

THE DEVONIAN-CARBONIFEROUS BOUNDARY AT GRÜNE SCHNEID SECTION (CARNIC ALPS) A REVIEW

by

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(2 figures)

At the Grüne Schneid section of the central Carnic Alps of southern Austria the Devonian-Carboniferous boundary is well defined. Based on rich occurrences of conodonts, ammonoids and trilobites the boundary is drawn 26.5 cm above the base of the 32 cm thick limestone bed no. 6, between subbed nos. 6 C and 6 D (Fig. 1). Our data suggest continuous sedimentation of cephalopod limestones in a pelagic setting at the passage from the Devonian to the Carboniferous.

In successive order conodonts assigned to the Lower, Middle and Upper *praesulcata*, the *sulcata*, and the Lower *duplicata*-Zones were recognized (Fig. 2). However, the transition from *Siphonodella praesulcata* to *S. sulcata* has not been recorded. The first occurrence of the name-bearer of the *sulcata*-Zone, however, coincides with the appearance of index goniatites for the base of the Carboniferous.

In addition to conodonts the Grüne Schneid section provided a rich collection of more than 200 ammonoid specimens. They were grouped into four ammonoid horizons. These are the Lower and Upper *paradoxa*-Zones of the *Wocklumeria* Stage, the *prorsum*-Zone of the following *Acutimitoceras* fauna of the latest Devonian, and the *acutum*-Zone of the *Gattendorfia* Stage of the Lower Carboniferous (Fig. 1).

Of particular interest is the 11 cm thick subbed no. 6 B. It can be subdivided into a lower 4 cm thick, more argillaceous, ammonoid-free horizon (6 B1), which presumably corresponds to the Hangenberg Shale, and a 7 cm thick upper horizon (6 B2) which is characterized by small goniatites. They belong to the genus *Acutimitoceras*. In contrast with the

underlying subbed no. 6 A from this level no clymeniids are recorded. The assemblage clearly indicates a time-equivalent of the *Acutimitoceras* fauna of Stockum.

Subbed no. 6 D coincides with the lowermost Carboniferous *Gattendorfia* Stage which is defined by the entry of *Gattendorfia subinvoluta* and *Acutimitoceras acutum*.

From the Grüne Schneid section more than 120 trilobite remains have been collected. They belong to three associations. The late Upper Devonian part of the section is characterized by both blind forms and those with reduced eyes of the *Helioproetus-Chaunoproetus* association, followed in subbeds 6 B2 and 6 C by the *abruptirhachis* association with normally oculated trilobites; such forms appeared immediately after the "Hangenberg Event" and shortly below the D/C boundary. The oldest Carboniferous trilobite association consists of *Liobolina* and *Macrobole* which exhibit moderately sized eyes in oculated specimens.

In conclusion, the vertical change of the trilobite fauna suggests a change of the environment from the aphotic zone in the late *Wocklumeria* Stage to a slightly shallower environment inhabited by trilobites with well developed eyes during the latest Devonian subbed nos. 6 B and 6 C. It may reflect the end-Devonian regression which lasted through the succeeding *sulcata*-Zone. At the base of the *duplicata*-Zone the appearance of trilobites with reduced and also normal eyes suggest a deepening and, hence a transgression.

