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PETROGRAPHICAL DATA ON THE LOWER CRETACEOUS FOSSIL RESIN DEPOSIT, GOLLING/SALZBURG

by

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Already in 1885 the first geological hiking routes have been described between Grubach and the Lammer valley [1]. Detailed geological work of this area was carried out by PLÖCHINGER [2], later by FAUPL & TOLLMANN [3]. In 1962 the first resin samples were found in a clayey bed rich in coal (embedded in the sandstone of the Upper Roßfeld strata) after blastings for a freight road [2, 4-5].
The Upper Roßfeld strata (Hauterive to Apt) consist of coarsely clastic accretion and sandstones with higher carbonate content than the sandstones of the Lower Roßfeld strata, silification and layers of chert. In the sedimentological model, the Upper Roßfeld strata are the result of small sediment fans, which advance from the slope perpendicular to the deep sea trench and are supplied with material from canyons. The black stone layers, which include the resins, are typical for the Upper Roßfeld strata of the Apt [2-3, 6-7].

The majority of the resin samples is translucent and dark brown, or of a lighter brown color, other samples are completely opaque and of a milky brown color. The milky brown areas seem to be the contact zones with the surrounding sediment, where thermal influence during orogenesis could take effect. Smaller resin particles within thin coal strata are completely alterated, the strata themselves are deformed by tectonic activity. Occurrence of calcite veins, pyrite, and limonite together with the resin rodlets was documented [4, 8]. SCHLEE [9-10] describes the red variety of the resin surrounded with remains of "rusty" sediments instead of coal as speciality. Usually these samples show a very intense red color. They were found in a small area of about one m3 embedded in the other brown resins [8].
Microscopical investigations on several polished thin sections of completely new fossil resin material from Golling have proved an enormous richness in microfossils. The numerous microfossils, which have not been documented in any previous studies, may help form a more detailed picture of the flora of the former Araucaria-woods.
The microfossils found range from sizes less than 10 mm to sizes more than 50 mm and have not been identified, yet, except wood fragments and possible hyphas. Many microfossils follow an obvious flow trend (also detectable with UV-fluorescence) - possibly due to the flow of the original resin material as well as the kneading of the re-softened resin mass during orogenic activities. Some inclusions seem stretched or slightly deformed by this process.

The deposit from the Lower Cretaceous in Golling (Salzburg) was investigated concerning the resin samples as well as their surrounding coal by X-ray diffraction (Siemens D500). The coal samples include quartz, gypsum, pyrite, muscovite, albite and/or calcite, in one coal sample lepidocrocite could be detected. Gypsum in the coal samples is in some cases even visible as small crystals.
The fossil resin samples show similar mineral inclusions, such as quartz, gypsum, pyrite, muscovite, albite, calcite, and bassanite in one totally milled sample. The oxidation crust of the red variety additionally includes lepidocrocite and clinochlore. Thus, lepidocrocite in the red samples from the very restricted area (about one m^3) within the former and now reafforested mine from Golling could be identified as the coloring substance.
The bedrock with quartz, pyrite, muscovite, albite, calcite, clinochlore, and marcasite exhibits similar mineral content.
The white oxidation crust of brittle brown samples, according to the other components, includes rozenite and melanterite, the oxidation products of pyrite.
The fracture fillers are quartz and pyrite, whereby the quartz fillings deserve special attention. The fillings originate in the surrounding sediment and especially the agate- and chalcedony-structures within larger cavities point towards crystallization of a fluid phase, which is transported into the cavities over fractures from the surface. The agates are banded in white to grey and are translucent in thin sections [10-12].

Further investigations concerning relative age dating have been conducted by Raman spectroscopy. A number of differently aged samples have been included in a comparative study concerning age-dependent intensity changes of typical Raman bands in the resins [13].

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