

Introduction.

Palaeozoic ammonoids from the Carnic Alps are known for more than 100 years (FRECH 1887), but a modern synthesis of the faunas is still lacking. Except for a few faunas, the current state of knowledge is strictly limited, and some of the old and destroyed finds could not be confirmed in more recent investigations.

Faunas from the Early and Middle Devonian were collected from the Valentintörl in the vicinity of Lake Wolayer (FRECH 1887, 1894, 1902), but it is now unclear if the species do belong to the genera *Gyroceratites*, *Mimagoniatites*, and *Anarcestes* (as listed in FLÜGEL & KROPFITSCH-FLÜGEL 1965). Not less problematic are the species newly erected by FRECH: "*Goniatites (Tornoceras) Stachei*", and "*Goniatites (?Tornoceras) inexpectatus*", which all urgently require revision.

Frasnian and early Famennian ammonoids are better known. "*Beloceras praecursor*" was described by FRECH in 1902, and GAERTNER (1927, 1931) added numerous species of *Manticoceras* and *Ponticeras* from near Lake Wolayer. This material, however, was neither described nor figured. The same is true for early and middle Famennian Faunas, consisting of the genera *Prolobites*, *Platyctymenia*, *Tornoceras*, *Cheiloceras*, etc.

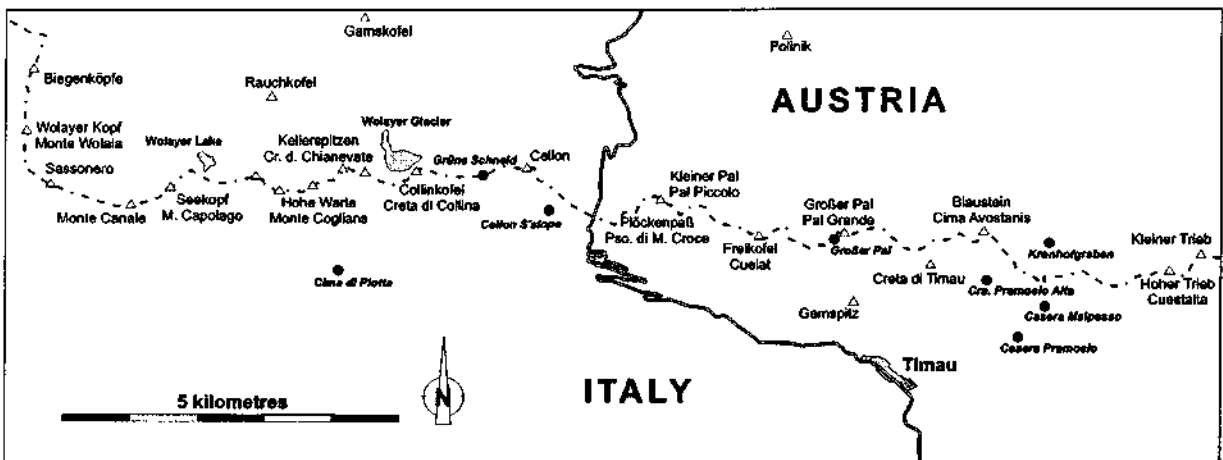


Fig. 19 - Location of the Famennian and Tournaisian ammonoid localities in the Central Carnic Alps of Southern Austria.

The latest Devonian *Clymenia* and *Wocklumeria* ammonoid Stufen (late Famennian) are much better represented by diverse assemblages (Fig. 19, 20), suggesting a complete succession of faunas (DE ANGELIS D'OSSAT 1899; GORTANI 1907, 1912). Many of the old localities which are mostly located on the Italian side of the Carnic Alps have been revisited, and rich collections of ammonoids could be assembled by M.R. HOUSE, J.D. PRICE, and the author.

