

CONNECTIONS OF THE UPPER CARBONIFEROUS BRACHIOPOD FAUNAS FROM THE CARNIC ALPS AND KARAVANKE MOUNTAINS WITH THOSE OF THE CANTABRIAN MOUNTAINS (SPAIN)

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ABSTRACT

The Lower Carboniferous faunas from the Alps show no relationship with those from the Cantabrian Mountains. The Middle Carboniferous in the Alps is only represented by its upper part, the Myachkovian. Rich brachiopod faunas are found at many localities in the Upper Carboniferous, starting with the Kasimovian and continuing to the end of the Orenburgian. In the Cantabrian Mountains, on the other hand, the Middle Carboniferous is rich in brachiopods, and so is the lower part of the Upper Carboniferous (Kasimovian). Table I lists the species that the Cantabrian Mountains have in common with the Carnic Alps and the Karavanke Mountains for the Upper Carboniferous. In the Karavanke Mountains the only rich brachiopod faunas are of Orenburgian age, and it is remarkable that they have many species in common with the Kasimovian faunas of the Cantabrian Cordillera.

RESUMEN

Las faunas del Carbonífero Inferior de los Alpes no muestran relación con las de la Cordillera Cantábrica. El Carbonífero Medio de los Alpes solamente está representado por su parte superior, el Myachkoviense. Ricas faunas con braquiópodos se han encontrado en varias localidades del Carbonífero Superior, desde el Kasimoviense hasta el Orenburgiense. Por el contrario, en la Cordillera Cantábrica las faunas ricas de braquiópodos son principalmente del Carbonífero Medio, continuándose por algunas faunas de la parte baja del Carbonífero Superior (Kasimoviense). En el cuadro I se presenta una lista de especies encontradas tanto en el noroeste de España como en los Alpes y en los montes Karavankes. En los Karavankes solamente existen faunas ricas de braquiópodos de edad Orenburgiense y el número elevado de especies que tienen en común con las faunas del Kasimoviense en España resulta sorprendente.

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No brachiopod fauna is known from the Lower Carboniferous in the Alps (Carnic Alps and Karavanke Mountains) that would correspond to the Lower Carboniferous brachiopod fauna of the Cantabrian Mountains. The existence of the Middle

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Carboniferous (Bashkirian and Moscovian) in the Alps has not yet been proved palaeontologically, but it is possible that the highest Moscovian has been deposited. In the opinion of the present author, the Sudetic orogenic phase must be considered as the reason for this gap. The Upper Carboniferous transgression in the Carnic Alps was—according to F. HERITSCH, F. KAHLER & K. METZ (*in* HERITSCH 1933)—of Moscovian age, and in the Karavanke Mountains it is in the present author's opinion either lowermost Kasimovian or upper Myachkovian in age. In the Carnic Alps no brachiopods are known from the lowermost Kasimovian or highest Moscovian limestones which contain *Protriticites pramollensis* (cf. PASINI 1963).

In the Carnic Alps, the Weidegger Shales, which, among other fossils, contain a large number of brachiopods, represent the basal part of the Upper Carboniferous; together with sandstones, mudstones, and quartzites they belong to the «lower beds poor in limestone» (untere kalkarme Schichtgruppe; METZ 1936, GAURI 1965, pp. 5, 6). GAURI (*loc. cit.*) determined an Uralian age for the Weidegger Shales as well as for the Waschbüchel and Watschiger beds. Still, the complicated stratigraphic position is still insufficiently known (cf. H. FLÜGEL 1964, p.423). Fusulinidae have not been recorded from the Weidegger brachiopod shales; these would certainly be important for the age determination and for a comparison with the brachiopod faunas from the Karavanke Mountains. WINKLER PRINS*, too, has informed me that he could not find fusulinids during his investigation of this locality in 1969. The middle part of the Upper Carboniferous strata is not present in the western part of the Carnic Alps (GAURI 1965, p.6).

The beds containing *Isogramma* (not *I. expansum*), which conformably underlie the *Pseudoschwagerina* Horizon (locality 9 of GAURI), cannot be correlated with any other Carboniferous occurrence. They are of Upper Uralian age (GAURI 1965, pp. 30, 31).

In the Karavanke Mountains, the Kasimovian is developed as a dark grey, massive limestone containing *Protriticites pramollensis senior*; the middle Kasimovian here has not yet yielded any brachiopods (KOCHANSKY-DEVIDÉ & RAMOVŠ 1966, p. 330; RAMOVŠ 1969, p. 241).

The Gzhelian consists of quartz conglomerate, quartzarenitic and calcareous sandstone, sandy limestone, and limestone containing numerous *Triticites* (KOCHANSKY-DEVIDÉ & RAMOVŠ 1966, p. 329; RAMOVŠ 1969, p. 241), but no brachiopods.

