

- 1941 Geological research in the Malay Peninsula and Archipelago. *Geol. Mag.* **78**, 125–50, 1 fig.
A review dealing mainly with Indonesia.
- 1942 Sponge spicules in rhyolitic ashes. *Geol. Mag.* **79**, 155–7.
A letter disagreeing with Oakley (1940) and suggesting that sponge remains are present in Malayan Recent rhyolitic ash.
- 1943 A further examination of organic remains in rhyolite-ash in Malaya. *Geol. Mag.* **80**, 1–14, 1 pl., 4 figs.
Concludes that some of the bodies were derived from silicified higher plants and may have come from the Toba volcano in N Sumatra. Undoubted sponge-spicules occur and are regarded as marine because of the presence of spherasters. The latter also occur in Lake Chini. If marine, the sea was 200 ft higher at some time in the Recent. Siliceous rods, spheres, and club-shaped bodies are problematical (Scrivenor 1930b).
- 1946a Sea-levels in Malaya. *Geol. Mag.* **83**, 103–4.
A letter to point out the error of the supposed 200 ft sea-level which Zeuner had included in his book on the Pleistocene Period. Spherasters can occur in freshwater sponges and their presence in Recent rhyolitic ash at 200 ft above sea-level does not necessarily indicate that the ash was deposited in the sea.
- 1946b The Cornish mica-trap problem compared with a sequence of rocks in Malaya. *Geol. Mag.* **83**, 197–8.
Dolerite dykes cutting granite at Bt. Ubi, Kuantan, are in turn cut by later quartz porphyry. In Cornwall the minette dykes are possibly older than the quartz porphyry and felsite.
- 1949 Geological and geographical evidence for changes in sea-level during ancient Malayan history and late pre-history. *J. Malay Brch R. Asiat. Soc.* **22**, 107–15, 1 tab.
Notes bore-holes through the alluvium of the west coast. The table compares Malayan Pleistocene history with that of Java, Upper Burma, Punjab, Kashmir, and the Alps. In the Lower and Middle Pleistocene, Malaya was part of Sundaland and the sea-level was about 100m lower than at present. The Batu Arang Conglomerate, Gopeng Beds, and High Level Alluvium are Middle Pleistocene. Volcanic ash in Perak is Upper Pleistocene and contains no marine organic remains. In post-Pleistocene times sea-level stood about 50 ft higher than at present. Marine erosion may be responsible for hills which rise sharply from the plain in many parts of Malaya.

SCRIVENOR, J.B. and JONES, W.R.

- 1919 The geology of south Perak, north Selangor and the Dindings, 196p., frontispiece and 15 pls., 26 figs., geol. sk. map 1:253,440. Kuala Lumpur: Govt. Press.

Reviews the relevant previous literature. The granite is compared with Cornish granite which is richer in muscovite, lithia-mica and topaz. During the weathering of the granite feldspar is kaolinized, this process not being restricted to pneumatolysis. Kaolin veins are probably weathered feldspar-rich veins and sometimes contain cassiterite. Describes the working of cassiterite-bearing quartz-topaz veins on Gunong Bakau, and a mineralized pipe in granite on Bujang Melaka, Perak. The limestone is regionally metamorphosed. Mineralization at the limestone-granite contact is described from Kanching, Selangor but frequently such contact mineralization is absent. The limestone hills are considered to be faulted horsts. The 'Gondwana deposits' of Kinta are divided into Western Clays and Boulder Clays, characterized by the presence of boulders of tourmaline-corundum rock; and Eastern Clays and Boulder Clays (formerly termed Gopeng Beds and Tekka clays) characterised by pure corundum and discoidal granite boulders. The 'younger Gondwana rocks' are represented by quartzites and phyllites and are extensive in Kinta, lower Perak and north Selangor. They also cap Gunong Kerbau. The Tertiary coal-measures at Rantau Panjang, Selangor, unconformably overlie easterly dipping quartzites. The lignite seams are drift deposits. Chemical analyses of the lignite are given. Lignite also occurs in Recent alluvium of Kinta. Cave alluvium in Kinta is commonly cemented by calcite and sometimes contains cassiterite.

The distribution of primary and secondary tin-ore throughout the area is described. Primary tin-ore replaces limestone in Kinta, the most important ore bodies being pipes. Cassiterite in limestone is associated with metallic sulphides, tremolite, and fluorite. Tourmaline is rare or absent but is common in lode deposits in granites. Tin was probably introduced as tin borate and tin fluoride, the boron escaping from the limestone. The Lower temperature of the limestone favoured the deposition of metallic sulphides. Reviews the tourmaline-corundum rocks of Kinta (Scrivenor 1910f). Discusses the evidence for the origin of the Kinta clays and boulder clays and concludes that they are of Gondwana age and probably glacial.

SCRIVENOR, J.B. and SHENTON, J.C.

- 1927 Thorotungstite. A mineral containing tungsten and thorium from the Federated Malay States. *Am. J. Sci.* (ser. 5), **13**, 487-90, 2 figs.

A hydrated oxide of tungsten, thorium and rare earths is described from eluvium overlying granite at Kramat Pulai, Perak. It occurs massive and in small crystals lining druses.

SCRIVENOR, J.B. and WILLBOURN, E.S.

- 1923 The geology of the Langkawi Islands, with a geological sketch map. *J. Malay. Brch R. Asiat. Soc.* **1**, 338-47, geol. map 1:126,720.

The sedimentary sequence is divided into about 5,000 ft of quartzite and shale overlain by about 5,000 ft of limestone with molluscs and polyzoa assumed to be Carboniferous in age. About 1,000 ft of phyllite and quartzite are intercalated in the centre of the limestone sequence and it is overlain by younger quartzite and shales exposed only on small islands in the SE. Porphyritic granite intrudes these rocks and has thermally metamorphosed the limestone, producing good quality marble on Pulau Dayang Bunting and Pulau Timun. Beach concentrates contain tourmaline, ilmenite, and zircon but not cassiterite. Zinc, copper and bismuth sulphides are worked near Kuah. Raised marine sands are noted around Padang Matsirat. [see later references to Langkawi for a revision of the structure and stratigraphy].

SEHESTED, K.G.

- 1960 The geology of Singapore as seen by a civil engineer. *J. Singapore-Malaya Joint Overseas Engineering Group*, **5**, 8-18, 2 figs. incl. 1 geol. map 1:160,000.

Geology based on F.E.S. Alexander (1950). Describes a 'boulder clay' in the Mesozoic of Singapore town. Gives specific examples of engineering problems with regards to rock type.

SERVICE, H.

- 1940 Progress report on the geological survey of parts of the Lipis and Raub districts, Pahang, covered by topo. sheets 2N/5, 2N/6, 20/13, and 3B/3. *Rep. geol. Surv. Dep. F.M.S.* [for 1939], 22-4.

Sediments in the Kuala Lipis area comprise shale, mudstone and tuff with small limestone lenses believed to be Permo-Carboniferous, and a series of sandstone, conglomerate, tuff and shale, at least in part Upper Triassic. Rhyolitic, andesitic, and basaltic tuff, lava and agglomerate are more abundant in the older series. At the Kerchau Gold Mine near Kuala Lipis, quartzites are quarried which apparently contain minutely disseminated gold. At the Penjom Gold Mine alluvial and eluvial gold is mined, the latter associated with a muscovite aplite dyke, 20-100 ft wide.

- 1941 An explanation of the shallowness of alluvium in the river flats of western Pahang. *Yb. Chamb. Mines F.M.S.* [for 1940], 140-1.
- The Pahang river and its tributaries in the K. Lipis area have almost reached their base level of erosion in the solid rock and thus their alluvium is shallow.
- 1947 Report on the geological survey of the part of north-west Pahang covered by topo. sheets 2N/15, 2N/16, 20/13, 3B/3, and 3C/1. *Rep. geol. Surv. Dep. Malay. Un.* [for 1946], 31-4.
- Further fossil collections show Triassic rocks to occur in two synclinal areas at and SE of Kuala Lipis. The underlying Permo-Carboniferous calcareous formation consists of shale and tuff with lower and upper limestones. The arenaceous formation (Richardson 1940a) is probably older than the Permo-Carboniferous. Both the Trias and the calcareous formation contain volcanics. The northern end of the Benom Range is mainly of biotite granite. Quartz porphyries occur in the eastern part of sheet 20/13 and are affected by a shear zone extending across the sheet. Alluvial gold widely distributed over the area probably originates from small quartz veins sometimes forming stock-works in and near aplite dykes.
- 1948 *Rep. geol. Surv. Dep. Malay. Un.* [for 1947], 1-11, 30-1.
- Notes on economic minerals include a description and chemical analyses of columbite obtained from concentrates in Johore and Kedah.
- 1949 Progress report. *Rep. geol. Surv. Dep. Fed. Malaya* [for 1948], 17-19.
- In the Kuala Lipis area gold is the only economic mineral. Its slight potentialities are summarized. Fossil lists from 10 localities include Permian and Triassic faunas.
- 1950a Progress report. *Rep. geol. Surv. Dep. Fed. Malaya.* [for 1949], 25-8.
- The Blanda Mabok lode, near Batu Kurau, Perak is again working and yielding coarse detrital cassiterite and mixed sulphides. Quotes Wray (1891) on the earlier workings [see also Scrivenor 1928, p. 42-3]. Notes on hydraulic mines near Pusing and Bidor, Kinta; interbedded limestone and phyllite is recorded.
- 1950b Report on geological work in Trengganu carried out by the late Mr. A. C. Amies. *Rep. geol. Surv. Dep. Fed. Malaya* [for 1949], 38-44.

Notes on alluvial tin mining in the Besut valley. Granite carries disseminated cassiterite and this occurs in small alluvial flats along the rivers. Tourmaline granite contains cassiterite and wolframite in the Bt. Rakit area and wolfram-bearing quartz veins are known from Bt. Bidong Darat. Poorly preserved fossils from several localities are probably Palaeozoic and plant fragments from Tg. Mat Amin are compared by Dr. W. N. Edwards with two Lower Carboniferous genera. Eight analyses of bauxite from near Kuala Brang are given.

SERVICE, H. and PATTERSON, I.L.

- 1953a The solid fuel situation of the Federation of Malaya. In: Development of mineral resources in Asia and the Far East. *Miner. Res. Devel. Ser. 2*, 156-7 Bangkok: U.N. Dep. Econ. Affairs.
A brief note on the coal measures of Batu Arang, Selangor and Enggor, Perak.
- 1953b Iron-ore resources of the Federation of Malaya. *Ibid.* p. 214-21.
An abstract of Ingham (1952).
- 1953c Mineral resources for ferro-alloy metals in the Federation of Malaya. *Ibid.*, p. 242-3.
Not seen.
- 1953d Mineral resources for non-ferrous metals in the Federation of Malaya. *Ibid.*, p. 317-23.
Summarises the geology of tin and bauxite deposits.

SHENTON, J.C.

- 1936 *Rep. geol. Surv. Dep. F.M.S.* [for 1935].
A tektite from Malaya was forwarded to the University of Adelaide. A small deposit of nitre is recorded from a limestone cave in Kinta. Notes on Perak and Selangor mines. Coal, plant- and oil-bearing shale prospected at Kepong, Johore. The haematite of the Sri Medan Iron Mine, Batu Pahat, Johore, lies above intensely kaolinised agglomerate through which magmatic solutions may have migrated.

SMITH, S.

- 1948 Carboniferous corals from Malaya. Appendix to Muir-Wood, H.M. *Malayan Lower Carboniferous fossils and*

their bearing on the Viséan palaeogeography of Asia, p. 93-6, 1 pl. London: British Museum (N.H.).

One species of each of the genera *Caninia*, *Lithostrotion*, and *Amygdalophyllum* is described from the Viséan of Sg. Lembing, Pahang.

SMIT-SIBINGA, G.L.

- 1940 The Malay Archipelago in pre-Tertiary times. *Proc. 6th. Pacif. Sci. Congr.* **1**, 231-9.

The Upper Palaeozoic and Triassic history of Malaya is compared to that of West Kalimantan. There was probably a widespread unconformity between the Upper Permian and Upper Triassic in Sundaland. Granite pebbles in Triassic conglomerate in Malaya indicate plutonic activity during this time.

SNELLING, N.J.

- 1965 Age determination unit. Summary of results from Malaysia. *Ann. Rep. Overseas geol. Surveys* [for 1964], 32-3, tab. 6.

Dates given by granites and pegmatites show at least three intrusive episodes, late Jurassic, late Triassic and early Triassic.

- 1967 Age determination unit. Summary of results from the Pacific and S.E. Asia. *Ann. Rep. Inst. geol. Sciences* [for 1966], 145 only.

K:Ar dates on micas gave ages corresponding with the main plutonic episodes recorded previously (Anon. 1966). Rb: Sr dates on micas previously dated by K:Ar ratios gave discordant results, indicating that later intrusion disturbed the radioactive clocks in the country rock.

