The Paleozoic of Austria – An Overview

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During Variscan and Alpine orogeneses several Paleozoic remnants were dismembered and are incorporated into the complicated Alpine nappe system. The primary geographic positions and mutual bio(geo)graphic relations of these isolated developments are only poorly understood. A possible arrangement of Paleozoic areas south of the Alpine front, including high grade metamorphosed Paleozoic parts within crystalline complexes, see below.

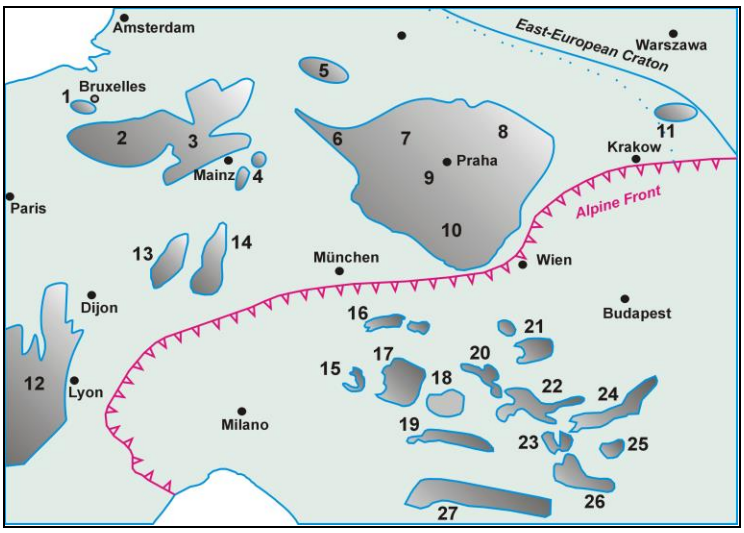

Fig. 1: Variscan regions in Europe. The geographic positions of Paleozoic areas of the Eastern and Southern Alps (15-27) are reconstructed after palinspastic subtraction of alpidic tectonic movements. Redrawn and modified after FAUPL (2000) and RATSCHBACHER & FRISCH (1993). 1 Brabant Massif, 2 Ardennes, 3 Rhenish Slate Mountains, 4 Spessart, Odenwald, 5 Harz, 6 Thüringerwald, Frankenwald, 7 Erzgebirge, 8 Sudetes, 9 Barrandian, 10 Bohemian Massif, 11 Holy Cross Mountains, 12 Massif Central, 13 Vosges, 14 Schwarzwald, 15 Err-Bernina, 16 Hohe Tauern, 17 Silvretta, 18 Ötztal, 19 Cristalline south of the Hohe Tauern, 20 Quartzphyllites of Innbruck, Radstadt, Ennstal, 21 Wechsel, 22 Seckau and Wölzer Alps, 23 Koralpe, Saualpe, 24 Greywacke Zone, 25 Graz Paleozoic, 26 Gurktal Nappe System, 27 Carnic Alps, Karawanken Mountains.

Austria's anchizonal to lower greenshist metamorphosed Paleozoic successions are irregularly distributed (Fig. 2). Two major regions of Paleozoic developments are distinguished which are separated by the most prominent alpine fault system, the Periadriatic Line (PL). Variscan sequences north of the PL form parts of the "Upper Austroalpine Nappe System" whereas sequences south of the PL belong to the Southern Alpine System.

The Carnic Alps and the Karawanken Alps of Carinthia belong to the Southern Alps.

Austroalpine Paleozoic areas are the Greywacke Zone of Tyrol, Salzburg, Styria and Lower Austria, the Nötsch Carboniferous, the Gurktal Nappe System, the Graz Paleozoic and some isolated outcrops in south Styria and Burgenland.

The differences between Austroalpine and Southalpine areas are the result of paleolatitudinal settings, subsidence rates and source areas for clastic sediments.

Fig. 2: Main regions of anchizonal to lower greenshist metamorphosed Paleozoic strata in Austria. The Periadriatic Line (P.L.) separates the Carnic Alps and the Karawanken Mountains (Southern Alps) from other Alpine Paleozoic remnants belonging to the Eastern Alps.

The Paleozoic of the Carnic Alps

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The Carnic Alps of Southern Austria and Northern Italy represent one of the very few places in the world in which an almost continuous fossiliferous sequence of Paleozoic age has been preserved (Fig. 2). They extend in a W-E-direction for over 140 km from Sillian in Tyrol to Arnoldstein in central Carinthia. Continuing into the Western Karawanken Alps the Variscan sequence is almost completely covered by rocks of Triassic age. Further in the east, however, Lower Paleozoic rocks are excellently exposed in the Seeberg area of the Eastern Karawanken Alps south of Klagenfurt, the capital of Carinthia. Differing from the Carnic Alps, in this region the Lower Paleozoic strata are distributed on either side of the Peri-adriatic Fault (Gailtal Fault) which separates the Southern and the Central or Northern Alps. These rocks have been subdivided into a northern and a southern domain, respectively. The latter extends beyond the state border to northern Slovenia.

In both the Carnic and Karawanken Alps systematic research started soon after the foundation of the Geological Survey of Austria in the middle of the last century. The equivalents of the Lower Paleozoic were first found in the Karawanken Alps and not in the more fossiliferous Carnic Alps (SUESS, 1868; TIETZE, 1870). In this latter area main emphasis was drawn on marine Upper Carboniferous and Permian rocks. At the end of the 19th century this initial phase was followed by the second mapping campaign carried out by the Geologi-cal Survey of Austria and detailed studies by FRECH. During the first half of the 20th century HERITSCH and his research group from Graz University revised the stratigraphy on the Austrian side while GORTANI from Bologna University and others worked on the Italian part of the mountain range. One of the outstanding contributions of that time focusing on the Lower Paleozoic was provided by VON GAERTNER (1931). The detailed knowledge of Upper Carboniferous and Permian rocks resulted mainly from studies by KAHLER beginning in the early 1930s. Since that time many students of geology started to visit both regions. During this third campaign study of various microfossil groups began and other techniques were also applied. This research culminated in the publication of detailed maps, a new stratigraphic framework, and revisions of old and discoveries of new faunas and floras (see e. g., SCHÖNLAUB, 1971, 1980, 1985, 1997; SCHÖNLAUB & KREUTZER, 1994).