



*Pinnacled limestone bedrock contrasted against gentler slopes of granite and trough near Ipoh.*

## Sea over Ipoh: the geology of Kinta

This is the story of the geology of the valley in which Ipoh lies. Geologists know that 300 million years ago, a warm sea covered the site of the town

THE ORIGIN of the development and prosperity of Ipoh and the Kinta District generally can be traced back to the geology of the area, and in particular to the characteristic, frequently valuable, mineralization which occurs in some of the rocks forming the Kinta Valley and which has helped to make Ipoh one of the most important towns in the Federation of Malaya.

The geological history of these rocks, that is the story revealed by the superficial alluvium and detritus, the original underlying sediments, and the igneous intrusions, began million of years ago.

At one locality near Chemor, north

of Ipoh, the discovery of fossil remains has shown that some of the rocks there are as old as Ordovician (500 million years) to Silurian (400 million years). There was then a break in the geological record between these rocks and those of the sedimentary rocks subsequently laid down in Carboniferous to Permian times (350-225 million years ago).

Most of the sedimentary rocks of the Ipoh area were formed during this latter period, when the area was occupied by a warm sea in which marine animals were probably abundant. Occasionally the sea became muddy when sands and muds were deposited but these periods were brief and clear water conditions prevailed for the greater proportion of the time.

Under these conditions, great thickness of limestone were laid down and it is this rock which now underlies Ipoh and indeed forms the greater propor-

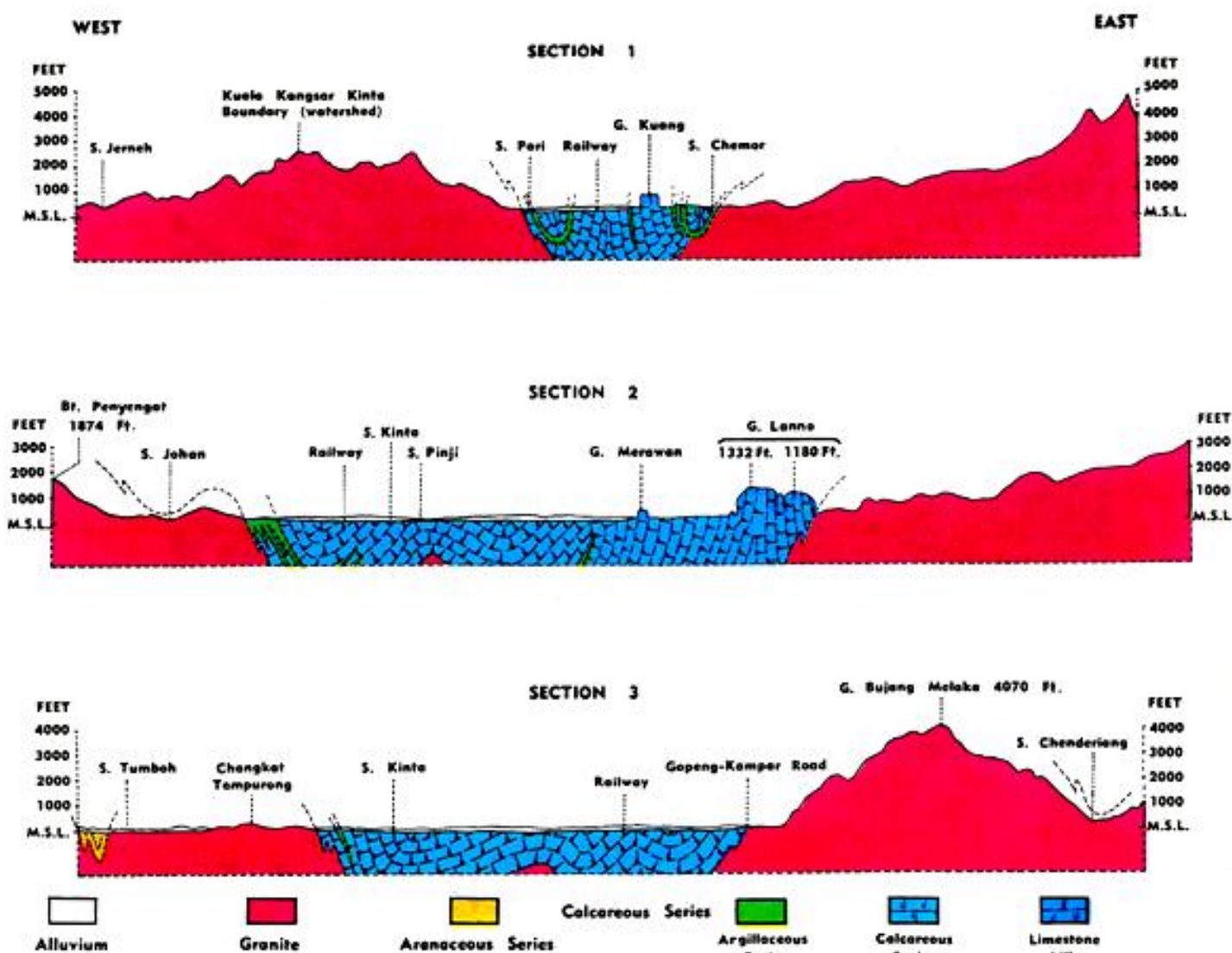
tion of the floor of the present-day Kinta Valley. Outstanding exposures of this limestone can be seen today forming not only the bedrock in many of the open-cast alluvial tin-mines, but also picturesque hills rising well above the general level of the valley. These limestone hills indicate that an old, flat limestone surface once lay more than 1,000 ft. above the present valley floor, but that continual erosion during millions of years has gradually worn away most of the limestone leaving the precipitous hills as remnants of the former large mass.