SNOW, A.B.

- 1902 *Mineral resources of Johore*, 11p. Singapore: Straits Times Press.

A report to the Sultan of Johore. Optimistic about gold near Kaduna, Mt. Ophir and in the alluvium. Mentions the occurrence of gneiss at Bt. Benggua, and iron at Palepahkanan. Rich alluvial tin is found at Bt. Abang in Ulu Endau and also on the Sg. Ayer Puteh in SE Johore. Coal analysed from near Batu Pahat.

SPATH, L.F.

- 1951 *Catalogue of the fossil cephalopoda in the British Museum (N.H.): part 5. The Ammonoidea of the Trias* (II), p. 15, 106. London: British Museum (N.H.)
 Cites *Ammonites* sp. indet. B Newton 1925 as possibly being *Hannoceras nasturtium* (Mojs.) and *Ammonites* sp. indet. A Newton 1925 as possibly a *Juvavites* or *Anatomites*. (*vide*, Kummel 1960, p. 685).

STEPHENS, F.J.

- 1901 Mineral features of Pahang, Malay Peninsula. *Trans. Inst. Min. Metall. Lond.* **9**, 419–24.
 A general account of the geology including notes on the occurrence of tin at Sg. Lembing.

STOKES, R.S.G.

- 1906a Geology of Malay tin-fields. *Min. Wld., Chicago*, **25**, 262–3.
 Not seen.
- 1906b Malay tin-fields. *Ibid.*, p. 424–5.
 Not seen.
- 1906c Geology and treatment of tin in the Malay fields. *Ibid.*, p. 572–3.
 Not seen.
- 1908 *Mines and minerals of the British Empire*. London.
 Not seen.

STUBBLEFIELD, C.J.

- 1948 Carboniferous trilobites from Malaya. Appendix to Muir-Wood, H.M. *Malayan Lower Carboniferous fossils and their bearing on the Viséan palaeogeography of Asia*, p. 97–102, 2 pls. London: British Museum (N.H.).
 Describes three species from the Sg. Terapai, east Pahang. Two of these are new and are placed in a new genus *Linguaphillipsia*.

STRUGNELL, E.J. and WILLBOURN, E.S.

- 1931 An ascent of Gunong Benom from Raub. *J. Malay. Brch R. Asiat. Soc.* **9**, 15–27, 4 pls., 1 map.

On the west side of Benom, between 1,200 ft and 2,500 ft hornblende granite intrudes augite syenite, but the central part of the massif is of more acidic granite. Banded schist and agglomerate lie near the granite contact at about 2,600 ft in Sg. Terbau, east of Benom. Large landslides are described.

SWAN, R.M.W.

- 1900 Extracts from notes on prospecting in Ulu Pahang. *Ann. Rep. Pahang, F.M.S.* [for 1899], appendix C, x-xii.

Gives details of shafts sunk in slate traversed by numerous granite and greenstone lenses in the Tui valley. Gold and metallic sulphides were recovered.

SWINNEY, A.J.G.

- 1891 *Report on work done etc., on the Rumpen river during the year 1890.* London: Crowther & Goodman. Privately published by the Pahang Corporation, Ltd.

An account of mineral prospecting in Ulu Rompin, Pahang. Mentions gently dipping sandstones overlying granite in the Sg. Pajah. A map is mentioned but this was not seen.

TENISON-WOODS, J.E.

- 1884a On the stream tin-deposits of Perak. *J. Straits Brch R. Asiat. Soc.* **13**, 221-40.

Two lectures delivered at Taiping. The first is on stream erosion and contains a clear account of the nature and occurrence of tin-ore in alluvium. The metasediments of the Larut area are assumed to be older Palaeozoic—Ordovician. Primary tin-ore is disseminated in granite near the contact of granite and sediments, but stream tin is thought not to be derived from veins or lodes. The second part of the paper is a lecture on the origin of granite by granitisation of sediments, the cassiterite being derived from minute amounts of Sn originally in the sediment.

- 1884b Geology of the Malay Peninsula. *Nature, Lond.* **30**, 76 only.

Records alluvial tin mined in limestone caves in Perak, and considers the limestone of Kinta to be overlain by Palaeozoic clay slate.

- 1884c Physical geography of the Malayan Peninsula. *Nature, Lond.* **31**, 152-4.

Mainly about Perak. The rocks are classified into granite, Palaeozoic slate, sandstone and clay, limestone, and alluvium. Brief description of the mountains of the west coast, and the Perak and Kinta valleys.

- 1885 Report on the geology and physical geography of the state of Perak. *Proc. Linn. Soc. N.S.W.* **9**, 1176–1203.

Considers that the granite was intruded into ancient schists and covered by Palaeozoic slate, clay, and limestone, also probably Palaeozoic. Recent basalt is reported from Kinta. [This is probably tourmaline-corundum rock—Scrivenor 1904b]. Tin-mining areas are briefly described.

THOMAS, H.D.

- 1963 Silurian corals from Selangor, Federation of Malaya. *Overseas Geol. Miner. Resour.* **9**, 39–46, 3 pls.

Species of *Ketophyllum*, *Heliolites*, *Favosites*, *Thecia*, and *Halysites* are described from Setapak. They are Middle or Upper Silurian.

THOMPSON, J.T.

- 1851 Description of the eastern coast of Johore and Pahang, and adjacent islands. *J. Indian Archipel.* **5**, 83–92, 135–54.

Includes clear descriptions of metasediments, granite and volcanic rocks. Hand-coloured geological map approx. 1:500,000.

TOKUYAMA, A.

- 1961 On some Triassic pelecypods from Pahang Province, Malaya. *Trans. Proc. palaeont. Soc. Japan*, **44**, 175–81, 1 pl.

Five species are described from the Benta area and Ulu Sg. Kenang, Pahang. The presence of subspecies of *Neoschizodus laevigatus* and *Myophoria goldfussi* suggest that the fauna is Middle Triassic and thus older than the *Myophoria* faunas described by Newton (1900) and Cox (in Savage 1949, 1950b).

TOOMS, J.S. and KAEWBALDHOON, S.

- 1961 Dispersion of tin in soil over mineralization at Sungei Lembing, Malaya. *Trans. Inst. Min. Metall., Lond.* **70**, 475–90, 7 figs., (discussion p. 614–22).

Over 3,500 soil samples were analysed for tin using a rapid colorimetric procedure. Geochemical soil anomalies were defined

by detailed sampling. Their width was related to width and grade of the lodes and primary dispersion in the bedrock, to topography, and to sample depth. Over mineralization, the amount of tin in the soil generally increased with depth but superficial enrichment could occur through the elutriation of lighter minerals. The method was useful to detect tin-ore too fine to be panned.

VERCOE, C.

1880 Tin deposits in the Malay Peninsula. *Min. J., Lond.* **50**, 904-.

Not seen.

1886 Tin deposits of the Straits. *Min. J., Lond.* **56**, 1277-.

Not seen.

VILLA, E.M.

1935 *The study of mines in China, Indochina and Malaya*, 226p. 12 pls., Hong Kong: H.K. Daily Press.

A few notes on Malayan geology, p. 172-4.

WALKER, D.

1956 Studies on the Quaternary of the Malay Peninsula. I. Alluvial deposits of Perak and the relative levels of land and sea. *Fedn. Mus. J.* **1-2**, 19-34, 1 pl., 8 figs.

The alluvial deposits of the Kinta Valley comprise:

- a) boulder beds, including the Gopeng Beds, Western Boulder Clays and Tekka Clays, which outcrop in discontinuous strips along the valley sides and infill small tributary valley heads;
- b) old alluvium, clays with sand and gravel laminae derived from granite and boulder beds deposited in relatively deep, quiet water and filling the main rock-cut valley basins;
- c) young alluvium, mainly sand and gravel, often current bedded with well-rounded quartz pebbles, but including organic mud and tree trunks, and limited to hollows on the old alluvium and boulder beds;
- d) necron and detritus muds.

The bedrock beneath modern river valleys on the W coast lies up to 400 ft below the surface. A widespread break in slope occurs at about 250 ft and old alluvium is aggraded up to 230 ft above M.S.L., concordant with a horizontal terrace in the Boulder

Beds and solid rock in the higher parts of the valleys. This level and two others, 50 to 100 ft and 10–15 ft above M.S.L. shown by raised beaches along the coast, represent earlier sea-levels caused by eustatic movements.

- 1962 The Palaeolithic industry of Kota Tampan, Perak, Malaya. Part 1. Geography and geology. *Proc. Prehist. Soc.* **28**, 103–7.

Rhyolite ash forms hillocks which are interpreted as consolidated aeolian dunes. It overlies terrace gravel containing stone tools.

WARD, T.

- 1833 Short sketch of the geology of Pulau Pinang and the neighbouring islands, with a map and sections. *Asiat. Res.* **18**, 149–68, geol. sk. map, 2 sections. Republished in *Miscellaneous papers relating to Indo-China*, vol. 1, 1886. London: Trubner & Co.

Describes granite specimens from Penang and a visit to caves in Gunung Keriang, Kedah. P. Panghil (P. Telor) is formed of limestone and on P. Bidan the limestone overlies argillaceous rock. P. Sonsong, P. Kendi, and P. Kra (P. Aman) are of argillaceous schist; and P. Bunting, P. Riman, and P. Jerejak are of granite.

WARNFORD-LOCK, C.G.

- 1906 Tin in Trengganu. *Min. J., Lond.* **79**, 182–.

Not seen.

- 1907 *Mining in Malaya for gold and tin*. 195p., 50 pls., map 1:1.3M. London: Crowther & Goodman.

Quotes Scrivenor on geological aspects of gold (Scrivenor 1904c) and on tin (Scrivenor 1905a). Map shows distribution of gold and tin in Malaya.

WESTERVELD, J.

- 1936 The granites of the Malayan tin-belt compared with tin-granites of other regions. *Proc. Sect. Sci. K. ned. Akad. Wet.* **39**, 1199–1208.

Describes the main types of Malayan granites. Hornblende granite, syenite, and diorite occur mainly as marginal facies and may have formed early in the history of the intrusion, before differentiation occurred to give a more acid rock. All tin-bearing granites appear to be similar petrologically. Chemical analyses

of these are given from all parts of the world. Tin-granites are end stages of differentiation of acid magmas, in mineralogy similar to non-stanniferous biotite granites but containing more rare earths and other trace elements.

WEIR, J.

- 1925 On some specimens of fossiliferous sandstone from Pahang, Malay Peninsula. *Geol. Mag.* **62**, 347-50.

Reviews the Myophoria faunas from Kuala Lipis and Singapore and concludes that these have affinities with the fauna of the St. Cassian Beds of the Tyrol and are thus older than Rhaetic.

WHITE, E.I.

- 1962 Palaeontological Unit. *Ann. Rep. Overseas geol. Surveys* [for 1960-1], 41-4.

Lists reports on fossil occurrences from Setapak, Kuala Lumpur.

- 1963 Palaeontological Unit. *Ann. Rep. Overseas geol. Surveys* [for 1962], 44-7.

Lists reports on Carboniferous and Permian fossil occurrences from Trengganu and Sg. Luit, Pahang.

WILLBOURN, E.S.

- 1916 Pneumatolytic alteration of a very fine-grained granitic rock from Negri Sembilan, Federated Malay States. *Geol. Mag.* **53**, 441-6.

A quartz-muscovite rock with tourmaline spots is described from Ayer Kuning. A rock similar but lacking tourmaline occurs at Bt. Chindras associated with auriferous quartz veins.

- 1917 The Pahang Volcanic Series. *Geol. Mag.* **54**, 447-62, 503-14, 2 pls.

Based mainly on field work in Ulu Pahang, on the Jelai and Pahang rivers but volcanics also described from elsewhere. Rhyolite, trachyte, andesite, quartz porphyry, granophyre, porphyrite and dolerite are recorded from the marine Raub Series. Serpentine is thought to be altered lava of the Pahang Volcanic Series. However the majority of the volcanic rocks are mixed andesitic and rhyolitic tuff and breccia and these are also found in the lower part of the 'Gondwana rocks'. Volcanic boulder beds, thought to have been beach deposits, are unconformable on the Raub Series. The Permo-Carboniferous andesites of Gomaigebergte, S. Sumatra resembles those of the Pahang Volcanic Series.

(WILLBOURN, E.S.)

- 1922a A general account of the geology of the Malay Peninsula and the surrounding countries, including Burma, the Shan States, Yunnan, Indo-China, Siam, Sumatra, Java, Borneo and other islands of the Dutch East Indies. *J. Straits Brch R. Asiat. Soc.* **86**, 237-56.

A review article. Mentions large scale faulting of limestone hills against schist; the presence of Permian beach deposits of volcanic boulders in a tuff matrix in Pahang; and the occurrence of granite fragments in Pahang Volcanic Series ash in Singapore.