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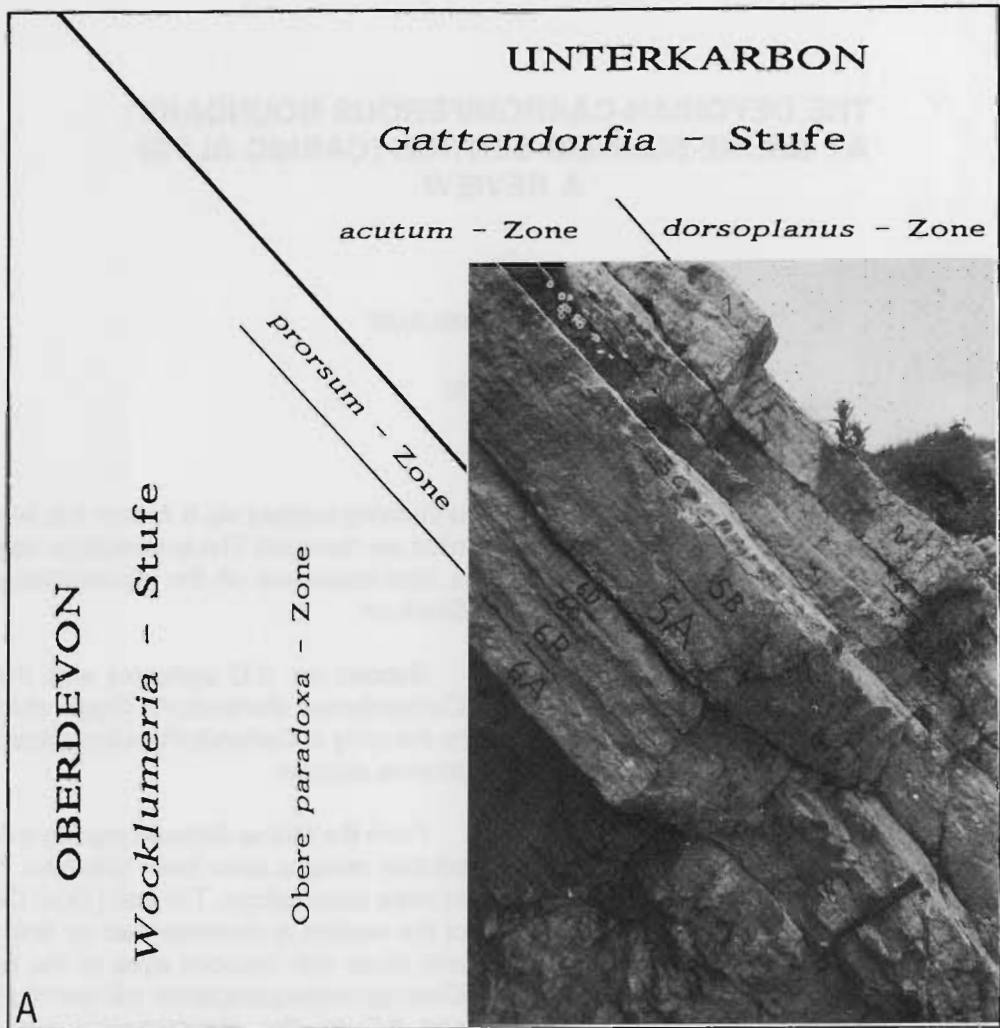


Fig. 1.A, B.- Grünenschneid section. Fig. 1A shows the upper part of the section with bed nos. 8 to 1. Fig. 1B, 32 cm thick bed no. 6 and its subdivision into 4 (5) subbeds numbered from base to top 6 A, 6 B₁, 6 B₂, 6 C, 6 D. D/C boundary between subbed nos. 6 C and 6 D. Note uniform lithology throughout the boundary bed.

Sample no.	Thickness (cm)
1	24
2	18
3b	3
3a	7
4	10
5c	5
5b	11
5a	13
6d	5.5
6c	5.5
6b ₁	7
6b ₂	4
6a	10
7	18
8	91
9	23
10	34
11	14
12	

Ammonoidea

- Balvia* sp.
- Finiclymenia wocklumensis*
- Parawocklumeria paradoxa*
- Wocklumeria sphaeroides*
- Cymaclymenia striata*
- Linguaclymenia similis*
- Acutimitoceras carinatum*
- Acutimitoceras kleinerae*
- Acutimitoceras cf. kleinerae*
- Acutimitoceras intermedium*
- Acutimitoceras cf. intermedium*
- Acutimitoceras subbilobatum*
- Acutimitoceras acutum*
- Acutimitoceras cf. prorsum*
- Acutimitoceras convexum*
- Acutimitoceras sphaeroidale*
- Acutimitoceras* sp.
- Mimimitoceras crestaverde*
- Mimimitoceras* ? sp.
- Gattendorfia subinvoluta*
- Gattendorfia reticulum*
- Gattendorfia evoluta*
- Eocanites planus*
- Eocanites cf. spiratissimus*