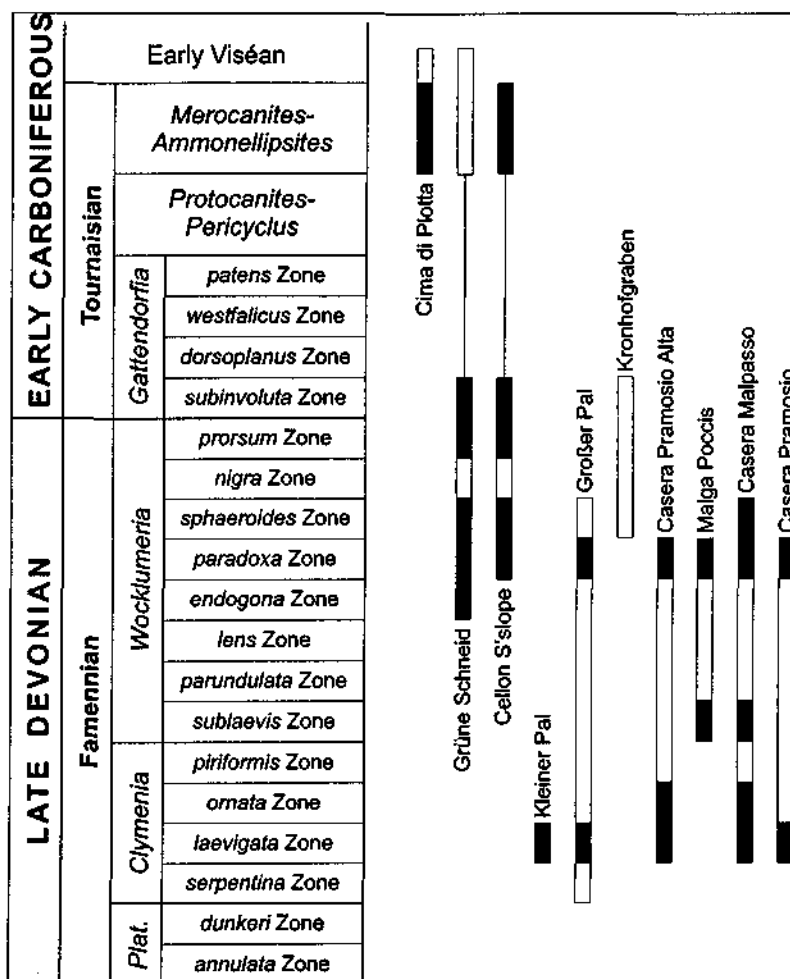


Fig. 20 - Stratigraphical scheme of the late Famennian and Tournaisian ammonoid succession with indication of faunas represented in the Carnic Alps.

Diverse ammonoid faunas of the *Clymenia* and *Wocklumeria* Stufen are known especially from Großer Pal (Pal Grande; 3.6 km east of the Plöckenpaß) and Casera Malpasso (7 km south-southeast of the Plöckenpaß) located. These two latter localities yielded the clymeniid genera *Nodosoclymenia*, gen. nov. aff. *Clymenia*, *Piriclymenia*, *Cyrtoclymenia*, *Cymaclymenia*, *Falciclymenia*, *Kosmoclymenia*, *Gonioclymenia*, *Sellacllymenia*, and *Progonioclymenia* as well as the goniatites cf. *Prolobites*, *Discoctlymenia*, *Alpinites*, *Gundolficeras*, *Erfoudites*, and *Mimimitoceras*. These genera indicate the presence of the *acuticostata* and *piriformis* Zones of the *Clymenia* Stufe.

The Carnic faunas principally resemble the time-equivalent faunas of the Rhenish Massif and other regions, but are remarkable for their high percentage of miniature forms. It is remarkable that a prolobitid ammonoid occurs in this fauna; only in sections of the South Urals these forms maintain into the *Clymenia* Stufe. Analyses of the biogeographical relations of the *Clymenia* Stufe faunas led to the conclusion that the Carnic Alps are close related to the South Urals, rather than to the Rhenish Massif or North Africa (Fig. 21).