- 1922b *An account of the geology and mining industries of south Selangor and Negri Sembilan*, 115p., 5 pls., 7 figs., geol. sk. map 1:253,440. Calcutta: Baptist Mission Press.

The only general work covering the geology of this region. A general geological sketch presented as notes on specific localities is followed by a more detailed discussion of the main granite and sedimentary outcrops. The Mount Ophir granite is non-porphyrific and apparently not tin-bearing. Describes a pyroxene-granite-prophyry from Genting Sempak on the Selangor-Pahang border. Limestone in the Kuala Lumpur area dips generally away from the granite and is frequently dolomitic. Phyllite, talc schist and carbonaceous schist outcrop extensively in Negri Sembilan and are considered to be altered shale of the Raub Series. Radiolarian chert is associated with arenaceous rocks sometimes containing volcanic material. Quartzite, phyllite and shale now known (Gobbett 1965a) to be partly older and partly younger than the limestone are confused. Coastal alluvium and alluvial tin deposits are briefly described. Gives geological notes on the principle tin mines. Descriptions of gold workings at Chindrass, Batu Bersawah, and Pasoh, Negri Sembilan, are quoted from Scrivenor (1904c). At Chindrass shales with auriferous quartz veins are associated with greisenized granite porphyry.

- 1923 *Rep. Geol. F.M.S.* [for 1922]. Published as a supplement to F.M.S. Govt. Gazette, June 15, 7p.

Includes a sketch of the geology of N Kelantan.

Notes the limestone and volcanics of the Pulau area, Pahang-Kelantan border; the distribution of granite in Kedah; iron-ore at Kota Tinggi and other areas of Johore; *Estheriella*-like fossils and radiolarian chert from E Kedah; sulphides of zinc, copper and bismuth from the granite contact in Langkawi; the granite margin and possible tin-ore deposits in Johore; wells through alluvium to 537 ft near Sg. Bernam, Selangor; and records two minor earthquakes in S Malaya.

- 1924 *Notes on the occurrences of lode tin-ore in the Kinta valley*, 22p., 16 figs., map in 3 sheets 1:42,240. Kuala Lumpur: Govt. Press.

All known lode tin-ores lie near the sides of the valley. They are briefly described and plotted on the map. On the east 16 localities are recognised including a weathered mineralized aplite body E of Tanjong Rambutan and the Ulu Petai pipe, containing metallic sulphides, cassiterite and wolframite, on Gunong Bujang Melaka. On the west 56 localities are mainly lodes and pipes in limestone but include some lodes in granite.

- 1925a The volcanic rocks of the Malay Peninsula, and a comparison with their equivalents in the surrounding countries. *Gedenboek Verbeek. Verh. Geol.-mijnb. Genoot. Ned. Kol. (geol. ser.)*, 8, 601-15.

The discussion of the Pahang Volcanic Series is taken from Willbourn (1917). Rhyolite, dolerite and basalt, probably of Tertiary age, outcrop in the Kuantan district of Pahang.

- 1925b A list of minerals found in British Malaya together with a description of their properties, composition, occurrences and uses. *J. Malay. Brch R. Asiat. Soc.* 3, (3), 57-100.

Seventy-eight minerals are listed including all those common in concentrates and occurring in ore deposits. Optical and chemical properties are not given.

- 1926a Geological survey of Pahang, Johore and Kedah. *Rep. Geol. F.M.S.* [for 1925], appendix 1. Published in a supplement to the F.M.S. Govt. Gazette, April 30, p. 4-8.

In SE Pahang and N Johore quartz porphyry, rhyolite, and andesite are deformed and are probably older than the granite. Quartz conglomerate, quartzite and shale are probably Triassic; *Myophoria* and *Halobia* are recorded from Bt. Senarong. The granite is mostly medium-grained, non-porphyritic and often contains hornblende. Brecciated and quartz-veined dolerite cuts granite at Tanah Abang, Johore; and coarse tuff is intruded by a quartz dyke near Mersing. Briefly describes alluvial tin mines of E Johore. Brief notes are given on the geology of the Baling area, Kedah.

- 1926b The geology and mining industries of Kedah and Perlis. *J. Malay. Brch R. Asiat. Soc.* 4, 289-332, 1 geol. map. 1:850,400.

A compilation of notes on individual localities grouped under the headings of physical and general geology, granite, quartzite

(WILLBOURN, E.S.)

and shale older than the limestone, limestone, quartzite and shale younger than the limestone, Tertiary, tin and wolfram, and mining prospects. Mentions *Euomphalus* and *Productus* and other brachiopods from Bt. Temiang, Perlis: and phosphate deposits in Perlis caves. The younger pre-Tertiary clastic sequence contains radiolarian chert and conglomerate. Details three bore-holes through Tertiary coal measures of Bt. Arang, Perlis.

- 1926c The geology of Malaya. *Proc. 3rd. Pacif. Sci. Congr.* **1**, 443–51, 2 figs.

The geological sequence is tabulated and ten major anticlinal belts are described. The N–S structural grain of Malaya is shown as part of an arcuate structure traversing Sarawak, Sabah, Palawan, N Philippines and Formosa.

- 1926d The mineral deposits of British Malaya. *Proc. 3rd. Pacif. Sci. Congr.* **2**, 1727–9.

Seven out of ten anticlinal granite cores are tin-bearing. The primary tin deposits are of pneumatolytic origin and are associated with wolframite in Kedah and Negri Sembilan. Cassiterite-bearing pipes in limestone are rich in arsenopyrite. Scheelite, gold, haematite, manganese and coal are briefly mentioned.

- 1926e A journey in the Ulu Rompin district, south-east Pahang. *J. Malay. Brch R. Asiat. Soc.* **4**, 201–12, 4 pls., 1 topo. map 1:760,320.

Mentions quartz porphyry in the Sg. Kukau and a quartzite ridge with 400 ft cliffs extending E of Gunong Ulu Kinchin. Gunong Lesong is flat-topped.

- 1926–7 The Beatrice Mine, Selibin, Federated Malay States. *Min. Mag., Lond.* **35**, 329–38; **36**, 9–15, 9 figs.

A gently dipping cassiterite-bearing pipe in limestone is characterised by tremolite, a magnesium borate, and talc: calcite is uncommon. This pipe and others in Kinta were probably emplaced by hot gases dissolving the limestone. Tin-bearing pegmatite dykes cut the limestone near the pipe.

- 1927 The geology of Pulau Tioman and other islands in the China Sea. *Rep. Geol. F.M.S.* [for 1926], appendix. Published in a supplement to F.M.S. Govt. Gazette, April 14, p. 6–8.

The islands trend NW–SE. Rhyolite, andesite and associated pyroclastics are metamorphosed by the granite of P. Tioman. Rhyolite is intruded by andesite sills on P. Ujol. P. Tioman

has pyroxene-hornblende-syenite; P. Aur, hornblende granite and syenite with some uneconomic eluvial tin-ore; P. Tinggi and P. Ibol, granophyre; and P. Babi, micrographic granite.

- 1928a *Rep. geol. Surv. Dep. F.M.S.* [for 1927]. Published as a supplement to the F.M.S. Govt. Gazette, May 11, 4p.

The quartz of the Klang Gates ridge, Selangor, is suitable for optical glass. Fragmentary plant remains are reported from metamorphosed shale mineralized by cassiterite near Kuantan.

- 1928b The geology and mining industries of Johore. *J. Malay. Brch R. Asiat. Soc.* **6**, (4), 5-35, 8 pls. 3 figs., geol. map 1:760,320.

Describes the topography and general geology giving details of individual localities. Permo-Carboniferous phyllite of the Raub Series outcrops around Mt. Ophir. Extensive quartzite and shale are all assumed to be Triassic and to be older than the granite. The Pahang Volcanic Series is represented mainly by acid volcanics: columnar rhyolite from P. Ujol is figured. Much of the granite is non-porphyrific and some contains hornblende. High-level alluvium mainly derived from granitic rocks is widespread in the lower areas. At Bt. Medan, a haematite body is associated with a kaolinitic clay which may originally have been rhyolite or quartz porphyry. Notes are given on the tin mines.

- 1929 Fauna of the Batu Caves, Selangor. IV. Geology. *J. Fed. Malay St. Mus.* **14**, 331-2, 1 fig.

Batu Caves hill is composed of fine-grained marble containing up to 15.7% MgO.

- 1931 The occurrence *in situ* of corundum-bearing rocks in British Malaya. *De Mijningenieur, Bandung*, **10**, 170-6, 6 figs.

Pure corundum occurs as alluvial pebbles in Kinta but has not been found *in situ*. Tourmaline-corundum rock occurs *in situ* in Kinta, surrounded by steeply dipping phyllite interbedded with limestone. It is concluded that the rock was not formed by the metamorphism of bauxite as it occurs interbedded with phyllite. The oval bodies in the tourmaline-corundum rock are metamorphic structures and are not present in the phyllite.

- 1932 *Rep. geol. Surv. Dep. F.M.S.* [for 1931]. Published as a supplement to the F.M.S. Govt. Gazette, April 8, 12p.

Includes a sketch of the geology of Sg. Siput North, Perak. Highly sheared granites are mentioned from the Ulu Kinta-Ulu Nenggiri area. The surface of limestone pavements in Kinta

(WILLBOURN, E.S.)

is richer in Mg than limestone a few inches below. Notes new occurrences of sulphide and tin-ores in Kinta.

- 1933 *Rep. geol. Surv. Dep. F.M.S.* [for 1932]. Published as a supplement to the F.M.S. Govt. Gazette, May 5, 1932.

Notes on the geology of Kinta mines include a summary of Willbourn and Ingham (1933). A N-S trending outcrop of schist interstratified with limestone extends for seven miles in E Kinta (Rastall 1931). Serpentine is recorded from Mt. Ophir. Notes on the Sg. Siput North area of Perak mention sheared quartz porphyry, probably of similar age to the granite; tufa deposits in the Sg. Perlop basin; and occurrence of tin-ore.

- 1934 *Rep. geol. Surv. Dep. F.M.S.* [for 1933]. Published as a supplement to the F.M.S. Govt. Gazette, March 9, 1934.

Includes a progress report on the geology of the gold belt west of Gunong Benom and an account of the Raub gold mines; a summary of Savage (1937); and notes on Kinta and Kuala Lumpur mines.

- 1935 *Rep. geol. Surv. Dep. F.M.S.* [for 1934].

Notes on mineralized shale within the limestone sequence in Kinta; tourmaline-corundum rock *in situ*; Perak mines and the geology of the Batang Padang district, Perak. A further report on the gold belt of central Pahang (Willbourn 1934) includes notes on the syenite of the W flank of Gunong Benom; occurrence of recent volcanic ash in the Raub district: the gold deposits in several places are associated with small laccoliths of granite porphyry.

- 1936a The relationship of geology and civil engineering in Malaya. *J. Engng Ass. Malaya*, [for 1935], 5p.

Notes for civil engineers on the geological history of Malaya, water in coastal alluvium, weathering of different rock types, and hot springs.

- 1936b A short account of the geology of those tin-deposits of Kinta that are mined by alluvial methods. *J. Engng Ass. Malaya*, 4, 255-64, 4 figs.

A general account of Kinta geology. Considers sub-alluvial limestone surface formed originally by marine action. Tekka Clays and Western Boulder Clays thought to be residual deposits of weathered schist interbedded with limestone. Mentions records of tektites in Malaya.

- 1937 *Rep. geol. Surv. Dep. F.M.S.* [for 1936].

At least some of the Western Boulder Clays (Scrivenor 1913a, 1931a) are formed by the weathering of pelite interstratified with limestone, and its subsequent collapse into solution hollows. Such deposits are sometimes mineralized with cassiterite. Mixing of alluvium shown by teeth of the recent *Elephas maximus* found at deeper levels than a tooth of the Lower Pleistocene *E. namadicus*. Summarises occurrence and origin of gold in the Raub district, Pahang, and near Bidor, Perak. Uneconomic coal beds at Kepong, Johore, are underlain by volcanic ash and boulder beds of volcanic material. The occurrence of *Viviparus* (Cox 1937) suggests an Upper Tertiary age for the coal beds. A small lens of metamorphosed Mesozoic coal is described from Singapore. Brief accounts of Mn-ore in NE Malaya and of bauxite in Johore. Mentions occurrences of cassiterite and haematite together at Pelepah Kanan, Johore. Minor earth tremors recorded.

- 1938a *Rep. geol. Surv. Dep. F.M.S.* [for 1937], 1-16.

Stannite is recorded from Pelepah Kanan, Johore. Unconsolidated rhyolite ash overlies river gravel near Lenggon, Perak, and forms a hummocky surface 205-230 ft above sea-level. It contains organic remains thought to be marine. Thus the ash is probably Pleistocene rather than Recent (Scrivenor 1930b, 1942, 1943, 1946a). A Neolithic 'beaked adze' and a tooth of *Elephas maximus*, possibly 1500 BC, dredged from a depth of 40 ft in Kinta.

