

The coal from the two formations differed mainly in turns of rank. The older Balingian coal is bituminous (*steinkohle*) and is ranked as high volatile A (ATSM rank) while the younger 'Begrih-Liang' coals range from sub-bituminous B to high volatile B (ATSM rank). The rank of the coals were determined by measuring the reflectance of vitrinite.

Petrographic analysis showed the Balingian coals be banded microscopically in which bands of vitrite alternate with clarite v. The morphology of the individual maceral groups were indistinguishable. The presence of vitrinite, resinite and liptodetrinite indicate that the swamp was either inundated or had a high ground water level. Vitrite and clarite v suggest forest-peat litter. Also, the exinite-poor clarite are said to originate from angiosperm forests.

The 'Begrih-Liang' coal, although being of two varieties, the brown coal (*braunkohle*) and bituminous coal (*steinkohle*), contain similar microlithotype compositions and associations. The morphology of the individual maceral groups could be distinguished such as telinite and telocollinite (vitrinite group), resinite and ontinite (exinite group) and fusinite and selerotinite (inertinite group). Pyrite and clay minerals are also present. The interpretation of the 'Begrih-Liang' coal suggest a similar autochthonous mode of formation. Hence, it is suggested that the depositional milieu had not changed since the Upper Miocene.

The Balingian coal and the 'Begrih-Liang' coals were buried to a depth of at least 2,000 m (discounting anomalous geothermal gradients). This suggests that the 'Begrih-Liang' Formation at one time, was at least 5,000 m thick. The present thickness of 3,000 m suggests considerable uplift/epeirogenesis since the Pliocene-Pleistocene boundary. The younger formation coal only straddles the 'oil window' and therefore could be ruled out as being the source of an oil seep in the area of study. The source of the oil seep would most likely be the Balingian coals.

Some petrographical implications of the coal from
the Mukah-Balingian area

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The younger basin in the south Mukah-Balingian area contains coal seams which are distinctive in outcrop, and therefore used as stratigraphic markers. They represent autochthonous and allochthonous deposits of accumulated plant debris and peat. The environment of formation lay within or close to a landmass.

Interpretation of the palaeo-environment is based on both sedimentological and coal analysis. The petrographic analysis of coal, based on its microlithotype composition and association, supported the sedimentological evidence for a poralic-fluvial environment of formation. Most of the coal originated autochthonously from the humification of peat formed in swamps.