There is another gap in the record during the Triassic times (225-180 million years ago) and it is presumed that any sediments which were then deposited have since been completely removed by erosional processes.

During the early part of the Jurassic period (180-135 million years ago, large masses of very hot molten granite

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*Idealized geological sections across the Kinta Valley from the Geological Survey Department's memoir on Kinta geology.*

were intruded into the rocks which then occupied the area. During the intrusion of this granite great pressures were developed which resulted in the overlying limestone being folded, crumpled, faulted and in some places shattered.

At the same time the heat given off from the cooling liquid granite caused the limestone to slowly change to a hard white marble. The molten granite contained a number of metallic oxides and sulphides which were gradually concentrated as the granite cooled down and were finally emplaced as veins in the granite and replacements in the limestone.

The majority of these veins and replacements which contain valuable minerals were formed on, or very close to, the contact between the granite and the limestone, a fact which for many years has been well known to the local miners.

From Cretaceous times to the present day (roughly 135 million years), the original rocks in the Ipoh area have been subjected to almost continual ero-

sion and slowly worn away. With the removal of the limestone, the underlying granite was gradually exposed as two large ridges, one west of Ipoh, forming the Kledang Range and the other to the east, forming the Main Range. The granite, being much harder than the limestone, had relatively more resistance to erosion and now forms high mountains, whereas the limestone has been slowly eroded away from the higher granite country, leaving only isolated limestone remnants protruding above the alluvial plain.

From the middle of Quaternary times to the present day (roughly 35 million years) weathering of the granite has produced abundant detrital gravel and sand which has been carried down from the hills by streams and deposited on the flat valley floor. The valuable metalliferous minerals, originally contained in the veins in the limestone and in the granite, also have been carried downstream and deposited with the sand and gravel. These loose, superficial deposits on the valley floor con-

tained the concentrations of tin-ore which have been the prime reason for the development of the Kinta Valley in general and Ipoh town, in particular.

Ipoh to-day is the centre of a flourishing mining industry based on the production of tin-ore, iron-ore, brick clay and road metal. There is also abundant limestone available for cement making.

The earliest references to tin in Malaya are contained in the recorded history of the Indus civilization which existed approximately 5,000 years ago. The mining of tin-ore appears to have continued without a break from these early days.

The Kinta Valley is the richest single tin-field in the world and has yielded since 1874 more than 1½ million tons metallic tins. In the past localized patches of land have shown spectacular values and even as recently as 1905 the local tin-miners neglected ground that did not contain 25 ketties per cubic yard, but the situation today is very different and ground containing only 0.2 to 0.4 katty per cubic yard can be