- 1938b The creation of Malaya. *Straits Times Annual*, 81-88. Reprinted (1939) in *Yb. Chamb. Mines F.M.S.* [for 1938], 143-58.

A popular account illustrated by eight half-tone figures and a geological map of Malaya 1:3.2M.

- 1938c British Malaya. In Groves, A.W. *Manganese. Reports on the mineral industry of the British Empire and foreign countries*, p. 63-4. London: Imperial Inst.

Pyrolusite and psilomelane is quarried from Kemaman, Trengganu. The deposit is 40 ft wide and strikes NW in sandstone and shale near granite. Mainly psilomelane is quarried as concretions and large masses from weathered shales and schist at Pasir Mas, Kelantan. Unworked ore is known in Ulu Airing, Kelantan.

- 1939 La creazione della Malesia. *Materie Prime d'Italia e dell'Impero*, Rome. 17, 341-53.

Italian translation of Willbourn (1938b).

- 1940 *Rep. geol. Surv. Dep. F.M.S.* [for 1939], 1-15, 46-7.
 Boron mineral previously reported from the Beatrice mine, Kinta, shown by Prof. C. E. Tilley to be a new fluorborite. Another occurrence of Pleistocene rhyolite ash recorded from SW Pahang. Siliceous bodies in the ash were re-examined and shown not to be sponge spicules (Oakley 1940). Tremolite-fluorite rock containing cassiterite and sulphides recorded in limestone near Temoh, Perak. Notes on subsurface geology of coastal areas in Perak and Selangor and occurrence of scheelite in Kinta.
- 1941a Notes on tin deposits in Malaya. Where payable alluvial deposits may still remain undiscovered. *Yb. Chamb. Mines F.M.S.* [for 1940], 120-6.
 Addressed to non-geologists. Suggests that coastal alluvium is a probable future source of the ore.
- 1941b *Rep. geol. Surv. Dep. F.M.S.* [for 1940], 1-14.
 Notes, on bore-hole evidence, of subsurface geology of the west coast, S of Kuantan, and Manchis, Pahang. At Sitiawan, Perak the alluvium is 360 ft thick. Granite proved in the vicinity of the Manchis tin fields. Quartz conglomerate and dolerite recorded in north Selangor. Arenaceous rocks forming the foothills east of the Main Range in Pahang thought to be older than the calcareous formation on structural grounds.
- 1946 The relationship of the Geological Survey to the mining industry of Malaya. *Bull. Imp. Inst., Lond.* **44**, 128-48, geol. map 1:3.2M.
 Outlines economic geology and mining methods and the present and future work of the Survey. Summarizes the geology of Raub Australian Gold Mines and Kramat Pulai scheelite mine. Mentions deeply buried alluvial tin deposits along the west coast.

WILLBOURN, E.S. and INGHAM, F.T.

- 1933 The geology of the scheelite mine, Kramat Pulai Tin Limited, Kinta, Federated Malay States. *Q. Jl. geol. Soc. Lond.* **89**, 449-79, 7 pls., 8 figs.
 Strongly folded marble and schist were intruded by granite and later by aplite and pegmatite dykes, many of which were localised along tension cracks normal to the fold axes and were bordered by a zone of contact metamorphic minerals including cassiterite. At a late stage and a relatively low temperature scheelite-fluorite ore replaced marble along anticlinal axes, ascending *via* the aplite veins which were reopened by further tension. Geological plan of the mine 1:1600.

WOLFF, W.

- 1911 J. B. Scrivenor's Arbeiten über die Geologie der Zinnerz-lager von Britisch-Malaya. *Z. prakt. geol.* **19**, 152-7.

A general review of contemporary geological knowledge of Malaya based on Scrivenor.

WRAY, L.

- 1874 Tin in the Straits of Malacca and Tenasserim. *Mining Journal, Railway and Commercial Gazette*, **44**, 378-.

Not seen.

- 1885 Physical geography of the Malayan Peninsula. *Nature, Lond.* **31**, 459 only.

Letter replying to Tenison-Wood (1884c) pointing out errors in the latter.

- 1886 *Notes on Perak, with a sketch of its vegetable, animal and mineral products*, 33p. London: W. Clowes and Sons.

A long terrestrial history is postulated between the deposition of the limestone and formation of Quaternary deposits. Siliceous sinter recorded from hot springs. Recent submergence of coastal areas is shown by a 105 ft well in Larut which cut 17 ft of marine beds underlain by terrestrial deposits. Economic geology is noted and the occurrence of alluvial tin in Larut is described.

- 1891 Report on prospecting at Blanda Mabok. *Perak Govt. Gazette*, **4**, 11-12.

Describes a quartz vein with cassiterite and silver-rich galena traced for at least 175 feet.

- 1893a On the black limestone at Kamuning. *Perak Museum Notes*, **1**, (1), 28-9.

Limestone with 8% graphite is described from Changkat Kamuning, Perak. This formation is presumed to be Precambrian.

- 1893b Alluvial tin-prospecting. *Perak Museum Notes*, **1**, (2), 1-114.

Includes a short account of the occurrence of alluvial tin-ore in Larut.

- 1894a The bats' guano from Gunong Pondak. *Perak Museum Notes*, **1**, (3), 72-3.

The guano contains 3% ammonia, 33% calcium phosphate and 0.68% potash.

- 1894b Report on a sample of wolfram from Chumor, Batang Padang. *Perak Museum Notes*, 1, (3), 75-8.

Two analyses are given of an alluvial sample of wolframite. Primary deposits of wolframite and scheelite are recorded from other parts of Perak.

- 1894-8 Some account of the tin mines and the mining industries of Perak. *Perak Museum Notes*, 1, (3), 1-24; 2, 81-8, 2 pls., 2 tabs.

Includes a short chapter on the geology, based on Kinta. Several thousand feet of Laurentian schist are overlain, probably unconformably, by limestone which has been recrystallized by sheets of trap rock. These rocks are intruded by granite, probably in several phases, and all is overlain by Quaternary deposits. Describes how initial aggradation of the valleys may kill trees which then further obstruct the flow of streams and become embedded in more alluvial deposits.

Subject Index

- Age determinations (*see* Radiogenic ages)
- Algae
 Permian: GOWDA 1965
- Alluvial minerals
 Kuantan area: FITCH 1952
 separation of: FLINTER 1959c
- Alluvium: SCRIVENOR 1931a (*see also* Older alluvium, Younger alluvium)
 bore-holes in: WILLBOURN 1923; ROE 1949; SCRIVENOR 1949; FITCH 1952
 carbonized plant remains in: RICHARDSON 1947c
 coastal: SCRIVENOR and JONES 1919; RICHARDSON 1947d
 Dindings: KOOPMANS 1964
 Kinta: SCRIVENOR and JONES 1919; INGHAM and BRADFORD 1960
 Perak: WALKER 1956
 Singapore: LOGAN 1851
- Amang
 composition: SCRIVENOR 1907; DUNSTAN 1911a
- Ammonoids
 Triassic: NEWTON 1923, 1925; SAVAGE 1949; KUMMEL 1960; SATO 1963
- Amphibole Schist Series: ALEXANDER, J.B. 1956
 origin: RICHARDSON 1947e
 Pahang: RICHARDSON 1939b, 1947g
 Selangor, N.: ROE 1951, 1953
- Amphibolite
 Pahang, N.W.: RICHARDSON 1938, 1947g
- Analyses of
 rocks, minerals and concentrates: ALEXANDER, J.B. *et al.* 1964
- Andesite (*see also* Pahang Volcanic Series)
 Johore, E. islands: WILLBOURN 1927
- Antimony
 distribution of ore: HILL, J.H. 1964
 native, from P. Ubin: OLDHAM 1871
- Arenaceous Formation: ALEXANDER, J.B. 1956
 Pahang, S.W.: RICHARDSON 1939b; 1946 (*see also* Foothills Formation)

- Arenaceous Series: ALEXANDER, J.B. 1956
 Kinta: INGHAM and BRADFORD 1960
 metamorphism of: RICHARDSON 1938
 Pahang, E.: FITCH 1952
 Pahang, N.W.: RICHARDSON 1950
 Selangor, N.: ROE 1951, 1953
 Singapore: ALEXANDER, F.E.S. 1950
- Argillaceous Series: ALEXANDER, J.B. 1956
 Singapore: ALEXANDER, F.E.S. 1950
- Artifacts: INGHAM 1939; ROE 1939; WILLBOURN 1938a; WALKER 1962
- Baling Formation: BURTON 1967a
- Basalt
 at Kuantan: SCRIVENOR 1906; FITCH 1952
- Batang Padang, Perak
 geology: WILLBOURN 1935; INGHAM 1938a
- Batu Arang coalfield: SCRIVENOR 1911g; SCRIVENOR and JONES 1919;
 MACKIE 1938; ROE 1941, 1949, 1953; ANON 1952; SERVICE and
 PATTERSON 1953a; RENWICK and RISHWORTH 1966
 boulder beds: SCRIVENOR 1931b, 1949; ROE 1949
 fossil plants: SCRIVENOR 1911g, 1912a
 geophysical prospecting: EDGE 1930
- Batu Caves: RIDLEY 1899; WILLBOURN 1929; McCLURE 1961
- Bauxite: SERVICE and PATTERSON 1953d
 formation: GRUBB 1963
 Johore: WILLBOURN 1937; INGHAM 1939; RICHARDSON 1947a; GRUBB
 1963, 1966
 mineralogy: GRUBB 1966
 Pahang, S.E.: FITCH 1940a, 1947a
 Selangor, N.: ROE 1947
 Trengganu: SERVICE 1950b
- Beach form: HILL, R.D. 1966
- Beach ridges: NOSSIN 1961a, 1964a,b; 1965a,b; KOOPMANS 1964
 (*see also* Raised beaches)
- Beatrice Mine, Kinta: WILLBOURN 1926-7; ADAMS 1928
 borate mineral from: SCRIVENOR 1927a; WILLBOURN 1940
 'pipe': WILLBOURN 1926-7; SCRIVENOR 1929a, 1930a, 1931b
- Bentong district (*see* Pahang, SW)
- Bentong Group: ALEXANDER 1959
- Bibliography: CHEESEMAN 1959
 Tin: HESS and HESS 1912
 1822-1900: NEWTON 1901a

- 1900-1925: JONES, W.R. 1925c
to 1930: SCRIVENOR 1931a
- Blanda Mabok Lode, Perak: WRAY 1891; SCRIVENOR 1928; SERVICE 1950a
- Bok Bak Fault: BURTON 1965
- Brachiopoda
- Devonian: GOBBETT 1966
 - Permian: SERVICE 1949; IGO 1964; BALL 1967
 - Silurian: GOBBETT 1965a; BOUCOT *et al.* 1966
 - Triassic: NEWTON 1923
 - Viséan: FITCH 1947a, 1948; MUIR-WOOD 1948
- Bryozoa (*see* Polyzoa)
- Building stone: HUTCHISON 1959
- Bukit Arang, Perlis
- coal-bearing formation at: WILLBOURN 1926b; ALEXANDER, J.B. 1947b
- Bukit Ranjut syenite: RICHARDSON 1950
- Bundi Mine, Kemaman
- cassiterite occurrence: SCRIVENOR 1907
- Calcareous Formation: ALEXANDER, J.B. 1956
- Calcareous Series: RICHARDSON 1950; ROE 1951, 1953; ALEXANDER, J.B. 1956; INGHAM and BRADFORD 1960
- Cambrian
- Langkawi: JONES, C. R. 1961a
- Cameron Highlands
- roof pendants in granite: RICHARDSON 1947g
 - topography: SCRIVENOR 1924c
- Cannel coal
- Batu Arang: DRYSDALE 1936
- Carboniferous: SCRIVENOR 1931a; ALEXANDER, J.B. 1956
- fossils from Sg. Lembing: SCRIVENOR 1920; FITCH 1940b, 1947a, 1948; EDWARDS 1948; MUIR-WOOD 1948; OAKLEY 1948; SMITH 1948; STUBBLEFIELD 1948; SERVICE 1950b
- Cassiterite (*see also* tin-ore)
- alteration to varlamoffite and malayaite: ALEXANDER, J.B. and FLINTER 1965
 - Bentong area: ALEXANDER, J.B. 1940, 1941
 - Besut Valley, Trengganu: SERVICE 1950b
 - comprehensive survey of geology and occurrence: SCRIVENOR 1928; BRADFORD 1961
 - containing iron: SCRIVENOR 1911b
 - in granite: SCRIVENOR 1927a; ALEXANDER, J.B. 1941; SERVICE 1950b; BRADFORD 1961