In the Yugoslavian part of the Alps, Carboniferous brachiopods are only known from the uppermost Carboniferous (Orenburgian). In the Karavanke Mountains a well known collecting site for Upper Carboniferous brachiopods is at Spodnja počivala in Javornički rovt, near the town of Jesenice. Here we find highly fossiliferous, dark grey, finely micaceous, generally somewhat sandy mudstones with marly intercalations. The mudstones alternate with sandstones. Although brachiopods are the most frequent fossils at this locality, it also contains numerous bryozoa and cri-

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noid remains. Other faunal elements are corals, sponges, gastropods, lamellibranchs and trilobites. Most important is the fact that fusulinids and calcareous algae are frequently found together with the brachiopods, particularly in the marly beds. The brachiopod fauna is of Upper Carboniferous (Orenburgian) age; as is indicated by the abundant *Rugosofusulina alpina antiqua*. This fusulinid is accompanied by the calcareous alga *Archaeolithophyllum missouriensum* and by green algae.

The brachiopods have both valves preserved, and the spines of productids are still found attached in the rock. The brachiopods are frequently covered with bryozoa. The fauna from Spodnja počivala represents the biocoenosis of a shallow well-lighted sea with moderate wave action. The brachiopods and other fossils are preserved as exterior and interior moulds in the mudstones; in marls, however, we also find the shells.

The second collecting locality with the same and equally old —yet not so rich— brachiopod fauna is from the village Planina near the town of Jesenice. A third one occurs above the village Konjiška vas on the mountain Konjiška gora, in the eastern Karavanke Mountains; where less well preserved brachiopods are found. Several other fossil localities containing a few brachiopod species are quoted in the literature; for these places, however, it will be necessary to revise the brachiopods.

The brachiopod fauna from the Karavanke Mountains is younger than the Kasimovian brachiopod fauna from the Cantabrian Mountains (Brañosera and Barruelo formations), described by WINKLER PRINS in WAGNER & WINKLER PRINS (1970). In spite of this we find in both faunas identical species and forms with close affinities.

The identical and related species in the Alpine and Cantabrian brachiopod faunas occur mainly in the Upper Carboniferous. Nevertheless, the difference in age of these brachiopod faunas should be emphasized. The following species from the Brañosera and Barruelo formations are identical with those of the Alpine brachiopod fauna (see Table I).

Table I. The common occurrence of brachiopod species in the Alps and in the Cordillera Cantábrica.

	CORDILLERA CANTABRICA			CARNIC ALPS	KARAVANKE MTS
	Brañosera Fm. Kasimovian	Barruelo Fm. Kasimovian (?)	Cabrales beds Kasimovian (?)	Weidigger Shales Kasimovian (?)	Spodnja počivala Orenburgian
<i>Mesolobus sinuosus</i> (SCHELLWIEN 1898)	+	+		+	+
<i>Streptorhynchus reliquus</i> GAURI 1965	cf.	cf.		+	
<i>Juresania subpunctata</i> (NIKITIN 1890)	+	+		+	+
<i>Enteletes carnica</i> (SCHELLWIEN 1892)			+	+	+
<i>Brachythyrina carnica</i> (SCHELLWIEN 1892)	+	+	+	+	+
<i>Plicatocyrtia zitteli</i> (SCHELLWIEN 1892)	+	+		+	+
<i>Martinia karawanica</i> VOLGIN 1959	+	+	+	+	+

The distribution of the species *Isogramma expansum* is highly interesting. In the Carnic Alps, it occurs in the Weidegger Shales (lower Upper Carboniferous), and in the Karavanke Mountains in the Orenburgian. It is closely related to the species *I. davidsoni* from Kashirian deposits in the railway section south-east of Villanueva de la Tercia (MOORE, NEVES, WAGNER & WAGNER-GENTIS 1971).

Reference should be made to some interesting genera on which a brachiopod zonation was introduced for the Carboniferous of the Cantabrian Mountains, e.g. the *Alitaria-Karavankina* Zone in the lowermost Moscovian, and the *Kozłowska-Karavankina* Zone in the upper Kashirian and partly perhaps in the lowermost Podolskian (*Fusulinella* A Subzone) (WINKLER PRINS 1968). After new finds by WINKLER PRINS (this volume), the *Kozłowska-Karavankina* Zone ranges throughout the Podolskian and includes parts of the Kashirian and Myachkovic. *Kozłowska* is very frequent in the Karavanke Mountains, whilst *Karavankina* is less common in the same strata. Both these genera are characteristic elements of the Orenburgian brachiopod fauna in the Karavanke Mountains. However, in the Carnic Alps and in the Karavanke Mountains, different species occur, and it would seem necessary to name the brachiopod zones after their species in order to ensure a useful chronostratigraphic analysis. The results of a further examination of the Upper Carboniferous (Kasimovian, Gzhelian and Orenburgian) brachiopod faunas from the Carnic Alps and Karavanke Mountains as well as from the Cantabrian Mountains should provide a more complete picture of the faunal connections between these two important areas with marine Carboniferous rocks in southern Europe.

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