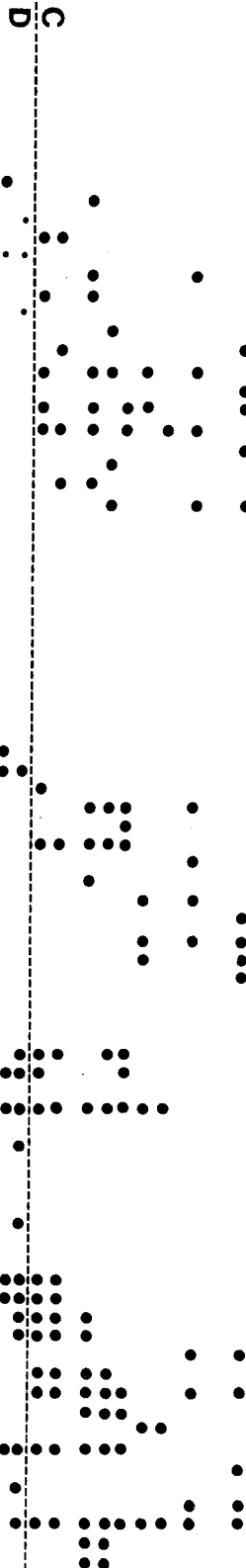
Trilobita

- Helioproetus cf. ebersdorfensis*
- Helioproetus carintiacus*
- Helioproetus subcarintiacus*
- Typhloproetus* (S.) korni
- Typhloproetus* (S.) sp.
- Chaunoproetus* (Ch.) carnicus
- Chaunoproetus* (Ch.) cf. palensis
- Haasia cf. antedistans*
- Phacops* (Ph.) granulatus
- Belgipole abruptrhachis*
- Semiproetus* (M.) cf. funirepa
- Liobolina crestaverdensis*
- Liobolina submonstrans*
- ? *Globusia* sp.
- Semiproetus* (M.) funirepa alpinus
- Semiproetus* (M.) drewerensis
- Semiproetus* (M.) sp. aff. drewerensis
- Cyrtoproetus* (C.) blax
- Archegonus* (Ph.?) planus
- Semiproetus* (M.) brevis
- Philliboloides macromma*
- Diacoryphe schoenlaubi*

Conodonta

- Bispathodus a. aculeatus*
- Bispathodus c. costatus*
- Bispathodus c. ultimus*
- Bispathodus stabilis*
- Bispathodus zieglerei*
- Branmehla suprema*
- Palmatolepis gr. expansa*
- Palmatolepis gonioclymeniae*
- Palmatolepis gr. gracilis*
- Palmatolepis gr. sigmoidalis*
- Polygnathus n.sp. A*
- Pseudopolygnathus m. trigonicus*
- Protognathodus meischneri*
- Protognathodus collinsoni*
- Protognathodus kockeli*
- Protognathodus kuehni*
- Protognathodus praedelicatus*
- Siphonodella praesulcata*
- Siphonodella sulcata*
- Siphonodella duplicata* MT 1
- Siphonodella duplicata* MT 2
- Polygnathus c. communis*
- Polygnathus c. bifurcatus*
- Polygnathus c. carinus*
- Polygnathus p. purus*
- Polygnathus p. subplanus*
- Polygnathus mehli*
- Elictoygnathus laceratus*

C
D



The extensive geochemical analysis of the boundary beds include common and trace element abundances, the content of Ir in selected samples, and the distribution of carbon and oxygen isotopes. The comprehensive set of data provides no evidence for an extraterrestrial component in the boundary ediment nor is there any argument for a severe and major extinction event occurring on Earth some 350 million years ago.

Although the imprints of the internationally recognizable "Hangenberg Event" are well preserved in the Carnic alps our results suggest an event of rather moderate amplitude. In the pelagic realm it is

manifested as a regressive event shortly before the end of the Devonian, followed by a transgression at the base of the *duplicata*-Zone of the early Tournaisian.

This summary report is based on the interdisciplinary study of the Devonian-Carboniferous boundary beds of the Carnic Alps carried out by H.P. Schönlaub, M. Attrep Jr., K. Boeckelmann, R. Dreesen, R. Feist, A. Fenninger, G. Hahn, P. Klein, D. Korn, R. Kratz, M. Magaritz, C.J. Orth and J.-M. Schramm. For further results we refer to the joint report published in J.B. Geol. B.-A., vol. 134, Vienna 1992.