ALCAPA - Field Guide	IGP/KFU Graz	pp. 93 - 95	Graz 1992

REMARKS ON THE BIOGEOGRAPHICAL RELATIONSHIP OF THE GRAZ PALAEOZOIC UNIT

B. Hubmann

Institut für Geologie und Paläontologie, KFU Graz, Heinrichstrasse 26, A-8010 Graz.

Geologist's troubles to point out faunal relationships between the Palaeozoic of Graz and other remnants of the Palaeozoic, especially the Rhenish Slate Mountains date back to the last century (e.g. Suess, 1868). But till now all these efforts have been failed because of incorrect determinations, misinterpretations of taxonomy, macrobiosis of the referred organisms, etc.

Especially the strongly fossiliferous late Emsian to Eifelian formations of the Palaeozoic of Graz (particularly the Barrandei Limestone) seem to be designated to point out faunal relations. These successions have been studied by palaeontologists for more than 100 years. According to these studies a large number of fossils has been recorded (see Flügel, 1975):

Dasycladacean and Udoteacean Green Algae: 3 genera, 3 species
Stromatoporoids: 9 genera, 15 species
Rugose Corals: 18 genera, 21 species
Tabulate Corals: 11 genera, 30 species
Gastropodes: 7 genera, 13 species
Bivalves: 8 genera, 5 species
Cephalopods: 1 genus
Trilobites: 1 genus
Eridostraca: 2 genera, 2 species
Bryozoan: 1 genus
Brachiopodes: 28 genera, 37 species
Conodonts: 3 genera, 6 species

The usefulness of these fossils is somewhat limited by the fact that most of the identifications were carried out during the last century and revision is required urgently. Also, a great number of type localities is now inaccessible or cannot be found, so that re-sampling is curtailed: The typoids of the brachiopodes cannot be found thus precluding a revision.

Obviously it is quite easy to draw incorrect conclusions when one compares the listings of fauna - especially since the same or similar uncertainties could have affected other listings of faunas as well.

To achieve reliability of faunal correlations it is of paramount importance that only modern publications are consulted that are based on state-of-the-art taxonomy and systematic, otherwise any further statements of a more general nature will become pseudo-scientific fancies.

When you take these aspects into account it is impossible at this stage to establish quantitative patterns of faunal affinities or similarities (e.g. to calculate affinity indices after Johnson, 1971; or similarity coefficients after Clark and Hartleberg, 1983 or others). For this reason it is wise to restrict oneself to quantitative comparisons. But also in this case it is of crucial importance to use only well defined taxa. Likewise conodonts are nearly of no use because they are very abundant fossils distributed worldwide and therefore impracticable. Green Algae as well as some tabulate and rugose corals and the Brachiopod genus Zdimir of the Middle Devonian of Graz can be used because their taxonomy was subjected recently to detailed studies.

Zdimir, for example is a common fossil of the upper parts of the Barrandei Limestone Formation (Zdimir cf. hercynicus; Boucot and Siehl, 1962); it has been an essential fossil for biogeographical considerations for quite a long timespan of palaeontological and stratigraphical research and not least it is a leading fossil of the Eifelian of Belgium and the Harz area (cf. Flügel, 1975).

Currently some 15 species of Zdimir are known distributed worldwide from Spain, the Rhenohercynian zone, the Uralian area to China (Boucot and Siehl, 1962; Sapelnikov et al., 1981; Bai and Bai, 1988). This genus apparently lived in a special narrow environment (transitional between a dacryoconarid-ammonite biofacies and a spiriferid-coral-biofacies) and perhaps - following the assumptions by Bai and Bai (1988) - their occurrences are restricted to a well defined time span ranging from the seriotinus conodont zone of Upper Emsian to the partitus conodont zone of Lower Eifelian. However, Zdimir seems to be a good fossil for palaeobiogeographical studies (Fig.1a).