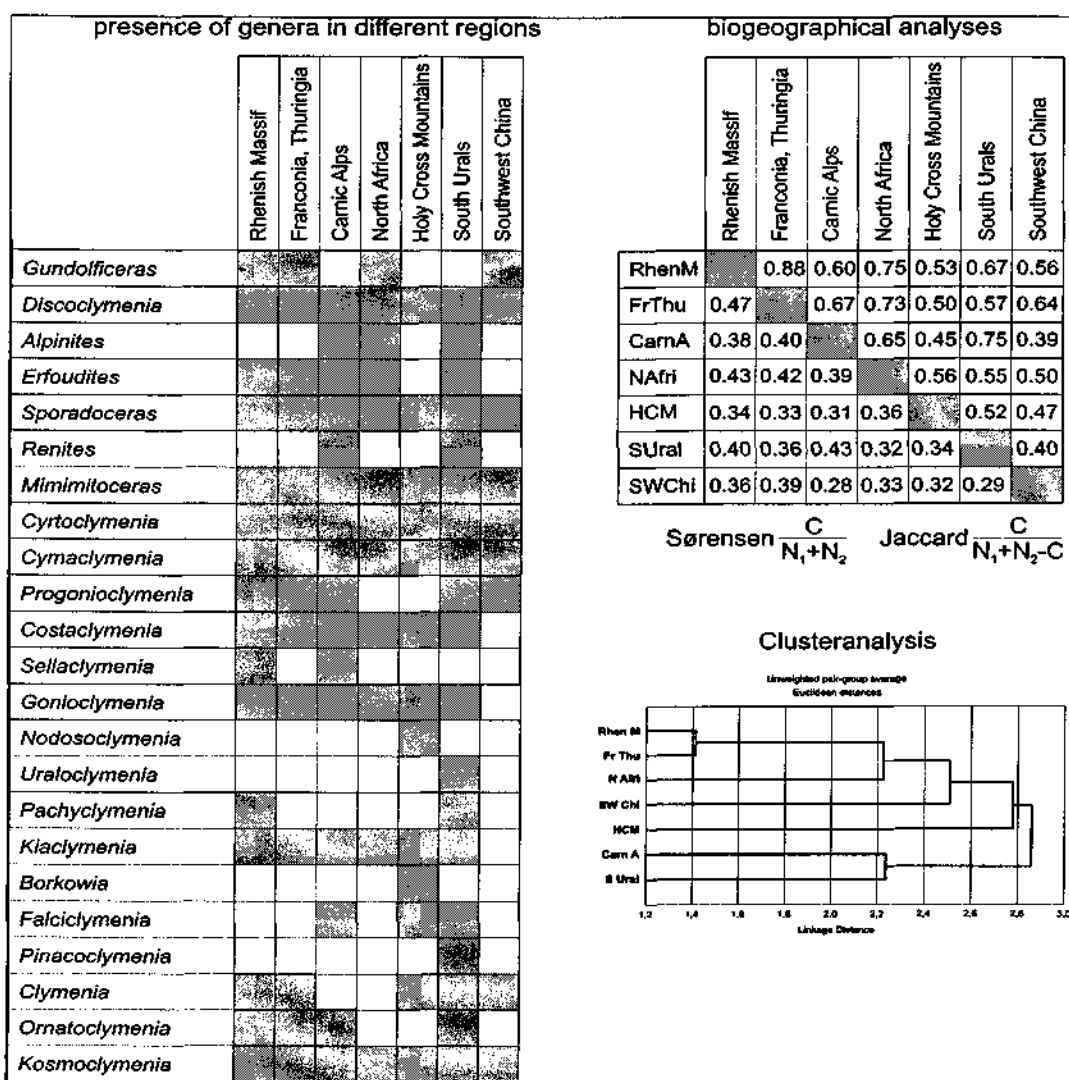


Fig. 21 - Biogeographical relations of ammonoid faunas from the *Clymenia* Stufe (late Famennian).

Limestones of the *Wocklumeria* Stufe contain in sections at Casera Malpasso, Grüne Schneid, and Großer Pal the clymeniid genera *Kalloclymenia*, *Finiclymenia*, *Sphenoclymenia*, *Wocklumeria*, *Parawocklumeria*, *Glatziella*, *Postglatziella*, *Kosmoclymenia*, *Linguaclymenia*, *Cymaclymenia* as well as the goniatites *Mimimitoceras* and *Balvia*. These demonstrate that horizons of the early and late part of this unit are represented. The faunal composition appears to be identical with the equivalents of the Rhenish and Thuringian Massifs and the Sudetes, and differs only in the lower species diversity.

The Devonian-Carboniferous Boundary is not well exposed in the Malpasso area, but can be studied at several other places, of which the Grüne Schneid section yielded the most complete ammonoid record (KORN 1992). The Hangenberg Event interval is characterised by a thin marly and unfossiliferous bed embedded in pure cephalopod limestones, and immediately above and below this bed characteristic ammonoid species were collected. The latest Devonian *prorsum* Zone as well as the basal Carboniferous *acutum* Zone are represented by their characteristic faunas, consisting of the goniatite genera *Acutimitoceras*, *Gattendorfia*, and *Eocanites*. The faunal composition closely resembles that of the Rhenish and Thuringian faunas.

At three places in the Plöckenpaß area, late Tournaisian ammonoid faunas could be found. They consist of the genera *Merocanites*, *Irinoceras*, *Muensteroceras*, and *Ammonellipsites*, and can be referred to time-equivalent faunas known from North Africa, the Rhenish Massif, Ireland, and other areas.