- in greisen: ROE 1938; ALEXANDER, J.B. 1940
 in hot springs: MEUNIER 1890; BOTT 1891a; JONES, W.R. 1914
 in limestone: INGHAM 1939
 in natural beach concentrates: SCRIVENOR 1927b
 in quartz veins: SAVAGE 1948
 in shale with plant remains: WILLBOURN 1928a
 in soil: BROWN 1913; TOOMS and KAEWBADHOON 1961
 in topaz-quartz rock: SCRIVENOR 1907, 1914a, 1914d; JONES, W.R. 1916a; SCRIVENOR and JONES 1919; ROE 1938; ALEXANDER, J.B. 1940
 in weathered quartzite: FITCH 1941
 magnetic: SCRIVENOR 1911e, 1929a; ROE 1947; FLINTER 1960; GRUBB and HANNAFORD 1966a,b; SANTOKH SINGH and BEAN 1967
 modes of occurrence: JONES, W.R. 1920
 origin: SCRIVENOR 1909h; SCRIVENOR and JONES 1919
 pleochroism: SCRIVENOR 1905a, 1907
 pseudomorphing quartz: SCRIVENOR 1911e
 secondary, with topaz: JONES, W.R. 1916a
 Selangor, N.: ROE 1938, 1951
 Sg. Lembing: FITCH 1947a
 Ta and Nb in: HOCKIN 1957b
 twinning: JOHNSEN 1908
 with fluorine: SCRIVENOR 1909h
 with fluorite and metallic sulphides in limestone: SCRIVENOR 1906; SCRIVENOR and JONES 1919; WILLBOURN 1940
 with haematite: WILLBOURN 1937
 Cave deposits: RIDLEY 1899; NOONE 1940; JONES, C.R. 1965
 evidence for a drop in sea-level: FITCH 1949b
 in Gunong Kriang: WARD 1833
 Caves (*see also* Batu Caves)
 formation of: GOBBETT 1965b
 in NW. Malaya: JONES, C.R. 1965
 Cerussite: DUNSTAN 1913; SCRIVENOR 1928
 Chert (*see also* radiolarian chert)
 associated with volcanics: SCRIVENOR 1916b; WILLBOURN 1922b
 pebbles in conglomerate: SCRIVENOR 1908b, 1912d
 Chert Series: SCRIVENOR 1907, 1911c, 1912d, 1916b, 1929c, 1931a; SAVAGE 1925; ALEXANDER, J.B. 1956
 China clay: SCRIVENOR 1905a; ALEXANDER, J.B. 1947b
 Chromium in serpentinite and amphibolite: RICHARDSON 1939a
 Chuping Formation: KOBAYASHI *et al.* 1964; JONES, C.R. 1965; KOOPMANS 1965

- Cinnabar: RICHARDSON 1939a, 1947b, 1951b
Civil Engineering, relation of geology to: WILLBOURN 1936a
Clay minerals, in lateritic soil: ERHART 1954
Clay pebbles, E. coast of Johore: NOSSIN 1961b
Clays, economic: JONES, W.R. 1915a
Coal (*see lignite*)
Coal measures: RENWICK and RISHWORTH 1966; (*see also* Batu Arang coalfield)
 Johore: SCRIVENOR 1931b; WILLBOURN 1937
 Perlis: SCRIVENOR 1913d, 1921a, 1922
Coal veins: FERMOR 1939a; RICHARDSON 1941; FITCH 1952
Coastal development, in NE Johore: NOSSIN 1961a
Cobaltite in tin concentrate: SCRIVENOR 1926b
Columbite: SCRIVENOR 1911b; INGHAM 1947a; SERVICE 1948a
Conifer remains in chert: SCRIVENOR 1922, 1931a
Conodonts:
 Devonian of Perak: ALEXANDER and MÜLLER 1963
 Ordovician and Silurian of Langkawi: IGO and KOIKE 1966
 Trias of Kedah: ISHII and NOGAMI 1966
 Trias of Kelantan: IGO *et al.* 1965
Copper, native, in tin concentrates: SCRIVENOR 1910b, 1926b
Copper-ore: SCRIVENOR 1928; HILL, J.H. 1964
Corals
 Permian: NEWTON 1926; IGO 1964
 Silurian: THOMAS 1963; GOBBETT 1965a; BALL 1967
 Viséan: SCRIVENOR 1920; FITCH 1948; SMITH 1948; INGHAM and BRADFORD 1960
Correlation between Malaya and Burma: SCRIVENOR 1934
Corundum, in Kinta: DUNSTAN 1904, 1908; WILLBOURN 1931
Cretaceous plants: KON'NO 1966
Crinoids: NEWTON 1901b
 Permian: NEWTON 1926
 Viséan: FITCH 1948; OAKLEY 1948

Dam site
 Klang Gates: ALEXANDER and PROCTER 1955
Deep leads, Kinta: CAMERON 1924a; RASTALL 1927a (*see also* Kinta Valley, controversy over the geological succession)
Devonian
 conodonts: ALEXANDER and MÜLLER 1963
 correlation with Thailand and Yunnan: BURTON 1967a

- fossils from Kampar: GOBBETT 1966
 graptolites: JONES, C.R. 1967
 Kedah: BURTON 1967b
 trilobites from Perlis: KOBAYASHI and HAMADA 1966
- Diabase: SCRIVENOR 1907
- Diamond: RIDLEY 1891
- Diatoms, in Pleistocene ash: SCRIVENOR 1930b
- Dinding Schist: GOBBETT 1965a
- Dindings
 geology: SCRIVENOR and JONES 1919
 geomorphology: KOOPMANS 1964
- Dolerite: SCRIVENOR 1907
 dykes in granite: SCRIVENOR 1911c, 1922, 1946b; WILLBOURN 1926a;
 AMIES 1949
 Pahang, E.: FITCH 1952
 Pahang, NW.: RICHARDSON 1947g
 Selangor, N.: WILLBOURN 1941b; ROE 1947, 1953
 Trengganu: AMIES 1949
- Drainage pattern
 Pahang, E.: FITCH 1952
 Pahang, NW.: RICHARDSON 1947d
 Pahang, SW.: ALEXANDER, J.B. 1947a
- Earthquakes: LOGAN 1847a; RIDLEY 1894; WILLBOURN 1923, 1937
- Eastern clays and boulder clays: SCRIVENOR and JONES 1919
- Economic geology: SCRIVENOR 1928, 1935; ANON 1935; FERMOR 1949;
 PATON 1966 (*see also* Tin-ore and under mineral species)
- Economic rocks and minerals: WILLBOURN 1925b; INGHAM 1933; SCRIVENOR
 1931a
- Elephant teeth in alluvium: ANDREWS 1905; WILLBOURN 1937, 1938a
- Engineering geology, Singapore: SEHESTED 1960
- Enggor Coal Measures: SCRIVENOR 1917b; SERVICE and PATTERSON 1953a;
 ALEXANDER, J.B. 1956
- Epidiorite, N. Selangor: ROE 1939
- Epidote granite: FITCH 1940b; ROE 1940
- Erosion
 cliff fall: SCRIVENOR 1920
 river erosion in Pahang: SERVICE 1941
- Euxenite: SCRIVENOR 1920
- Ferberite: BRADFORD 1961
- Fluoborite: JOHNSTON and TILLEY 1940

- Flysch, Triassic: BEMMELEN 1949
- Foothills Formation: RICHARDSON 1946; ALEXANDER, J.B. 1956
- Foraminifera (other than Fusulinidae)
- Permian: CUMMINGS 1965; GOWDA 1965
- Fossil occurrences: SCRIVENOR 1926c, 1929c, 1931a; MUIR-WOOD 1948;
 WHITE 1962, 1963; JONES, C.R. *et al.* 1966; BALL 1967
- Fraser's Hill: ROE 1951
- Fuel resources: RENWICK and RISHWORTH 1966
- Fusulinidae
- Kelantan: CUMMINGS 1965
- Kinta: INGHAM and BRADFORD 1960; ISHII 1966b
- Pahang: IGO 1964; 1966; GOWDA 1965; ISHII 1966a
- Perlis: SCRIVENOR 1922; NEWTON 1926
- Gabbro
- Singapore: SCRIVENOR 1910e; HUTCHISON 1964
- Trengganu: AMIES 1949
- Gagau flora: KON'NO 1966
- Gagau Formation: ALEXANDER, J.B. 1959; PATON 1959; KOOPMANS 1966
 correlation with Khorat Series: KOBAYASHI 1964
 plants from: KON'NO 1966
- Gahnite: FLINTER 1963
- Galena
- Pahang: SAVAGE 1950a
- Perak: WRAY 1891
- Gambang mining field: FITCH 1941, 1952
- Gasteropoda
- Ordovician: KOBAYASHI 1958, 1959
- Silurian: GOBBETT 1965a
- Tertiary: COX 1937
- Triassic: NEWTON 1923
- Viséan: OAKLEY 1948
- Geochemical prospecting: TOOMS and KAEWBADHOON 1961
- Geological survey: WILLBOURN 1946; ALEXANDER, J.B. 1963
- Geomorphology
- Dindings: KOOPMANS 1964
- Johore, NE.: NOSSIN 1961a
- Kuantan area: NOSSIN 1964b
- limestone areas: RASTALL 1927b; GOBBETT 1965b
- Malaya: SCRIVENOR 1921b; RICHARDSON 1947d
- Older alluvium: BURTON 1964
- Pahang, NW.: RICHARDSON 1950

Geophysical prospecting

- airborne magnetometer and scintillation counter survey: AGOCS 1959-65, 1966
 possibilities in Malaya: EDGE 1930
 resistivity measurements: CHAN 1967

Gold

- alluvial gold controlled by joints: RICHARDSON 1951c
 associated with granite porphyry: WILLBOURN 1935; RICHARDSON 1950
 Batu Bersawah Mine, Negri Sembilan: WILLBOURN 1922b; RICHARDSON 1940b
 Bentong area: ALEXANDER, J.B. 1948
 central Pahang gold belt: SCRIVENOR 1911c; WILLBOURN 1934, 1935
 Chindrass mine: DALY 1882
 general distribution and mode of occurrence. SCRIVENOR 1904c, 1907, 1928, 1929e; WARNFORD-LOCK 1907; HILL 1964
 in muscovite-aplite: SERVICE 1940, 1947
 in quartz lodes: BECHER 1893; SCRIVENOR 1926b; RICHARDSON 1947c
 Kelantan: SAVAGE 1925; SCRIVENOR 1929a, 1931c
 Kuala Lipis: SERVICE 1940, 1947, 1949; SAVAGE 1949
 Malacca: SCRIVENOR 1927b
 Negri Sembilan: (*see* Batu Bersawah Mine)
 open cast gold mine: SAVAGE 1949
 Pahang, NW.: RICHARDSON 1950
 Perak, S.: WILLBOURN 1937; INGHAM 1938b
 Raub Mines: SCRIVENOR 1911c; LILBURNE 1933; WILLBOURN 1934, 1937, 1946; RICHARDSON 1938, 1939a,b, 1940c, 1947c
 Selingsing Mine: SCRIVENOR 1911c; RICHARDSON 1940a, 1950
 Tapah: SCRIVENOR 1912a, 1930a
 Tui valley, Pahang: SWAN 1900
 Upper Perak: SCRIVENOR 1915
- Gondwana rocks: SCRIVENOR 1911c
- Gopeng beds: SCRIVENOR 1911b, 1912c; 1931a, 1949; RASTALL 1927a; ALEXANDER, J.B. 1956; WALKER 1956; INGHAM and BRADFORD 1960
- Granite (*sensu lato*)
 compared to that of Indo-China: LACROIX 1933
 compared with other tin-bearing granites: SCRIVENOR and JONES 1919; WESTERVELD 1936
 contact at Sg. Lembing: FITCH 1947a
 coulisses: SCRIVENOR 1923a, 1931a
 hornblende-bearing: SCRIVENOR 1924a; WILLBOURN 1926a, 1927
 Johore: SCRIVENOR 1924a; WILLBOURN 1926a
 Kedah: WILLBOURN 1923
 Kinta: INGHAM and BRADFORD 1960

