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STRUCTURAL CONTINUITY BETWEEN SUMATRA, PENINSULAR MALAYSIA AND THAILAND

CHARLES S. HUTCHISON
DEPT. OF GEOLOGY
UNIVERSITY OF MALAYA
59100 KUALA LUMPUR

The spectacular N-S Bengkalis Graben, aligned at 102.3° E, deepens southwards from Malacca to more than 3 km below sea level over a horizontal distance of 265 km. It terminates abruptly against a NW-SE wrench fault defining the northeast margin of the Tigapuloh Mountains. The Paleogene drainage flowed southwards on the tilted basement landsurface, and initial sediments were alluvial, fluvial and lacustrine.

In Peninsular Malaysia, Mesozoic molasse strata occur at progressively higher elevations northwards, and deep-seated metamorphic rocks outcrop in the north. The continental block, extending from the Thai Border to Central Sumatra, is southerly down-tilted. The sea level hinge lies in the Straits of Malacca. The Sumatran pre-Tertiary topography has been infilled by Tertiary oil-bearing formations, while the similar Malaysian topography has been eroded since the Paleogene.

The Muar River is a relict of its past glory. The Tembeling-Muar was the premier Paleogene river, flowing south down the regional slope, probably reaching the Indian Ocean on the South Sumatran coast. It was responsible for the Paleogene lakes and source rocks in the Bengkalis Graben, and later provenanced granite-derived reservoir sands from Malaysia. It has been captured and now flows east as the Pahang River. Tasek Bera is one of its extant lakes, comparable to those of the Bengkalis Trough, but it has not been geologically investigated.

The N-S trending system continues uninterrupted to north Thailand. However there must exist a major fault beneath the coastal plain from Songkla to Kota Baru, with spectacular northwards downthrow. Surprisingly it does not appear on any map. The continental block is progressively up-tilted from the southern Gulf, where the Paleogene lacustrine basins are deep below sea level, to north Thailand, where they are high above sea level. The Paleogene Chao Phraya-Mekong river flowed southwards along this regional slope; a direct analogue of the Tembeling-Muar.

The Bengkalis Graben was interpreted by Tjia (1989) as a southwards continuation of the Malaysian Bentong-Raub Suture. This is an unlikely hypothesis. The Suture is structurally conformable with and defines the western margin of the Central Triassic Basin. The Gemas Formation continues southwards as the Jurong Formation, and the regional N-S strike swings abruptly SE at Gunung Pulai, and continues through Singapore into the predominantly Triassic Riau Archipelago. The Bentong-Raub Suture therefore swings SE from Malacca to follow this trend, and it must be located between Kundur and Batam islands. This is the favoured position based on granite petrology and Triassic stratal distribution.

The basement geology of the Central Sumatran Basin may be satisfactorily equated with that around and south of Kuala Lumpur. Late Triassic and younger granites occur at depth in Sumatra, and Carboniferous basement "quartzites" may represent the Kenny Hill Formation. The "Mutus Assemblage" of Central Sumatra may have been regionally misinterpreted, and its lithologies may be found in the Hawthornden and Dinding schists and the Kuala Lumpur Limestone. The Central Sumatran rift-related Miocene basalts and gabbros may be equated with the poorly dated Segamat and Kuantan suites of Malaysia.

The dominant N-S and NW-SE Cainozoic fault directions of Peninsular Malaysia and Sumatra have been inherited from Indosinian Orogenic directions in Triassic and older rocks. N-S strikes dominate Peninsular Malaysia and NW-SE dominate Sumatra. The oroclinal swing is in the Straits of Malacca. Since these faults represent reactivation of basement weaknesses, their orientations cannot be analysed by strain ellipse analysis, and the Cainozoic stress field may remain elusive.