

## The „Angerkristallin“ and its relation to the Graz Paleozoic (Styria, Austria)

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The “Angerkristallin” is located about 30 km NNE of Graz. According of Tollmann (1977) it is part of the Middle Austroalpine unit, squeezed between the Lower Austroalpine unit to the NNE and the Upper Austroalpine nappes of the Graz Paleozoic in the SSW. Based on the proposed continuation of the Schöckel marbles of the Graz Paleozoic into the Kogelhof marbles of the “Angerkristallin”, a pre-Alpine connection with a continuous Variscan metamorphic zoning between the two units was interpreted by Neubauer (1981). Following this interpretation the “Angerkristallin” is part of the Upper Austroalpine unit.

Mapping on the sheet OK 135 Birkfeld showed, that even if the foliation is generally dipping to the SW, the “Angerkristalline is not a homogeneous crystalline unit, but consists of several lithostratigraphic complexes. These complexes are widespread in the Austroalpine unit east of the Tauern window.

The lowermost of these complexes consists of monotonous paragneisses, minor micaschist with scarce layers of garnet-amphibolites and feldspar-rich gneisses, maybe of metavolcanic origin. In the micaschist garnet without a distinct optical zoning reaches up to 5 mm in diameter. However, the age of the garnet growth and therefore the age of the, at least upper greenschist facies metamorphism in these lithological unit is unknown. It is present in the central part of the “Angerkristallin” and was called Schoberkogel Complex during the mapping campaign. However, further investigations may show that the **Schoberkogel Complex** is the continuation of the Seckau Complex in the Gleinalm area.

Above garnet-bearing micaschist with intercalations of amphibolites and albite-quartz mobilisats occur. The micaschists are rich in muscovite and show a well developed grenulation. Garnet reaches up to more than one centimetre in diameter. It shows a distinct core (garnet1) and rim (garnet2). The amphibolites occur in several varieties including garnet-bearing amphibolites and white mica-bearing amphibolites (Garbenschiefer). This lithostratigraphic unit built up the northern part of the “Angerkristallin” and is overlying the Schoberkogel Complex in the central part. Based on the lithological content it represents a part of the **Wölz Complex** of the Niederen Tauern. Therefore the metamorphic imprint which formed garnet1 can be expected as Permian in age, whereas garnet2 grow during the upper greenschist facies eo-Alpine tectonometamorphic event.

The southern part of the “Angerkristallin” consists of dark grey micaschists and paragneisses with intercalations of marbles and amphibolites. Important is the occurrence of partly spodumene-bearing pegmatite-gneisses (Esterlus, 1983) with Permian intrusion ages. The micaschist show clear indications for polymetamorphism. An older amphibolite facies assemblage including garnet1 and staurolite1 is overprinted by another amphibolite facies metamorphic event. During the second event the prograde breakdown of staurolite1 and the formation of garnet2, kyanite and staurolite2 can be observed (Esterlus, 1986). These characteristic lithologies indicate that the southern part of the “Angerkristallin” is formed by the **Rappold Complex** which is widespread in the Niederen Tauern and in the Gleinalm area. Most probable the older assemblage was formed during the Variscan tectonothermal event, whereas the second imprint is eo-Alpine.

- The “Angerkristallin” is whether a lithostratigraphic, nor a tectonic unit, but a descriptive term for an outcrop area (window or half window) built up by several lithostratigraphic units.
- It consists of at least three lithostratigraphic complexes: Schoberkogel Complex, Wölz Complex, Rappold Complex, which show different Alpine and pre-Alpine metamorphic evolutions. These complexes show the same spatial relationship as in the Niedere Tauern and in the Gleinalm region. As in these regions they represent a rock pile with a tectonically inverted metamorphic field gradient.
- Due to the inverted field gradient their present day relations are due to thrusting after the peak of the eo-Alpine metamorphic event which was reached at about 90 Ma. The thrust tectonic shows NNE directed stretching lineations and was induced by the exhumation of the eo-Alpine eclogite bearing units.
- As the “Angerkristallin” is an eo-Alpine nappe pile with remarkable internal deformation, there is no continuous Variscan metamorphic zoning between the Graz Paleozoic and the “Angerkristallin”.

Esterlus, M. (1983): Kurzer Überblick über die Pegmatite im Angerkristallin der Oststeiermark – Arch. F. Lagerst.forsch. Geol. B.-A., 3: 31-34, Wien.

Esterlus, M. (1986): Kristallisationsgeschichte und Strukturprägung im Kristallin E des Grazer Paläozoikums. – (unpublished) PhD thesis Formal- Naturwiss. Fak. Univ. Wien, 187pp, Wien.

Neubauer, F. (1981): Untersuchungen zur Geologie, Tektonik und Metamorphose des „Angerkristallins“ und des E-Randes des Grazer Paläozoikums. – Jber. 1980, Hochschulschwerpunkt S15, 2: 114-121, Leoben.

Tollmann, A. (1977): Geologie von Österreich. Band 1. Die Zentralalpen. – 766 pp, Deuticke, Wien.