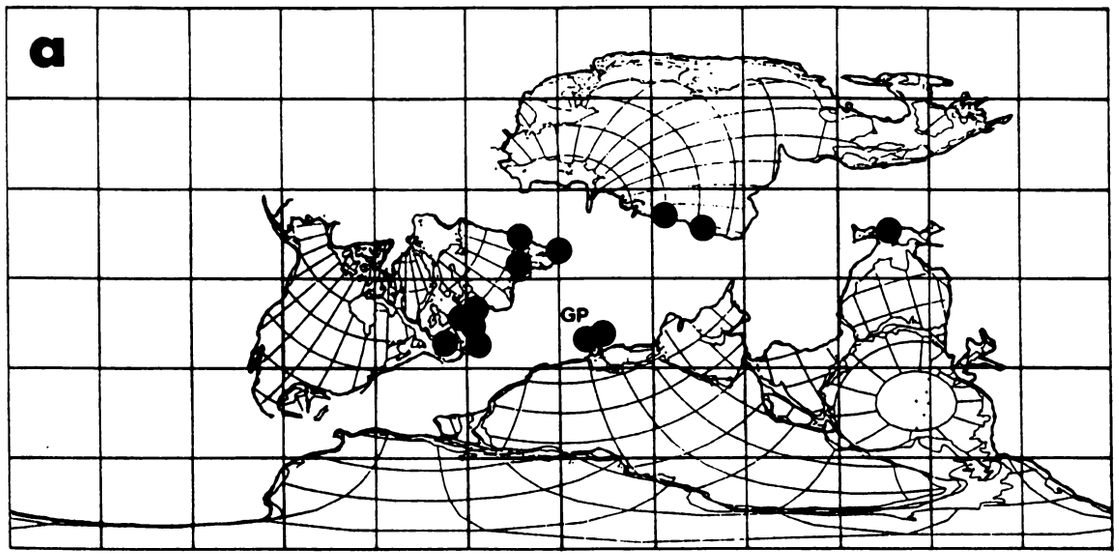

Fig.1a) Distribution of Zdimir. Middle Devonian base map of Smith, Hurley and Briden (1981). Cylindrical equidistant projection.

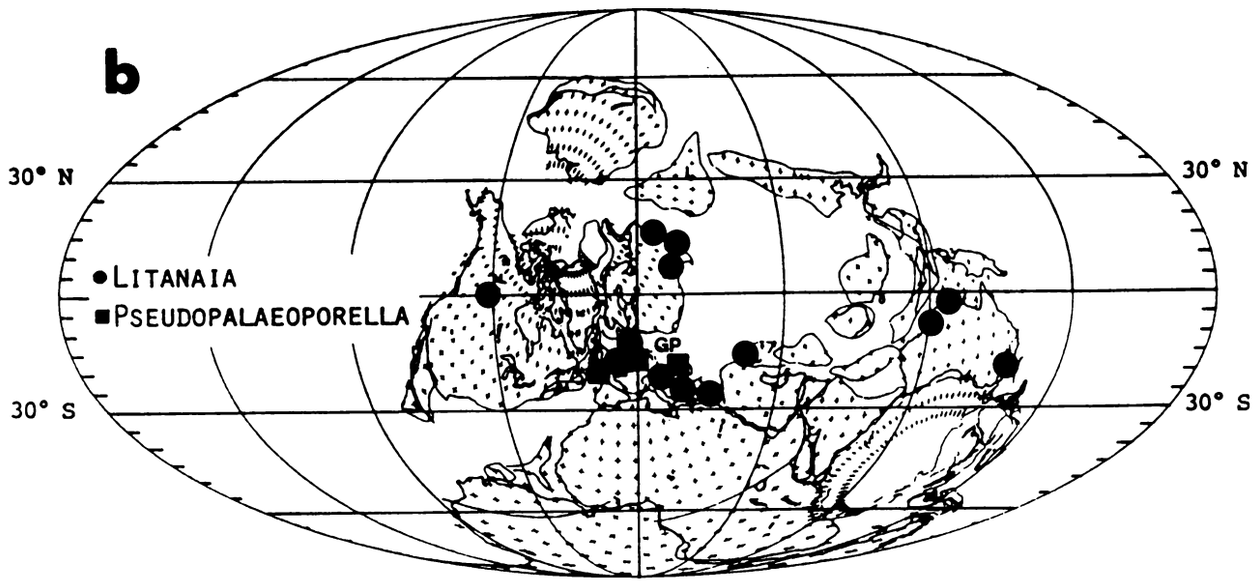

Fig.1b) Distribution of Litanaia and Pseudopalaeoporella. Middle Devonian base map after Scotese and McKerrow (1990). Mollwide projection.

Rugosa show no uniform trends (west-European forms may be predominant), but in particular the genus Thamnophyllum gives the coral fauna a certain appearence and show some affinities to the Devonian of Poland (cf. Flügel, 1975). Tabulate corals indicate connections with the Rhenohercynian zone, the Moravian Karst and the Cantabrian mountains (Hubmann, 1991). The former and the latter have also in common with the Devonian of Graz some floral elements (Pseudopalaeoporella lummatonensis; Hubmann, 1990). The Udoteacean genera Litanaia and Pseudopalaeoporella (calcified benthonic green algae) were also distributed worldwide within the intertropical climate zone

(30°N and S of the palaeoequator) during (Middle) Devonian times (Fig.1b). Especially Pseudopalaeoporella lummatonensis is currently known only from 5 localities in the European realm. They all are known from the Rhenohercynian zone exept the ones of the Devonian of Graz which represent findings of the Gondwanian shelf (Fig.1c). Recently Pseudopalaeoporella lummatonensis was discovered in the Devonian of Cantabria/Spain (Herrmann and Hubmann, in prep.). Both occurrences, the Austrian and the Spanish indicate that these basins were in connection with the Rhenohercynian basin, which enabled gene drift over these areas.

