Aus dem Muschelkalk wurden neben den Proben aus den Dolomiten noch solche von Recoaro (Sammlung Foetterle) und aus Deutschland (Prof. MEDWENITSCH und eigene Aufsammlungen) gewonnen. Die Proben gestatten einen wesentlich erweiterten Einblick in die mannigfaltige Sporenführung der Unter- und Mitteltrias, aus welcher noch kaum Veröffentlichungen vorliegen.

Auf Grund dieser Vergleichsbasis wurden die gipsführenden Proben im Anschluß an die roten Sandsteine im Langenbergtunnel einer weiteren Untersuchung zugeführt. Ferner wurden Proben aus den Werfener Schiefern am Straßenaufschluß bei Bischofshofen entnommen. Mit der Bemusterung der Werfener Schiefer des Rettensteinprofils an der Dachsteinsüdseite wurde begonnen.

Aus dem Unter-Skyth von Grönland konnten Sporen isoliert werden (Aufsammlung Prof. TRUEMPY, Zürich).

Aus den Partnachschichten wurde eine kleine Sporenflora gewonnen. In Zusammenarbeit mit der Bleiherger Bergwerksunion AG. (Dr. KOSTELKA) konnte eine geschlossene Probenserie aus den drei Cardita-Schieferhorizonten untersucht werden (Bergbau Mieß). Es ergaben sich Hinweise für eine sporenanalytische Gliederungsmöglichkeit.

Anläßlich des VIII. europäischen mikropaläontologischen Kolloquiums konnte der Verfasser einen kurzen Überblick über die Sporenstratigraphie im Bereich der Ostalpen mit besonderer Berücksichtigung der Trias vermitteln.

Aus dem Tertiär kamen Einzelproben aus Eozän, Chatt und Sarmat zur Untersuchung.

Aus dem Quartär kamen Torfproben aus der Umgebung von Salzburg und Mondsee sowie Vorarlberg zur Untersuchung. Die Bearbeitung der Sedimente aus der Salzofenhöhle wurden fortgesetzt. Bohrkernproben aus dem Wiener Becken (Glinzendorf T 1) wurden sporenstratigraphisch bearbeitet.

A briet report on the geology of the hydroelectric tunnels in the neighbourhood of the Reisseck, Molltal

by E. R. OXBURGH

In July 1963 it was possible through the kind cooperation of the Österreichischen Draukraftwerke, Kolbnitz, Mölltal, to make a geological survey of the rocks exposed in a number of tunnels which have been cut in connection with the Reisseck Hydroelectric Power Works. A total of about 5 km of tunnel was accessible; rock is exposed in the tunnel walls for about 70% of this distance. Elsewhere it has been necessary to face the inside of the tunnels with concrete. The tunnels run between the top of the Kolbnitz-Bergbahn and the Oberer Hochalmsee close to the Reisseck.

The surface geology of this area has not yet been mapped in detail; EXNER (1954) gives some information on it. The purpose of this report is to give a brief description of the geology of the tunnels; it is hoped later to map the surface geology and to correlate this with the subsurface observations.

The tunnels lie wholly within the Zentralgneis and the rocks exposed in them are in large part of hroadly granitic composition, commonly carry large feldspar augen and commonly have a well-defined foliation. Locally there occur subsidiary amphibolites.

It is believed that at least two major phases of acidic magmatic activity are represented in these rocks and at least three important phases of tectonic movements. The distinction hetween the older and the younger granitic rocks has been obscured to some extent by two overprinting effects. The first is the almost ubiquitous development of porphyroblastic K-feldspar augen and the second is late shearing movements on the S-planes of the older rocks

which have locally produced fine grained cataclastic textures in hoth older and younger groups.

The two groups may, however, he distinguished in most cases hy their mineralogy and their mode of occurrence.

The older rocks are characteristically quartz-orthoclase-alhite gneisses with variable amounts of hiotite and muscovite. The hiotite is in some cases partially converted to chlorite. There may he accessory sphene, apatite and calcite. In every case these rocks are found to carry epidote. This is evidently of two generations; large grains with hrown, pleochroic, allanitic cores, have rims which are clear and almost non-pleochroic; more widely distrihuted through the rock are small granules of epidote with identical optical properties to those of the outer rims of the large grains. The only K-feldspar in these rocks is orthoclase.

In contrast, the younger granitic rocks are characterised hy microcline and hy only one generation of epidote — dispersed clear granules similar to that of the second generation in the older group. Otherwise the mineralogies of the two groups are similar except that the younger may carry large single crystals of hoth alhite and K-feldspar; it is possihle that the former are phenocrysts and the latter prophyrohlasts. Both groups have abundant myrmekite.

The younger rocks may have either concordant or discordant relations with the older gneisses and concordant sheets are locally seen to give rise to suhsidiary discordant dykes. The younger rocks seem in all cases to be foliated to some degree; their foliation is generally parallel to the margins of the intrusive hody of which they are part. Thus dykes may have within them a planar structure parallel to the dyke walls and hearing no relation to that of the country rock. In contrast concordant hodies have a foliation parallel to that of the host rock and may he difficult to distinguish from it if the zone is strongly sheared. Occasionally dykes are found in which slip has occurred hoth parallel to the dyke walls and parallel to S in the host rock; in those cases the dyke foliation has a curiously sigmoidal aspect.

So far the younger rocks have heen treated as one group. In fact they range from large homogeneous hodies of granite of indeterminate gross shape but several hundred meters wide, through smaller dykes and sills of similar composition and one half to two meters wide, to small concordant aplitic veinlets a few centimeters thick. It seems most likely at present that all these intrusions belong to the same phase of igneous activity.

At least three distinct episodes of movement are indicated in the rocks. The older gneisses infrequently display isoclinal folds, the axial planes of which are parallel to S in the gneisses. These folds are cut discordantly hy the younger intrusive rocks.

At the time of intrusion of at least some of the younger igneous group, important horizontal movements appear to have taken place along nearly vertical shear zones; these zones are generally ahout one meter wide and range from N 30 E to N 15 W in direction. Magma seems to have been injected along the zones at the time of movement, and hlocks of country rock are set in the intrusive material which is itself strongly foliated parallel to the shear zone. For a meter or so on either side of the igneous material the country rock is dragged into parallelism in plastic fashion indicating the sense of the shear.

A third period of movement is indicated by the smaller dykes and veins which are themselves folded; the style of the deformation is consistent with non-affine slip on S in the host gneisses.

On the hasis of the Rh-Sr age determinations made hy LAMBERT (1964) it seems likely that the intrusion of the older igneous rocks took placc in late Hercynian times. The recumbent isoclinal folding displayed by them could he of this age or early Alpine. In any case, it predates the intrusion of the younger igneous rocks and the development of the vertical shear zones. The intrusion of the younger group presumably corresponds in a general way to the time of the Alpine metamorphism. Finally, non-affine movements on S have locally granulated hoth older and younger igneous rocks and partially or completely destroyed augen

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