within them. Where the movements were less intense the effect has been merely to fold discordant veins.

References: EXNER, C. (1954): Die Südostecke des Tauernfensters bei Spittal an der Drau. Wien 1954 (Jb. GBA 17—37). — LAMBERT, R. S. (1964): Isotopic age determination on gneisses from the Tauernfenster. Wien 1964 (Verh. GBA).

Field work during 1962 and 1963 in the vicinity of Obervellach (Sheet 182)

by E. R. OXBURGH

About five weeks during August and September 1962 and nine weeks during July, August and September 1963 were spent in mapping at a scale of 1 : 25.000 in an area bounded by the Mölltal in the south west and on the northeast by the ridge between the Säuleck and the Reisseck. Between these two limits a series of three northwestward trending ridges separating the Dösenertal, the Kaponigtal, the Zwenbergertal and the Riekental, give excellent sections through the Schieferhülle and into the Zentralgneiss.

In the southwest along the line of the Mölltal the Schieferhülle is cut by three „gneiss lamellae". Two of these have been described by EXNER (1962). A third lamella lies parallel to these two but somewhat further northeast. It varies in thickness from 50 to 5 m and is locally absent; it may, however, be traced discontinuously for at least 10 km southeast of Kaponig. It comprises coarse augen gneiss in its inner parts and has margins of phyllonite.

The glacial deposits, alluvium and thick vegetation on the lower ground underlain by the Schieferhülle make this area unsuitable for a detailed study of Schieferhülle structure and stratigraphy, although the important marker horizons, the dolomite-quartzite breccias and the Rauhwacke may both be recognised. A study has been made, however, of the metamorphic grade and folding style in the Schieferhülle for their siguificance in the interpretation of the higher ground to the northeast.

To the northeast there is a concordant transition from Schieferhülle through amphibolites into augengneiss. S-surfaces strike consistently N 30 W and in the Mölltal are nearly vertical; northeast of the Mölltal the dip is first steeply to the southwest and then diminishes gradually to about 30°.

In the valleys three main types of gneiss are distinguished (i) coarse muscovite biotite augengneiss (ii) a finer grained, grey, streaky gneiss with a fine lamination and dispersed orthoclase augen which seem to have been strongly sheared (iii) a coarsely banded medium to fine grained gneiss in which leucocratic and melanocratic layers alternate on all scales from a few millimeters to a decimeter; the rock has a striking banded appearance.

On the ridges between the valleys there lie within these gneisses layers of garnet-biotite-schists. These seem to be the tips of attenuated isoclinal synclines. These synclines do not generally extend down to the valley bottoms.

Similar dispersed patches of metasedimentary rock are found at a number of places on the higher ground. Their grade of metamorphism seems to increase towards the northeast until near the Pfaffenherger Seen kyanite-biotite schists occur. These schist inliers are all provisionally regarded as remnants of the Schieferhülle cover as they show no evidence of poly-metamorphism.

Amphibolites and garnet amphibolites also occur within the gneisses but their situation is at the moment uncertain.

In the highest parts of the area the gneisses are intruded by mesocratic, biotite-rich tonalites. These are in most areas foliated concordantly with the gneisses but locally the foliation is faint or lacking. The gneiss in the vicinity of the tonalites becomes progressively more

intensely injected by aplitic and pegmatitic veins as the margins of the intrusions are approached. Similar tonalites from adjacent areas have been described by KARL (1959). The evidence of the foliation supports the view that the tonalites are of Alpine age, presumably late-syntectonic.

In the vicinity of the Kaponigtörl the tonalites and gneisses are themselves cut by discordant, post-tectonic leucogranite. This granite lacks any marked planar structure and shows sharp contacts against the tonalite of which it carries many inclusions.

Three types of aplitic vein have been recognised — two types of quartz-feldspar vein and a third garnet-quartz-feldspar type — and a time sequence provisionally established. They seem to have been deformed to different degrees. Detailed relationships have yet to be worked out.

Numerous lines of evidence support the idea of EXNER (1934) that the increase in temperature during the Alpine metamorphism was somewhat greater in the vicinity of the Gossgraben than to the southwest. The metamorphic grade of the schist patches increases in that direction as does the abundance of aplitic injection and larger scale igneous intrusion. In addition the amount of albite and quartz which has been exsolved from the orthoclase augen in the standard augengneiss, increases markedly from southwest to northeast. Although several interpretations of this situation are possible it seems most reasonable to suppose that the orthoclase porphyroblasts in the northeast grew at a higher temperature and consequently were able to hold greater amounts of the myrmekite molecule in the solid solution (CARMAN & TUTTLE, 1963). This would later be exsolved as the temperature in the area fell.