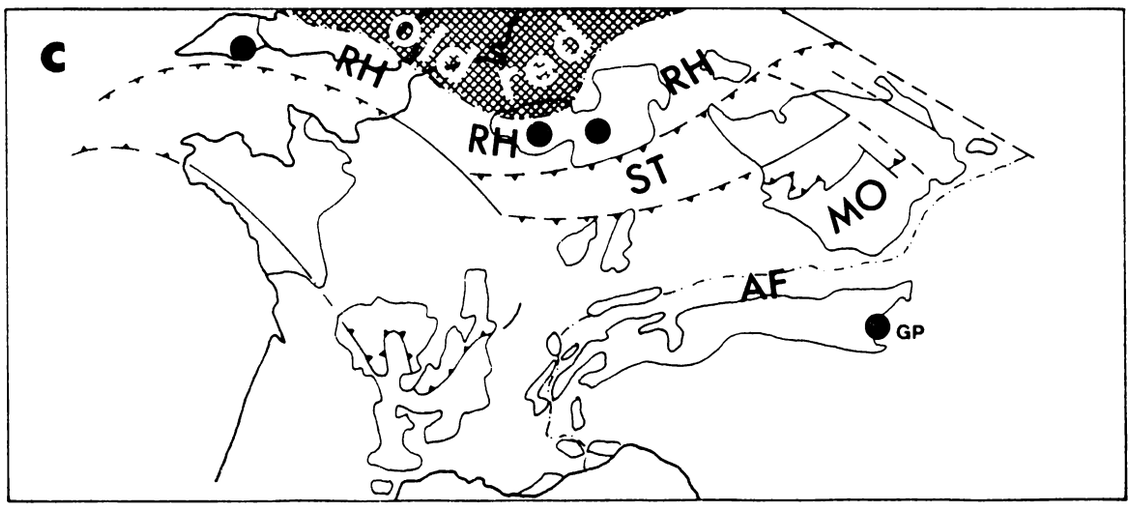

Fig.1c) Localities of Pseudopalaeoporella lummatonensis (ELLIOT) within the European realm. Tectonostratigraphic subdivision of the variscan belt after Franke and Engel (1986).RH: Rhenohercynian; ST: Saxothuringian; MO: Moldanubian; AF: Alpine front; GP: Graz Palaezoic

However, only few indisputable data are now available to allow reliable biogeographical interpretations and therefore the statement presented herein should be viewed as a preliminary rather than as a solidy based permanent one.

References

Bai,Z. and Bai,S.,1988. Conodont Biostratigraphy of the Devonian Zdimir from Bahe, Guangxi, China. In: N.J.McMillian, A.F.Embry and D.J.Glass (Eds), Devonian of the world, 3: 529-534

Boucot,A. and Siehl,A.,1962. Zdimir BARRANDE (Brachiopoda) redefined. Notizbl.hess.Landesanst.Bodenf., 80: 529-534

Clark,D.L. and Hartleberg,E.W.,1983. Paleoenvironmental factors and the distribution of conodonts in the Lower Triassic of Svalbard and Nepal. Fossil and Strata, 15: 171-175

Flügel,H.W.,1975. Die Geologie des Grazer Berglandes. Mitt.Abt.Geol.Paläont.BergbauLandesmus.Joanneum., Sh 1: 1-288

Franke,W. and Engel,W.,1986. Synorogenic sedimentation on the Variscan belt of Europe. Bull.Soc.geol.France, 8/2: 25-83

Hubmann,B.,1990. Udoteaceen (Grünalgen) aus dem Grazer Paläozoikum/Österreich (Barrandeikalke, Eifelium). Facies, 22: 147-158

Hubmann,B.,1991. Alveolitidae, Heliolitidae und Helicosalpinx aus den Barrandeikalken (Eifelium) des Grazer Devons. Jahrb.Geol.Bundesanst., 134/1: 37-51

Johnson,J.G.,1971. A quantitative approach to faunal province analysis. Amer.Jour.Sci., 270: 257-280

Sapelnikov,V.P., Mizens,L.I. and Snigireva,M.P.1981. Brachiopods and conodonts of the Zdimir Zone (Devonian) in the northern part of the Northern Urals. In: Sapelnikov,V.P.(Ed), Biostratigrafia i fauna srednego Paleozoya Ural, 75-91

Scotese,C.R. and McKerrow,W.S.,1990. Revised world maps and introduction. In: W.S. McKerrow and C.R. Scotese (Editors), Palaeozoic Palaeogeography and Biogeography. Mem.Geol.Soc.London, 12: 1-21

Smith,A.G., Hurley,A.M. and Briden,J.C.,1981. Phanerozoic paleocontinental world maps. Cambridge Univ. Press, Cambridge 102pp.

Suess,E.1868. Die Äquivalente des Rotliegenden in den Alpen. Sitzungsber.Akad.Wiss.,math.-naturwiss.Kl.,I, 57: 230-276