SPORE CORRELATIONS BETWEEN THE RHENISH SLATE MOUNTAINS AND
THE RUSSIAN PLATFORM NEAR THE DEVONIAN-CARBONIFEROUS BOUNDARY

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(1 figure, 2 tables, 2 plotted)

INTRODUCTION

Spore correlations between USSR and Western Europe are difficult for two reasons. Firstly the palynological taxonomy has arisen separately in both regions which has involved misinterpretation and duplication of species names. Secondly, the zonal concept used for correlation may also be different. This is well exemplified at the Devonian-Carboniferous boundary where the Soviet palynologists use assemblage zones characterized by dominant species (e.g. H. leptodiaphyta/t. H. pavilites/L. malvensis Zones in BYVSEHVA, 1976, 1978) whereas western palynologists use interval zones characterized by first (or last) occurrences of selected species (e.g. LL/LE/LN/VI Zones in HIGGS & STREEL, 1984).

We want to propose here a correlation between the Rhenish Slate Mountains in West Germany and the eastern part of the Russian platform in Udmurtia. The palynological details of these sections, which represent “basinal” facies, are published elsewhere (BYVSEHVA, 1976, 1978; HIGGS & STREEL, 1984) and need not be completely repeated here. We just want to emphasize briefly how the different systematic and zonal systems might be reconciled if more contacts between palynologists from both regions could be achieved.

SPORE CORRELATION

VAN VEEN (1981) was the first to attempt lateral correlation between BYVSEHVA’s results from Udmurtia and his own work in Western Europe, i.e. in Southwest Ireland. He used the sudden presence of involute and muronate forms (e.g. Dictyotretites trivalvis) as well as of Tunnulipora spp., to support a correlation between the abrupt transition of Byvsheva’s pavilites Zonal malvensis Zone and his own LN/LC transition. Such a correlation is an example of a major quantitative change which might be correlated between both regions despite the fact that the dominant species of the respective assemblages are not all the same.

In the present paper, a different approach has been adopted. We have attempted to identify the western interval zones in the Russian platform material. For this purpose, 4 samples have been selected, 3 from the Udmurtia boreholes 1 and 1 from the Malinskaya type region.

The samples from Udmurtia were chosen for their key stratigraphical positions in the sequence studied by BYVSEHVA (1978). Sample 1943/22 from borehole 292 is the first level carrying a V. pavilites assemblage while sample 2007/25 from borehole 277 is one of the highest levels obtained which carries the succeeding T. malvensis assemblage. Sample 17849/2 from borehole 290 represents a typical V. pavilites assemblage of the mLZ type (with co-abundance of H. leptodiaphyta, V. pavilites, etc… See BYVSEHVA 1978).

Sample 130 comes from the type Malinskaya horizon taken in the central part of the Russian platform near the city of Tula (Glubokovskaya K1 [124957]) borehole, interval 123.1 - 125.9 m). A fauna carrying the conodont Sclerosidda ammonitica was found at 116 m, 10 metres above this sample.

The western authors of the present paper (K.H. & M.S.) have carefully examined slides made out of these samples in order to recognize as many species as possible which are also known in Western Europe**. The most appropriate correlation can be made with two sections of the Rhenish Slate Mountains: Rinscheid and Haselbachtal where faunal data are available.

* If T.V. BYVSEHVA has formerly used the Navarro classification of mosqueras, she presently prefers to use the western palynologists’ classification.

** The authors thank very much G. CLAYTON (Dublin, Ireland) and G. PLAYFORD (Brisbane, Australia) for their attention on part of the material here involved.
The proposed correlation between both regions is demonstrated on Figure 1. Table 1 shows the list of species common to both regions and is given in the western nomenclature. In addition to the species present in the two sections of the Rheinish Slate Mountains, there are a few others known from elsewhere in Western Europe which have been recognized in the Russian platform material. They are also considered in the systematic comments.

**SYSTEMATIC COMMENTS**

In the following section the authors have focused their attention on specific identity, disregarding for the time being, the generic status of the taxa.

- **Asperispora asula** (KEDO) VAN DER ZWAN 1980. This species possesses prominent bulbous bases which are broader and galler. Mistakenly, several Western European palynologists e.g. DOLBY & NEVES 1970, HIGGS 1975 and VAN DER ZWAN & VAN VEEN (1978) have assigned much smaller and more delicately ornamented forms to this taxon.