Ammonoids of Late Carboniferous and Permian age are extremely rare in the Carnic Alps. SCHINDEWOLF (1939) mentioned "*Paragastrioceras* sp." and "Genus indet. aff. *Proshumardites* sp." from the "Stephanian" of Croce Pizzul, but the figured specimens do not allow closer determination. The description of "*Medlicottia artiensis* GRÜNEWALDT var. *carnica*" by HERITSCH (1933) from the white limestones of the Trogkofel refers to an specimen which is difficult to interpret. It belongs to the family Medlicottiidae and probably indicates an Early Permian age.

Grüne Schneid (Cresta Verde)

The locality is located 1500 metres west-northwest of the Plöckenpaß (Monte Croce Carnico), and is in the depression between the Cellon (Creta di Collinetta) and the Kollinkofel (Creta di Collina) at an altitude of 2142 m (Fig. 18). It was first mentioned by GAERTNER (1931), who listed several ammonoid species without exact stratigraphical record from this place. His species identifications, however, cannot be confirmed. According to the material housed in the collection of the Institute and Museum for Geology and Palaeontology, Göttingen, it cannot be stated from which exact stratigraphical position these derive. MÜLLER (1959) mentioned a late Tournaisian goniatite from this locality. GEDIK (1974) published a columnar section of the locality, and by investigation of the conodont content first noticed the uninterrupted succession ranging from the latest Devonian into the Carboniferous.

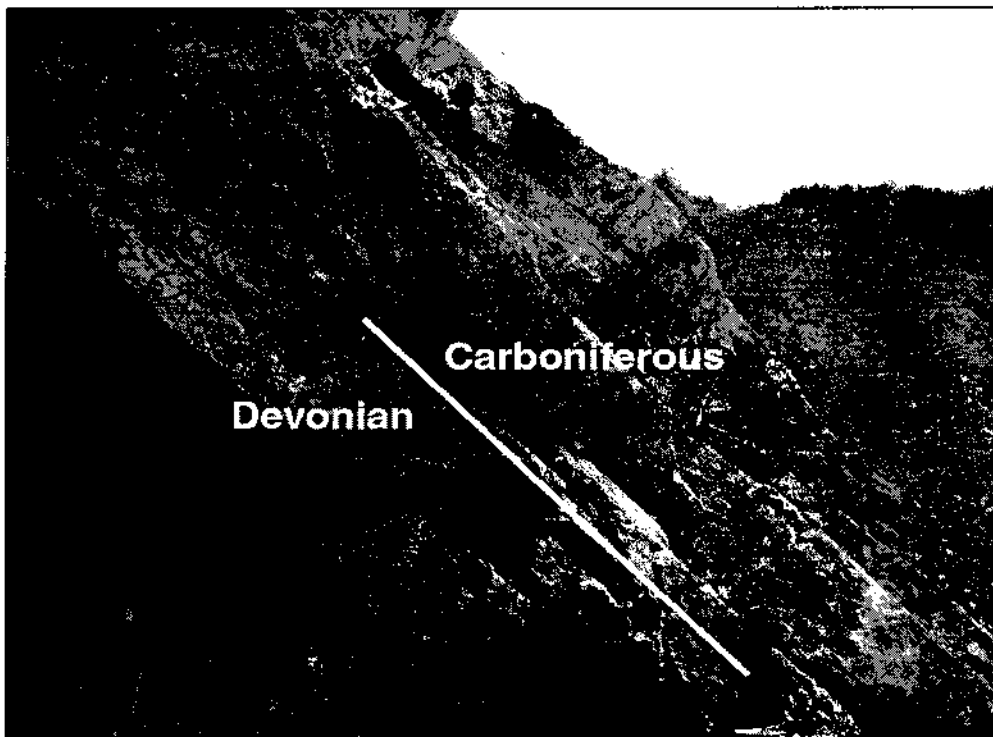


Fig. 22 - Photograph of the section around the Devonian-Carboniferous Boundary (between beds 6C and 6D) at Grüne Schneid.

During the activities for the search for an international stratotype for the Devonian-Carboniferous Boundary, H.P. SCHÖNLAUB (Vienna) revisited the section that is located immediately west of the western steep slope of the Cellon, about 5 m north of the Austrian-Italian frontier. The new results were preliminary presented in 1988 (SCHÖNLAUB et al.; SCHÖNLAUB, FEIST & KORN), and further investigations lead to several detailed publications (KORN 1992; FEIST 1992; SCHÖNLAUB et al. 1992). In these papers, the far-reaching stratigraphical completeness of the pure limestone section was demonstrated.

The intensively studied portion that includes the D-C Boundary has a thickness of 3.60 metres (Fig. 22). It is entirely composed of grey cephalopod limestone (mostly wackestone and mudstone), and yielded from almost every bed ammonoids, trilobites, and conodonts. In total, 23 ammonoid species belonging to 10 genera were secured.