- Malacca: ALEXANDER, J.B. 1950
 mode of intrusion: ROE 1938
 Negri Sembilan: WILLBOURN 1922b
 Pahang, E.: FITCH 1952
 Pahang, NW.: RICHARDSON 1950
 pebbles in Triassic conglomerate: SMIT-SIBINGA 1940
 Perak, S.: INGHAM 1938b
 planar flow structure in: HUTCHISON 1963
 Pre-Mesozoic: SCRIVENOR 1910e, 1929c, 1934; WILLBOURN 1922a
 radiogenic ages: ALEXANDER, J.B. 1962b; SNELLING 1965, 1967;
 ANON 1966
 Raub area: RICHARDSON 1939b
 relation of coarse and fine-grained granite: ROE 1938
 rhombic pyroxene-bearing: SCRIVENOR 1909a
 Selangor: WILLBOURN 1922b; ROE 1938, 1940, 1951, 1953
 sheared: WILLBOURN 1932; ROE 1938
 Singapore: SCRIVENOR 1910e; ALEXANDER, F.E.S. 1950; HUTCHISON
 1964
 tourmalinization of: HUTCHISON 1963; HUTCHISON and LEOW 1963
 weathering: SCRIVENOR and JONES 1919
 Granite porphyry: WILLBOURN 1922b; RICHARDSON 1939b, 1950
 Graptolites: INGHAM and BRADFORD 1960; JONES, C.R. 1959, 1961a, 1967;
 BURTON 1967a
 Guano: WRAY 1894a; GREENSTREET 1926
 Gunong Bakau: SCRIVENOR 1914a, 1914d, 1916a; JONES, W.R. 1915b,
 1916a,b,c; SCRIVENOR and JONES 1916; INGHAM 1930; ROE 1938;
 ALEXANDER, J.B. 1941
 Gunong Benom: SCRIVENOR 1911c; STRUGNELL and WILLBOURN 1931;
 RICHARDSON 1939b; SERVICE 1947
 syenite: WILLBOURN 1935
 Gunong Kerbau (Riam): SCRIVENOR 1912b; SCRIVENOR and JONES 1919
 Gunong Tahan: SCRIVENOR 1908a, 1912b, 1915

 Haematite
 associated with kaolinized agglomerate: SHENTON 1936
 deposits: SCRIVENOR 1922
 pseudomorphing pyrite: HITCHEN 1929; SCRIVENOR 1929b
 Hand axes (*see* Artifacts)
 Hawthornden Schist: GOBBETT 1965a
 Heavy minerals
 from alluvium in E Pahang: FITCH 1952
 from granite in N Selangor: ROE 1940

- from quartzite in N Selangor: ROE 1940
 from quartzite in Pahang: ALEXANDER, J.B. 1950
 methods of separating: FLINTER 1960
- High-level alluvium (*see* Older alluvium)
- Hitam Tin Mine, Perak: ADAMS 1928
- Holocene coastal sediments: NOSSIN 1962, 1964b
- Hotsprings: BOTT 1891a; SCRIVENOR 1931a
 Kinta: INGHAM and BRADFORD 1960
 Malacca: BOTT 1891a; JONES, W.R. 1914; SCRIVENOR 1927b
 Pahang, W.: MACHADO 1900; ALEXANDER, J.B. 1948
 Selangor: BOTT 1891a; ROE 1939, 1951
 tin in: MEUNIER 1890; BOTT 1891a; JONES, W.R. 1914
 Upper Perak: WRAY 1886
- Hydroilmenite: FLINTER 1959b
- Ignimbrite: AW 1967; BURTON 1967e
- Ilmenite
 alteration products: HOCKIN 1957a; FLINTER 1959b
 Nb and Ta in: HOCKIN 1957b
- Iron-ore
 general distribution: SCRIVENOR 1928; INGHAM 1952; HILL, J.H. 1964
 geology of main deposits: ANON 1952; INGHAM 1952; BEAN 1962
 Johore: WILLBOURN 1923
 Pahang: SAVAGE 1950a; ALEXANDER, J.B. 1961
 Trengganu: SAVAGE 1928; FITCH 1949a
 Ulu Rompin: FITCH 1947a
- Jehoshaphat Mine, Kinta: SCRIVENOR 1905a
- Jenka Pass, Pahang:
 fossils from: ICHIKAWA *et al.* 1966; IGO 1966; ISHII 1966a
 unconformity at: ICHIKAWA *et al.* 1966
- Johore
 coastal sedimentation: NOSSIN 1962
 general geology: THOMSON 1851; LAKE 1894; WILLBOURN 1926a, 1928b
 potassic basic lava: GRUBB 1965
 recent clay pebbles: NOSSIN 1961b
 SE.: LOGAN 1848c
- Jugra Hill, Selangor: SCRIVENOR 1904b
- Kaolin: JONES, W.R. 1915a; SCRIVENOR and JONES 1919
 veins: SCRIVENOR 1918a
- Karang (*see* Tin-ore)

Kedah

- Carboniferous—Trias: KOBAYASHI 1963b
coastal islands: WARD 1833
general geology: WILLBOURN 1926b
stratigraphy and fossil localities: IGO and HAMADA 1964

Kedah Perak: SCRIVENOR 1920

Kelantan: SAVAGE 1925

- fossils: HADA 1966; ICHIKAWA and YIN 1966
general geology: LOW 1921; WILLBOURN 1923; SCRIVENOR 1924a, 1929a
ignimbrite: AW 1967
S.: RICHARDSON 1947f

Kelantan schist: HUTCHISON 1961a; ALEXANDER, J.B. 1962a

- controversy: ALEXANDER, J.B. *et al.* 1961; HUTCHISON 1961b;
ALEXANDER 1962a

Kenny Hill Formation: GOBBETT 1965a

Kinta Valley

- controversy over geological succession and nature of clays: JONES, W.R. 1915c, 1917, 1919, 1925a,b; SCRIVENOR 1918b,c, 1925a, 1926a; CAMERON 1924a, 1925a,b,c,d, 1926; MARRIOT 1927; RASTALL 1927ab, 1928; WILLBOURN 1937; (for summary *see* SCRIVENOR 1931a)

distribution of lode tin-ore: WILLBOURN 1924

early accounts of the geology: CROIX 1881, 1882, 1883; TENISON-WOODS 1885; MORGAN 1886; WRAY 1894-8

general geology: SCRIVENOR 1912c, 1913a; JONES, W.R. 1917; SCRIVENOR and JONES 1919; RASTALL 1927b, 1931; WILLBOURN 1933; SERVICE 1950a; INGHAM and BRADFORD 1960

gondwana clays: SCRIVENOR 1912c, 1914c

minerals and mineralization: SCRIVENOR 1911d, 1913a, 1914b, 1931b; SCRIVENOR and JONES 1919; ROMANG 1922; WILLBOURN 1932, 1933, 1934, 1935; INGHAM 1938a; JOHNSTON and TILLEY 1940; INGHAM and BRADFORD 1960

Klian Intan, tin-ore: SCRIVENOR 1915

Klang Gates, Selangor: ROE 1949; ALEXANDER, J.B. 1950; ALEXANDER and PROCTER 1955

Kramat Pulai Mine, Kinta: SCRIVENOR 1928; WILLBOURN and INGHAM 1933; WILLBOURN 1933, 1940, 1946; INGHAM and BRADFORD 1960

thorotungstite from: SCRIVENOR and SHENTON 1927; INGHAM 1949a; BEARD 1950

Kuala Lipis

- general geology: SERVICE 1940, 1947
Triassic fossils: SAVAGE 1950b

- Kuala Lumpur
 general geology: WILLBOURN 1922b; INDIA GEOLOGICAL SURVEY 1945b;
 INGHAM 1947b; SAVAGE 1948; GOBBETT 1965a
 mines: WILLBOURN 1934
 Silurian fossils: WHITE 1962; THOMAS 1963; BOUCOT *et al.* 1966
- Kuala Lumpur Limestone: GOBBETT 1965a
- Kuala Selangor, granite: ROE 1947
- Kuantan
 Gambang Mining Field: FITCH 1941, 1952
 general geology: FITCH 1940b, 1947a, 1948, 1949a, 1950, 1952
- Kuantan Group: ALEXANDER, J.B. 1959
- Lahat pipe, Kinta: SCRIVENOR 1905a, 1907, 1909b, 1909c; SCRIVENOR and
 JONES 1919
- Lamellibranchia
 Permian: NEWTON 1926
 Trias: NEWTON 1900, 1906, 1923, 1925; WEIR 1925; COX 1936;
 TOKUYAMA 1961; KOBAYASHI 1963a,b; KOBAYASHI *et al.* 1966;
 ICHIKAWA *et al.* 1966; ICHIKAWA and YIN 1966
 Viséan: OAKLEY 1948
- Landslides, Gunong Benom: STRUGNELL and WILLBOURN 1931
- Langkawi Islands: SCRIVENOR 1920; SCRIVENOR and WILLBOURN 1923;
 JONES, C.R. 1961a
 fossil localities: KOBAYASHI *et al.* 1964
 Ordovician fossils: KOBAYASHI 1959; IGO and KOIKE 1966
 Permian fossils: SAKAGAMI 1963
 Silurian fossils: KOBAYASHI *et al.* 1964; KOBAYASHI and HAMADA 1964;
 IGO and KOIKE 1966
 stratigraphy: JONES, C.R. 1961a; KOBAYASHI *et al.* 1964
 structure: KOBAYASHI *et al.* 1964; KOOPMANS 1965; KIMURA and
 JONES 1966
 stylolites: HUTCHISON 1963
 tourmaline greisenization: HUTCHISON 1963; HUTCHISON and LEOW
 1963
 Zn-Cu-Bi ore: SCRIVENOR 1924a
- Larut tin field: DOYLE 1879a; WRAY 1886, 1893b; HAMPTON 1899
- Laterite: SCRIVENOR 1909f,g, 1910c,d, 1929d, 1930c, 1931a, 1937; PANTON
 1956
 due to plutonic activity: LOGAN 1847a
 in Malacca: SCRIVENOR 1927b
 in Pahang: RICHARDSON 1947a
- Lead-ore: SCRIVENOR 1928; HILL, J.H. 1964

- Lignite: SCRIVENOR 1909b; RENWICK and RISHWORTH 1966
analyses: SCRIVENOR 1910a
Batu Arang, Selangor: DUNSTAN 1912; MCCALL 1922; DRYSDALE 1936
Johore: SCRIVENOR 1930a; SHENTON 1936
Perlis: SCRIVENOR 1920
Recent veins in Perak: INGHAM 1938a,b
Singapore: WILLBOURN 1937
- Limestone
contact metamorphism at Kanching, Selangor: SCRIVENOR and JONES 1919
dolomitic: RICHARDSON 1939a
graphitic: WRAY 1893a
Mg-enriched: WILLBOURN 1932
petrology: CUMMINGS 1965
- Limestone hills
distribution: PATON 1961; GOBBETT 1965b
geomorphology: GOBBETT 1965b
Kinta: ALLEN 1961
origin: SCRIVENOR 1907, 1911d; JONES, W.R. 1917; CAMERON 1925a;
RASTALL 1927a,b; RICHARDSON 1947d; PATON 1961, 1964
structure: SCRIVENOR 1922, 1931b; SCRIVENOR and JONES 1919
- Lipis Group: ALEXANDER, J.B. 1959
- Lithia mica: INGHAM 1947a
- Lower Palaeozoic: PATON 1957; ALEXANDER, J.B. 1959 (*see also* under Cambrian, Ordovician, Silurian)
Kuala Lumpur: GOBBETT 1965a
Langkawi: JONES, C.R. 1961a
- Machinchang Formation: ALEXANDER, J.B. 1959; JONES, C.R. 1961a;
KOBAYASHI *et al.* 1964.
- Mahang Formation: BURTON 1966b, 1967a
- Malacca: SCRIVENOR 1927b
laterite: SCRIVENOR 1909g, 1927b
- Malaya
early geological description: COLLET 1903
general geology: SCRIVENOR 1911a, 1913b, 1931a; PARK 1914;
PATON 1966
geological history: BEMMELEN 1949
geological map: SCRIVENOR 1927c
mineral resources: FERMOR 1940
- Mammalia, Pleistocene: ANDREWS 1905; HOOIJER 1963

Manganese-ore

general distribution: SCRIVENOR 1928; HILL, J.H. 1964

Kelantan: WILLBOURN 1938c; SAVAGE 1956b

Kinta: DUNSTAN 1913

Trengganu: SAVAGE 1928; WILLBOURN 1938c

Mercury-ore: HILL, J.H. 1964 (*see also* cinnabar)

Mesozoic orogeny

Pahang, NW.: RICHARDSON 1939a

Selangor, N.: ROE 1939

Metalliferous deposits: SCRIVENOR 1928; FERMOR 1949; HILL, J.H. 1964

Trengganu: SAVAGE 1928

Metamorphism, in N. Selangor: ROE 1939

Military geology: INDIA GEOLOGICAL SURVEY 1945a,b

Minerals

distribution: INGHAM 1949b; HILL, J.H. 1964

list of: WILLBOURN 1925b

Monazite

composition and physical properties: GREIG and SCRIVENOR 1924;

