOVÁ (1991) we may state that the position of Meliaticum in the Odenhof tectonic window in the Northern Limestone Alps

is similar; it is lying here below the Schneeberg Nappe and the "Schurflings (i.e. Meliatic) are lying in Werfenian shales".

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