A Review of the Tertiary Sedimentary Rocks of Thailand

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Tertiary sedimentary rocks in Thailand were previously reviewed by Nutalaya (1975), Bunopas (1976), Gibling and Ratanasthien (1980), Snansieng and Chaodumrong (1981), and Sae Leow (1982). In this present review the paper is divided into three parts, i.e., the general review of the Tertiary rocks of Thailand, the review of previous works, and the stratigraphic details of some Tertiary basins.

There are many small intermontane basins and some larger regional basins with Cenozoic sedimentary deposits in Thailand (Fig. 1). Some large basins consist of a connected set of sub-basins.

Tertiary sedimentary rocks are known in isolated basins of limited extents in 6 main regions. In the northern and the western part of Thailand, the Tertiary sediments consist predominantly of lacustrine and fluviatile carbonaceous shale, coal bed, oil shale, claystone, sandstone and fresh water limestone. In the central basin of Thailand, the area is located within a broad structural depression which was filled by non-marine strata of several thousand feet thick. They are overlain by deltaic sediments of Pleistocene age. In the peninsular Thailand, isolated Tertiary basins contain fossiliferous marine limestone and marlstone with interbedded sandy

shale, carbonaceous shale and coal bed. In the Gulf of Thailand, the sediments are predominantly alternating beds of sand and shale with some lignitic layers. These sediments were laid down under the deltaic and fluviatile conditions in the northern part of the basin, while marine incursions were from the south. In the Khorat Plateau, the uppermost part of the Maha Sarakham Formation may represent some upper Cretaceous to lower Tertiary sediments in enclosed basins.

Tertiary basins are mainly fault - bounded grabens and/or half grabens formed by reactivation of basement structures. The shape and trend of the basins are elongated following the regional strike of the older formations, which were also controlled by subsequent faulting. The Tertiary strata rest unconformably on Mesozoic and older rocks and are commonly overlain unconformably by Quaternary, coarse terrigenous strata (Mae Taeng Group). Palynological analyses of well cuttings in the Gulf of Thailand indicate a major unconformity in late Miocene age. This unconformity is also found in the central basin of Thailand and can be traced to the Sundaland area of Southeast Asia.

Paleontological studies of fauna and flora from some of the Tertiary sequences in the Northern Thailand indicated that their ages range from upper Eocene to Pliocene. In the Gulf of Thailand, palynological studies indicated that the oldest rock is Oligocene. Five floral zones were found. Although in most of the studies, the fossils were taken from a limited stratigraphic interval but they represent the age range of each basin. Table 1 shows the summary of the age of rocks in the Thai Tertiary basins.

The topographic elevation of the Tertiary basins, varies from below sea level in the Gulf, to just above the sea level at Krabi basin in the south, to 1000 m above the mean sea level at Boluang basin, in the North. These elevation differences are probably the result of subsequent tectonic movements.

The thickness of Cenozoic strata in Northern Thailand is nearly 3000 meters thick as indicated by drilled holes. Results of geophysical survey suggested that the sediments in the Central basin may reach the thicknesses of 7000 meters in Phitsanulok basin and 3500 meters in the Chao Phraya basin. In the Gulf of Thailand, the study of the seismic and exploration wells data indicated that the Tertiary sequences are up to 8000 meters or more in thickness.

Coal beds are common in the Tertiary basins. Coals occur as seams up to 35 meters thick. They are interbedded with massive mudstone/claystone. Seven coal mines (lignite to high volatile C bituminous) were exploited in five basins. Natural gas is being piped from the Gulf of Thailand. Petroleum is found in the Phitsanulok basin and in Fang basin. Major oil shale deposits are found in the Mae Sot basin and diatomite deposits are in the Lampang basin.

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