SCRIVENOR 1928; FLINTER *et al.* 1963

in concentrates: DUNSTAN 1905, 1906a,b, 1913, 1914a; GREIG and

SCRIVENOR 1924; INGHAM 1950c

in situ: SCRIVENOR 1915

uraniferous: FLINTER 1963b

Montmorillonite: ROE 1940

Monzonite: LACROIX 1933

Mount Ophir: WILLBOURN 1922b

Myophorian Sandstone: NEWTON 1900; ALEXANDER, J.B. 1956

age: WEIR 1925; JONES, C.R. *et al.* 1966; KOBAYASHI *et al.* 1966

Nautiloidea, Ordovician: KOBAYASHI 1958, 1959

Negri Sembilan, geology: WILLBOURN 1922b

Neolithic adze from Kinta: WILLBOURN 1938a

Nick points in NW Pahang: RICHARDSON 1947d

Nickel, in serpentine and amphibolite: RICHARDSON 1939a

Niobium-tantalum minerals: HOCKIN 1957b

Nitre, in limestone cave: SHENTON 1936

Obsidianites: (*see* tektites)

Oil: RENWICK and RISHWORTH 1966

in mangrove mud: SCRIVENOR 1911b

in shale at Bukit Arang, Perlis: SCRIVENOR 1913d

- in shale at Kepong, Johore: SHENTON 1936
 lack of economic deposits: SCRIVENOR 1913c; SAVAGE 1956a
- Older alluvium: SCRIVENOR 1949
 Johore and Singapore: WILLBOURN 1928b; SCRIVENOR 1929c; ALEX-
 ANDER, F.E.S. 1950; ALEXANDER, J.B. 1956; BURTON 1964
- Older Arenaceous Series: ALEXANDER, J.B. 1956
- Ordovician
 conodonts: IGO and KOIKE 1966
 gastropoda: KOBAYASHI 1958, 1959
 Langkawi: KOBAYASHI 1959; JONES, C.R. 1961a
 nautiloidea: KOBAYASHI 1958, 1959
- Orogeny: BEMMELEN 1949
 Palaeozoic: KOOPMANS 1965; BURTON 1966b
- Pahang
 age of Foothills Formation: WILLBOURN 1941b; RICHARDSON 1947;
 ALEXANDER, J.B. 1947a
 N. central, structure: KOOPMANS 1966
 NW.: RICHARDSON 1938, 1939a,b, 1940a, 1946, 1947f,g, 1950;
 SERVICE 1947
 NW., facies variation: RICHARDSON 1947f
 NW., volcanic activity: RICHARDSON 1947f
 SE.: THOMPSON 1851; SWINNEY 1891; WILLBOURN 1926c
 SW.: ALEXANDER, J.B. 1940, 1947a
 SW., mining: ALEXANDER, J.B. 1941
 SW., occurrence of tin-ore: ALEXANDER, J.B. 1949
 W. central: SAVAGE 1949
- Pahang Consolidated Co., Ltd. (*see* Sg. Lembing)
- Pahang delta: NOSSIN 1965a
- Pahang river, evolution: RICHARDSON 1947d
- Pahang Volcanic Series: SCRIVENOR 1907, 1911c, 1931a; WILLBOURN 1917,
 1925a, 1928b; SAVAGE 1925; RICHARDSON 1940a, 1950; ALEXANDER,
 J.B. 1956; KLOMPÉ *et al.* 1961
- Palaeontology, general: SCRIVENOR 1926c, 1929c, 1931a; MUIR-WOOD 1948;
 JONES, C.R. *et al.* 1966 (*see also* under geological systems)
- Palaeozoic orogeny: BEMMELEN 1949; KOOPMANS 1965; BURTON 1966b
- Panti Sandstone, plant fossils: KON'NO 1966
- Paton Conglomerate: ALEXANDER, J.B. 1962a
- Pelepah Kanan Mine, Johore: WILLBOURN 1937
 magnetic cassiterite from: GRUBB and HANNAFORD 1966a
- Penang: WARD 1833

Perak

central: SAVAGE 1937

early accounts: TENISON-WOODS 1885 (*see also* Kinta Valley, early accounts)

mines: WILLBOURN 1935; SHENTON 1936; SAVAGE 1937

S.: SCRIVENOR and JONES 1919; INGHAM 1938b

Upper Perak: SCRIVENOR 1915, 1922

Perak river, lower course of: KOOPMANS 1964

Perlis

fossil localities: IGO and HAMADA 1964

general geology: WILLBOURN 1926b

Ordovician fossils: KOBAYASHI 1958, 1959

stratigraphy: IGO and HAMADA 1964

Permian: ALEXANDER, J.B. 1956

foraminifera: NEWTON 1926; CUMMINGS 1965; GOWDA 1965; IGO 1966; ISHII 1966a,b

fossils from N. Pahang: SERVICE 1949; IGO 1964

fossils from Perlis: NEWTON 1926; WILLBOURN 1926b

plants: EDWARDS 1926

polyzoa from Langkawi: SAKAGAMI 1963

Petroleum (*see* oil)

Phosphate

analyses of cave deposits: GREENSTREET 1926

Kinta caves: DUNSTAN 1913

Perlis caves: WILLBOURN 1926b

Physical geology: SCRIVENOR 1923a 1931a

Plants

Cretaceous: KON'NO 1966

Permian: EDWARDS 1926

Trias: EDWARDS 1933

Viséan: FITCH 1948; EDWARDS 1948

Pleistocene: COLLINGS 1938

mammalia: ANDREWS 1905; HOOIJER 1963

sea-levels: SCRIVENOR 1949; BURTON 1964

Pleistocene or Recent volcanic ash: ALEXANDER, J.B. 1956

Pahang: WILLBOURN 1935, 1940; INGHAM 1939; RICHARDSON 1939b

siliceous bodies in: SCRIVENOR 1929a, 1930b, 1942, 1943, 1946a, 1949; OAKLEY 1940; WILLBOURN 1940

Sg. Perak: SCRIVENOR 1929a, 1929c, 1930b; WILLBOURN 1938a;

INGHAM 1939; WALKER 1962

Pokok Sena Formation: BURTON 1966b

Polyzoa

Permian: NEWTON 1926; SAKAGAMI 1963

Viséan: FITCH 1948; OAKLEY 1948

Potassic basic lava, Johore: GRUBB 1965

Pottery clay (*see* China clay)

Precambrian, Kelantan: HUTCHISON 1961a

Prospecting

geophysical: EDGE 1930; CHAN 1967

tin in soil: TOOMS and KAEWBADHOON 1961

Pulau Langkawi (*see* Langkawi Islands)

Pulau Pisang, Johore: SCRIVENOR 1916b

Pulau Tinggi, Johore: SCRIVENOR 1924a; WILLBOURN 1927

Pulau Tioman: WILLBOURN 1927

Pulau Ubin: LOGAN 1849b

Quartz dykes

economic use: SCRIVENOR 1926b; WILLBOURN 1928a

impurities in: SCRIVENOR 1926b

Klang Gates: ROE 1949; ALEXANDER and PROCTER 1955; REID 1961

Quartz porphyry

Pahang, NW.: RICHARDSON 1939b, 1950; SERVICE 1947

Sg. Siput N.: WILLBOURN 1933, 1934; SAVAGE 1937

volcanic nature of: BURTON 1967e

Quartz-topaz rock: SCRIVENOR 1912a, 1914a, 1914d; INGHAM 1930

origin: JONES, W.R. 1915b, 1916a; SCRIVENOR 1914d, 1919; INGHAM 1930

Quartzite and Shale Series: SAVAGE 1925; ALEXANDER, J.B. 1956; NOSSIN 1961a

Quartzites and Schists Formation: CAMERON 1924; ALEXANDER, J.B. 1956

Quaternary (*see also* Pleistocene)

mollusca: INGHAM 1939

Perak: WALKER 1956

Radioactive minerals: FLINTER 1963b

Radiogenic ages: ALEXANDER, J.B. 1962b; SNELLING 1965, 1967; ANON 1966

Radiolarian chert: SCRIVENOR 1911c, 1912d, 1923, 1929f, 1931a

pebbles in Tembeling Series: SCRIVENOR 1908a

Trias of Kedah: WILLBOURN 1926b

Rahman Hydraulic Mines: HARRIS 1924

- Raised beaches: SCRIVENOR 1921b; FITCH 1948, 1949b; WALKER 1956;
NOSSIN 1964a (*see also* Beach ridges)
Telok Anson: SCRIVENOR 1912a
- Rantau Panjang coal measures (*see* Batu Arang coalfield)
- Raub Group: ALEXANDER, J.B. 1959
- Raub mines (*see* Gold)
- Recent volcanic ash (*see* Pleistocene)
- Resistivity measurements in alluvium: CHAN 1967
- Rhyolite (*see also* Pahang Volcanic Series)
columnar: SCRIVENOR 1922
Kuantan: FITCH 1947a
Johore: SCRIVENOR 1924a
Pulau Tioman and neighbouring islands: WILLBOURN 1927
- River systems: RICHARDSON 1947d
- River terraces
Kuantan: FITCH 1949b
Pahang, NW.: RICHARDSON 1947d
- Sand movement, E. coast: HILL, R.D. 1966
- Scheelite: WRAY 1894b; EVANS 1909; SCRIVENOR 1917a; RASTALL 1918;
JONES, W.R. 1920; WILLBOURN 1933, 1940; WILLBOURN and INGHAM
1933; ROE 1947; BRADFORD 1961 (*see also* Kramat Pulai Mine)
- Sea-levels: WRAY 1886; SCRIVENOR 1946a; FITCH 1949b; WALKER 1956;
NOSSIN 1961a, 1962
- Sedimentation
Recent in the Dindings: KOOPMANS 1964
Recent in Johore: NOSSIN 1962
- Selangor
mines: SHENTON 1936; INGHAM 1938a; ROE 1939, 1951, 1953
N.: SCRIVENOR 1914a; SCRIVENOR and JONES 1919; ROE 1938, 1939,
1940, 1947, 1948, 1949, 1951, 1953
S.: WILLBOURN 1922b
- Selangor Coal Measures: ALEXANDER, J.B. 1956
- Semanggol Formation: ALEXANDER, J.B. 1959
- Serpentine: SCRIVENOR 1907; WILLBOURN 1922b
economic use: SCRIVENOR 1905a; ALEXANDER, J.B. 1948
Mount Ophir: WILLBOURN 1933
origin: RICHARDSON 1938; KLOMPÉ *et al.* 1961
Raub area: RICHARDSON 1938, 1939b
- Setul Formation: ALEXANDER, J.B. 1959; JONES, C.R. 1961a, 1965;
KOBAYASHI *et al.* 1964; BURTON 1967a

- fauna: KOBAYASHI 1958, 1959; KOBAYASHI and HAMADA 1964;
KOBAYASHI *et al.* 1964; IGO and KOIKE 1966
- Siliceous sinter: WRAY 1886
- Silurian
- correlation with Thailand and Yunnan: BURTON 1967a
- fossils: THOMAS 1963; KOBAYASHI and HAMADA 1964; KOBAYASHI
et al. 1964; GOBBETT 1965a; BOUCOT *et al.* 1966; IGO and KOIKE
1966; BALL 1967
- Kedah: BURTON 1967a,b
- Langkawi: JONES, C.R. 1961a
- Singa Formation: KOBAYASHI *et al.* 1964; KOOPMANS 1965
- Singapore: LOGAN 1851; SCRIVENOR 1908b; ALEXANDER, F.E.S. 1950;
SEHESTED 1960
- cassiterite in granite: SCRIVENOR 1906
- fossils: SCRIVENOR 1906; NEWTON 1906, 1923
- igneous rocks: SCRIVENOR 1909a, 1910e; HOLLIS-BEE 1959; HUTCHISON
1964
- Soils, in relation to rock type: SAVAGE and WILSHAW 1932; PANTON 1965
- Sphalerite, Langkawi: WILLBOURN 1923
- Sponge spicules in Pleistocene ash: SCRIVENOR 1930b
- Sri Medan Iron Mine: SHENTON 1936
- Stannite: BRADFORD 1961
- Johore: WILLBOURN 1938a; SANTOKH SINGH and BEAN 1967
- Selangor: HOCKIN 1957c
- Stibnite: SAVAGE 1950a
- Stilbite: ROE 1940
- associated with gold in Ulu Pahang: SCRIVENOR 1911c
- Stolzite: INGHAM 1950a; BRADFORD 1961
- Stratigraphy, of Malaya: SCRIVENOR 1925b, 1931a; WILLBOURN 1926c;
ALEXANDER, J.B. 1956, 1959; JONES, C.R. 1961b
- Structure
- Langkawi: KOBAYASHI *et al.* 1964; KOOPMANS 1965; KIMURA and
JONES 1966
- Malaya: SCRIVENOR 1923a; WILLBOURN 1926c; BURTON 1965
- Pahang, N.: KOOPMANS 1966
- Struverite: DUNSTAN 1911b; CROOK and JOHNSTONE 1912; SCRIVENOR
1912e; FLINTER 1959a, 1964
- Stylolites, Langkawi: HUTCHISON 1963
- Subsurface geology
- Pahang: WILLBOURN 1941b
- W. coast: WRAY 1886; WILLBOURN 1940, 1941b; ROE 1949