The ammonoid faunas from this locality have an age from the late *Wocklumeria* Stufe (latest Famennian) up to the basal *Gattendorfia* Stufe (Early Tournaisian), and include a fauna of the *prorsum* Zone, the latest Devonian ammonoid zone (Fig. 23). Among all the stratotype candidates under discussion, the Grüne Schneid section displays the most complete ammonoid succession around the D-C Boundary. However, it was not chosen as the stratotype.

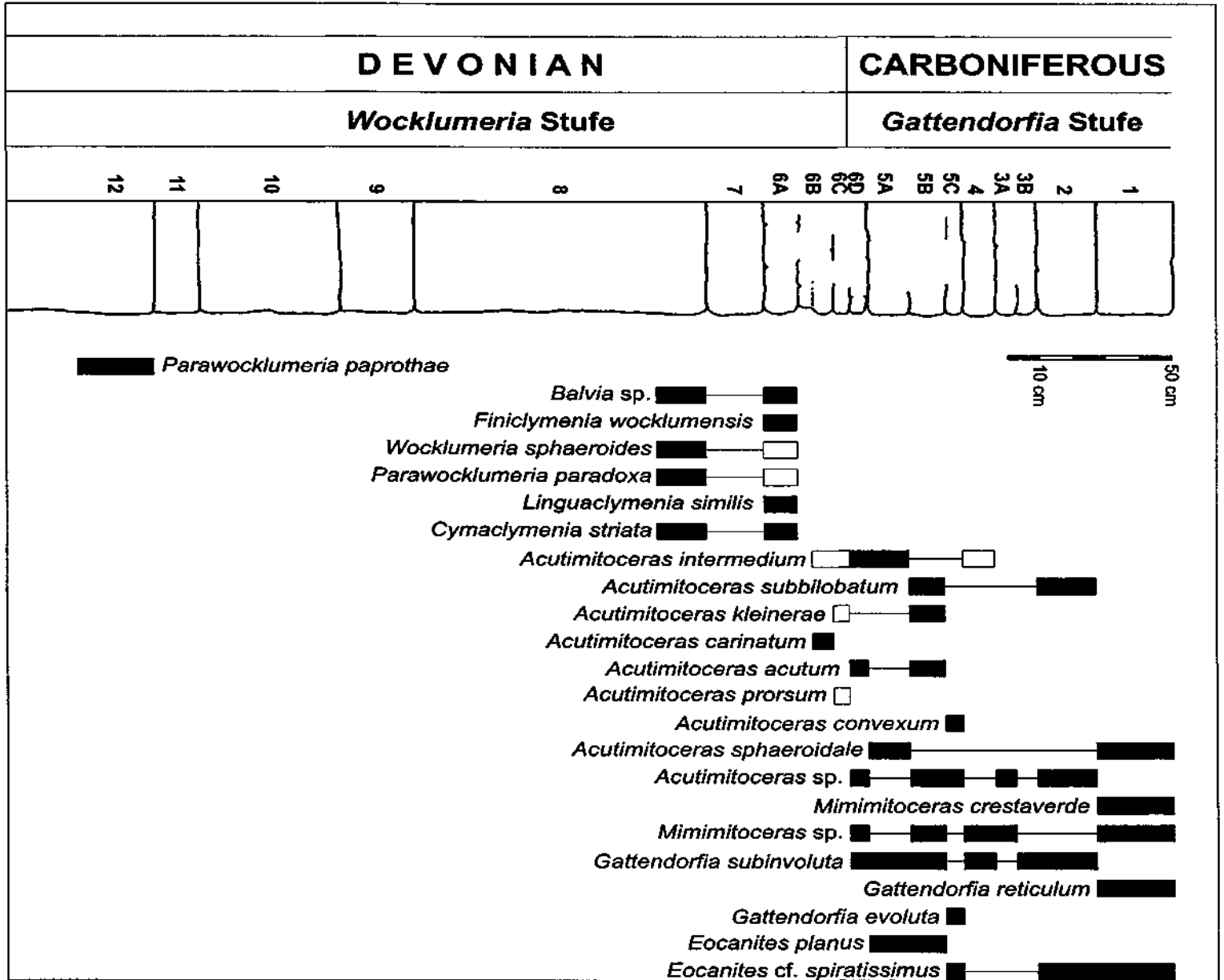


Fig. 23 - Columnar section of the Grüne Schneid outcrop with ammonoid content.