- **Concentricisporites concentricus** BYVSHEVA 1976. This is probably what KEEGAN (1977) referred to as *Lophozononocelites* sp. HIGGS (Irish type LE-VII).

- **Dicyctotriletes plicatulus** BYVSHEVA 1972 is very close to *D. triquartatus* (WINSLOW) KAISER 1970 which ranges from LL to VI in western Europe.

- **Lophozononocelites triangulatus** (ISCHENKO) HUGHES & PLAYFORD, 1961 is used by PLAYFORD (1976) for cingulate and verrucate (rounded shaped) spores, to combine L. rarituberculatus (LUBER) KEDO 1967 (a later homonym of L. rarituberculatus NAUMOVA 1953 which is a different species), and L. malenkensis (NAUM, IN LITT.) KEDO 1965. BYVSHEVA now uses the genus Tumuliscopia STAHLIN & JANSJONIS 1964 and confines to distinguish between T. rarituberculata (LUBER) POTONIE 1968 and T. malenkensis (NAUMOVA) TURMAIU 1978.

- **Lophozononocelites rugosus** (HOMOSCH) STREEL in BECKER et al., 1974 is obviously synonymous with *Tachytriletes radiatus* (JUSCHKO) KEDO 1974 (in BYVSHEVA 1976, 1978). The comparisons of Pl. 1, fig. 4 and Pl. 2, fig. 26 in JUSCHKO (1960) of *Tachytriletes eugeniaei* and *Concentricisporites radiatus* suggest the second name to be more appropriate. Pending a reexamination of the type material, a new combination in the genus Rugospora is not attempted here.

- **Spelaeotriletes ornatus** HIGGS 1975 is characterized by dense granule ornamentation and is probably similar to *Spelaeotriletes micranusculus* BYVSHEVA 1976.

- **Verruconisporites nitidus** PLAYFORD, 1964. This species has a denser verrucate and thus a well developed negative nodulum. Lophozononocelites menegozanus KEDO 1963 which is present in some of the Russian samples has a more widely spaced verrucose which are of variable size, shape and distribution on each specimen.

- **Vallatisporites vallatus** HACOUBEAUD 1957 is obviously synonymous (at least in part) with *Hymanosporites pustulatus* KEDO 1957. However, the Russian morphological concept of *H. pustulatus* is broad and Western palynologists have differentiated a smaller ornamented form *Vallatisporites vallatus* and a coarser sinuate form *V. pustulatus* (KEDO). From DOLBY & NEVES 1970 or *Concentricisporites hystrixicus* WINSLOW & STREEL & TRAVERS 1978. The arbitrary binomial of 2 my between these forms is used here on Table 1. The authors note that the specimens assigned to *V. pustulatus* from the Russian platform are generally less coarsely and densely ornamented than those recorded from the Rheinish Slate Mountains.

**STRATIGRAPHIC RESULTS**

Sample 17480/22 contains the association of *R. lepidophyta* and *H. explanatus* but lacks V. nitidus. It therefore correlates with the LE Zone.

Sample 17849/2 and 20075/5 contain V. nitidus. *R. lepidophyta* is abundant in 17480/2 but rare in 20075/5. Both samples correspond to the LN Zone. The rarity of *R. lepidophyta* is characteristic of the upper part of the LN Zone in Western Europe, which more or less coincides with the LG Zone of VAN VEEN (1981).

Sample 132 does not contain *R. lepidophyta* but is characterized by numerous specimens of *Lophozononocelites* and *Concentricisporites*. In these respects it compares well with the VI Zone.

All the species which are common to both regions (Table 1) do not invalidate these correlations.
Table 2. Correlation between Russian platform assemblage Zones and Subzones and Rhinemish Slate Mountain interval Zones.

<table>
<thead>
<tr>
<th>Zones</th>
<th>Assemblage</th>
<th>Interval Zones</th>
<th>Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>VI CARB.</td>
<td>without R. lapidiphyta</td>
<td>T. malvaceus</td>
<td>m12</td>
</tr>
<tr>
<td>LN</td>
<td>with rare R. lapidiphyta</td>
<td>m1</td>
<td>LE</td>
</tr>
<tr>
<td>LL</td>
<td>with M. explectans and R. lapidiphyta</td>
<td>R. lapidiphyta</td>
<td>R. lapidiphyta tener</td>
</tr>
</tbody>
</table>

*approximate position of the base of Sphenopteris atlantica in the Rhinemish Slate Mountains.

The occurrence of V. nudius is rather rare in the Russian platform and is therefore somewhat difficult to use for zonal purposes particularly as it remains a minor element within the V. psilophyta (m12) assemblage. The exact stratigraphical position of the V. psilophyta assemblage with rare R. lapidiphyta (m12) well known from the western part of the Russian platform in Bioturasia, has yet to be demonstrated in Udmurtia. If the R. lapidiphyta assemblage and the V. psilophyta (m12) assemblage are found directly in succession in Udmurtia, the younger subzones of the T. malvaceus zone are not. Therefore a continuous registration of spores from the V. psilophyta assemblage to the T. malvaceus assemblage has still to be found in the Russian platform.

It is striking to denote on Figure 1 the close similarity of the lichenostratigraphy in both regions. The sudden change in lithology between the Zavolga limestone beds and the Malevka shaly beds in Udmurtia coincides almost exactly with a similar change between the Wack- lum Kalk and the Hangerberg Schiefer in the Rhinemish Slate Mountains. The more sandy facies in the upper part of the Malevka shaly beds (borehole 277) makes a similar situation in several sections, in the upper part of the Hangerberg Schiefer. The return of the limy facies in the uppermost part of both sequences might also be more or less contemporaneous.

REFERENCES


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ABSTRACT
An attempt is made to correlate the Devonian–Carboniferous transitional beds of the Rhenish Slate Mountains and the Russian Platform by means of sporaxes, although different zonal concepts are used in both regions. The *T. malokievitsch* assemblage Zone of the Russian Platform is subdivided into two subzones, the lower one corresponding to the uppermost part of the *Nidulahystrites-nitidus* Zone, the upper one to the *verrucosus-inconicus* Zone. Systematic comments are made.

PLATE 1
All figured specimens X 1000, unless stated otherwise

Fig. 1-2. *Verrucosostrophites nitidus* PLAYFORD, Udumurtia, Malevka hor., bor. 277, 20075/5.

Fig. 3. *Protoverrucosostrophites* sp. a (HIGGS 1975) Tula, Malevka hor., Glubokovskaya K-1 bor., 132.

Fig. 4-5. *Diboliopites abstrusus* (PLAYFORD) PLAYFORD 1976, Udumurtia, Malevka hor., bor. 277, 20075/5; 5 : detail, X 2000.

Fig. 6. *Dictyosporites glumaceus* BYVSHHEVA, Udumurtia, Malevka hor., bor. 277, 20075/5.

Fig. 7. *Rugospora flexuosa* (USCHKO) STREEL, Udumurtia, Malevka hor., bor. 290, 17849/2.

Fig. 8. *Cyrtospora cristifer* (LUBERT) VAN DER ZWAN, Udumurtia, Malevka hor., bor. 290, 17849/2.

Fig. 9. *Concentricopolites concentricus* BYVSHHEVA, Udumurtia, Malevka hor., bor. 277, 20075/5.

Fig. 10. *Lophozonotriletes exculsus* NAUMOVA, Udumurtia, Malevka hor., bor. 277, 20075/5.
PLATE 2

All figured specimens X 1000, unless stated otherwise.

Fig. 11-12. *Lophozonotriletes varierrucatus* PLAYFORD, Tula, Malevka hor., Glubokovskaya K-1 bor., 132.

12. transitional form to *L. triangulus* (ISHCHENKO) HUGHES & PLAYFORD; it is called *T. malysheva* (NAUMOVA) TURNAU by T.V. BYVSHEVA.

Fig. 13. *Hymenosozonotriletes explanatus* (LUBER) KEDO, Udmurtia, Malevka hor., bor. 290, 17848/2.

Fig. 14. *Grandipora echinata* HACOUEBARD, Udmurtia, Malevka hor., bor. 290, 17848/2.

Fig. 15-18. *Antipora lepidophyta* (KEDO) PLAYFORD,

15. Udmurtia, Malevka hor., bor. 290, 17848/2.


Fig. 18-20. *Veilletiporites puellilites* (KEDO) DOLBY & NEVES,


20. detail, x 2000.

Fig. 21. *Asperipora acuta* (KEDO) VAN DER ZWAN, Udmurtia, Malevka hor., bor. 277, 20075/8.