- Sg. Lembing Mines: STEPHENS 1901; SCRIVENOR 1905a; FITCH 1940b, 1947b, 1952
 banded shale at: FERMOR 1939b; FITCH 1940b
 occurrence of lodes: FITCH 1949a
- Sg. Siput N., Perak: WILLBOURN 1932, 1933, 1934; SAVAGE 1937
- Syenite
 Gunong Benom: WILLBOURN 1935
 Johore, E. islands: WILLBOURN 1927
 Pahang, NW.: RICHARDSON 1940a, 1950
 sill at Pekan Jabi, Johore: GRUBB 1965
- Taku Schist (*see* Kelantan Schist)
- Tantalum-niobium minerals: HOCKIN 1957b
- Tekka Clays: RASTALL 1927a; SCRIVENOR 1931a; ALEXANDER, J.B. 1956; WALKER 1956; INGHAM and BRADFORD 1960
- Tektites: SCRIVENOR 1907, 1909e, 1916c, 1931a; PRIOR 1927; LACROIX 1932, SHENTON 1936
- Temangan
 ignimbrite: AW 1967
 Iron Mine: INGHAM 1938a
- Tembeling Series: SCRIVENOR 1907, 1908a,b; ALEXANDER, J.B. 1956; KOOPMANS 1966
- Temerloh Limestone: GOWDA 1965
- Tentaculitids: BURTON 1967a,b
- Tertiary: SCRIVENOR 1931a; ALEXANDER, J.B. 1956
 gastropods: COX 1937
 Johore: COX 1937
 Perlis: WILLBOURN 1926b
 volcanics: WILLBOURN 1925a; GRUBB 1965
- Thorotungstite: SCRIVENOR and SHENTON 1927; BEARD 1950
- Tin mines (*see also* under states)
 Kinta: INGHAM and BRADFORD 1960
 lode mines in Kinta: JONES, W.R. 1915b; WILLBOURN 1924; INGHAM and BRADFORD 1960
 review of: FAWNS 1905; SCRIVENOR 1907, 1928; PENZER 1921
- Tin-ore
 alluvial ore at limestone-granite contact: INGHAM 1949c
 analyses: DUNSTAN 1908, 1911a
 beneath thick alluvium: INGHAM 1939; WILLBOURN 1946
 compared to that of Indo-China: LACROIX 1933
 comprehensive survey of: BRADFORD 1961

- general distribution: HILL, J.H. 1964
geochemical prospecting for: TOOMS and KAEWBADHOON 1961
geophysical prospecting for: EDGE 1930; CHAN 1967
in beach sand: SCRIVENOR 1910a
in caves: TENSION-WOODS 1884b; SCRIVENOR 1913d; SCRIVENOR and JONES 1919; JONES, C.R. 1965
in soil: TOOMS and KAEWBADHOON 1961
Johore: WILLBOURN 1923
Kelantan: SCRIVENOR 1931c
Kinta: PENROSE 1903
Larut: WRAY 1893b
lodes: SCRIVENOR 1907, 1909b, 1910a; JONES, W.R. 1915b
lodes in Kinta: WILLBOURN 1924
lodes in limestone: SCRIVENOR 1914b
occurrence: CROIX 1882; WARNFORD-LOCK 1907; SCRIVENOR 1905a, 1909b, 1910a, 1911d; WARNFORD-LOCK 1907; DUNSTAN 1914b; JONES, W.R. 1925c; ADAMS 1928; SERVICE and PATTERSON 1953d
origin: TENSION-WOODS 1884a; PENROSE 1903; SCRIVENOR and JONES 1919
origin of alluvial ore: TENSION-WOODS 1884a; SCRIVENOR 1905a
Perak, S.: NIGHTINGALE 1908; SCRIVENOR and JONES 1919
Selangor, N.: NIGHTINGALE 1908; SCRIVENOR and JONES 1919
Sg. Siput, N.: WILLBOURN 1933
Trengganu: SAVAGE 1928; SCRIVENOR 1931c
Ulu Pahang: SCRIVENOR 1911c
- Topaz rock (*see* Quartz-topaz rock)
- Torbernite: ROE 1939; INGHAM 1950c; FLINTER 1963b
- Tourmaline
greisenization: WILLBOURN 1916; HUTCHISON and LEOW 1963
in granite and schist, Kuala Lumpur: SAVAGE 1948
- Tourmaline-corundum rock: SCRIVENOR 1910f, 1913a, 1929a, 1931a,b; SCRIVENOR and JONES 1919; WILLBOURN 1931, 1935; ALEXANDER, J.B. 1956; INGHAM and BRADFORD 1960
- Trengganu
fossils: WHITE 1963
general geology: AMIES 1949
metalliferous deposits: SAVAGE 1928; AMIES 1949; FITCH 1949a
- Triassic: ALEXANDER, J.B. 1956; KOBAYASHI *et al.* 1966
ammonoidea: NEWTON 1923, 1925; SAVAGE 1949, 1950a,b; KUMMEL 1960; SATO 1963; HADA 1966
brachiopoda: NEWTON 1923
conodonts: IGO *et al.* 1965; ISHII and NOGAMI 1966

- fish: SCRIVENOR 1905a; SERVICE 1949
 fossils: KOBAYASHI *et al.* 1966
 gastropoda: NEWTON 1923
 Kedah: KOBAYASHI 1963b; KOBAYASHI *et al.* 1966
 lamellibranchia: NEWTON 1900, 1906, 1923, 1925; JONES, T.R. 1905;
 WILLBOURN 1923; WEIR 1925; SCRIVENOR 1930a; COX 1936;
 INGHAM 1939; SAVAGE 1950a,b; TOKUYAMA 1961; KOBAYASHI
 1963a,b; ICHIKAWA *et al.* 1966; ICHIKAWA and YIN 1966; KOBAYASHI
et al. 1966
 Pahang NW.: SERVICE 1947
 plants: EDWARDS 1933; ICHIKAWA *et al.* 1966
- Trilobita
 Devonian-Carboniferous: KOBAYASHI and HAMADA 1966
 Silurian: KOBAYASHI and HAMADA 1964
 Viséan: FITCH 1940b, 1948; STUBBLEFIELD 1948
- Tronoh Mine, Kinta: SCRIVENOR 1905a
 Tufa, Sg. Siput N.: WILLBOURN 1933
 Tungstates, Kramat Pulai Mine: INGHAM 1949a
 Tungsten-ore: SCRIVENOR 1928; BRADFORD 1961; (*see also* Scheelite and
 Wolframite)
 Tungstite: BRADFORD 1961
- Uranothorite: FLINTER 1963b
- Varlamoffite: BRADFORD 1961; ALEXANDER and FLINTER 1965; SANTOKH
 SINGH and BEAN 1967
- Varves: FERMOR 1939b
 Viséan of the Kuantan area: FITCH 1952
 Volcanic rocks (*see also* Pahang Volcanic Series)
 Johore: WILLBOURN 1926a; GRUBB 1965
- Water supply
 artesian: SCRIVENOR 1911f
 Bentong area: ALEXANDER, J.B. 1948
 Kuala Lumpur: INDIA GEOLOGICAL SURVEY 1945b
 west coast: INDIA GEOLOGICAL SURVEY 1945a
- Weathering: SCRIVENOR 1930c, 1931a; HELLSTROM 1941; ERHART 1954;
 PANTON 1965
 basalt: NOSSIN 1964b
 black shale: INGHAM 1938b; BURTON 1966a
 granite: ALEXANDER, F.E.S. 1950; NOSSIN 1964b

- igneous rocks of Pulau Ubin: LOGAN 1849b
ilmenite: FLINTER 1959b
Kuantan area: NOSSIN 1964b
Older alluvium: BURTON 1964
Quartzite and Shale Series: NOSSIN 1961a
sediments in N. Selangor: ROE 1940
Singapore: LOGAN 1851; ALEXANDER, F.E.S. 1950, 1958, 1959
spheroidal: LEOW 1963
- Western Boulder Clays: SCRIVENOR and JONES 1919; RASTALL 1927a;
WILLBOURN 1937; ALEXANDER, J.B. 1956; WALKER 1956; INGHAM
and BRADFORD 1960
- Wolframite: SCRIVENOR 1917a; RASTALL 1918; JONES, W.R. 1920;
BRADFORD 1961
- Bt. Kachi, Kedah: SCRIVENOR 1924a
Bt. Rutoh: BRELICH 1914
Manchis, Pahang: ALEXANDER, J.B. 1940, 1948
Perak: WRAY 1894b; EVANS 1909
Selangor: ROE 1940, 1947
Trengganu: SAVAGE 1928; SCRIVENOR 1931c; SERVICE 1950b
- Wrench faulting: BURTON 1965, 1967d,e; PROCTER and JONES 1967
- Younger alluvium: ALEXANDER, J.B. 1956
Younger Arenaceous Series: ALEXANDER, J.B. 1956
Yttrotungstite: BEARD 1950; BRADFORD 1961
- Zinc-ore: HILL, J.H. 1964

Appendix I: Unpublished Works

This incomplete list includes reports, theses, and other manuscripts which may be cyclostyled and have a limited distribution but cannot be regarded as published. It also includes manuscripts being edited for publication as Memoirs or Map Bulletins of the Geological Survey Department, West Malaysia, for a list of which I am indebted to E. H. Yin.

ALEXANDER, J.B.

- 1952MS The geology and mineral resources of the neighbourhood of Bentong, Pahang, Federation of Malaya. To be published as *Mem. geol. Surv. Dep. W. Malaysia*, **8**.
- 1957MS The joint geological survey of the Malaya-Thailand border area. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E58.4G**, 7p.
- 1958MS The prospects for petroleum in the Federation of Malaya. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E59.3R**, 2p.
- 1960MSa Progress of geological survey and related activities in the Federation of Malaya since August 1957. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E60.1X**, 10p.
- 1960MSb Prospecting for uranium and other radioactive minerals in Malaya. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E60.2R**, 5p.
- 1960MSc Engineering geology in Malaya. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E60.4S**, 4p.
- 1960MSd The airborne magnetometer and scintillation counter survey in Malaya. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E60.5P**, 5p.
- 1960MSe *Survey of underground water resources in the Federation of Malaya*. 6p., 4 figs., 1 tab., 2 maps, 1:5.5M. Ipoh: Geological Survey Department, Federation of Malaya.
- 1961MS A review of the organisation of science and technology in Malaya. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E61.9X**, 17p.

ALEXANDER, J.B. and JONES, C.R.

- 1961MS News Bulletin Supplement 1961. Palaeontological information. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E61.8G**, 4p.

ANONYMOUS

- 1960MS Coal deposits at Batu Arang. Notes prepared for future use on account of the cessation of operations by Malayan Collieries Ltd. Mines. Dep. 140/46/169/(21).

AW, P.C.

- 1964MS *The geology of the Temangan-Sokor area, Kelantan*. Honours thesis, Department of Geology, University of Malaya.

BEAN, J.H.

- 1962MS A brief account of the iron-ore deposits of Malaya. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E62.8D**, 14p., 5 figs.
- 1966MS Geology and mineral resources of Pulau Tioman. To be published as *Map Bull. geol. Surv. Dep. W. Malaysia*, **111**.

BRADFORD, E.F.

- 1962MS Regional geochemistry in Malaya. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E62.6C**, 16p.
- 1965MS Geology and mineral resources of the Gunong Jerai area, Kedah, Malaya. To be published as *Mem. geol. Surv. Dep. W. Malaysia*, **13**.

BURTON, C.K.

- 1959MS *A note on the geology of the tin and iron-bearing deposits located near Sungei Pelepah Kanan, District of Kota Tinggi, Johore*, 14p., 11 pls., 1 fig., 2 geol maps 1:760,320 and 1:25,344. Ipoh: Geological Survey Department.
- 1962MS Geology and mineral resources of the Johore Bahru area, Johore. To be published as *Map Bull. geol. Surv. Dep. W. Malaysia*, **130**.
- 1963MS 1962 progress report on geological survey work done in the area of sheet 2I/8 in south Kedah and a review of the geology of sheet 130 in south Johore. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E63.2G**, 1-6.

- 1965MSa 1963 progress report on geological survey work done in the area of sheet 2I/8 in southeastern Kedah and upper Perak. *Prof. Pap. geol. Surv. Fed. Malaya*, **E65.1G**, 1-4, 1 map 1 : 253,440.
- 1965MSb 1964 progress report on geological survey work done in the area of sheet 2I/7 in Kedah. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E65.2G**, 1-4, 1 map 1 : 253,440.
- 1965MSc Geology and mineral resources of the Bedong area, Kedah, Malaya. To be published as *Map Bull. geol. Surv. Dep. W. Malaysia*, **2I/7**.
- 1965MSd Geology and mineral resources of the Baling area, Kedah, Malaya. To be published as *Map Bull. geol. Surv. Dep. W. Malaysia*, **2I/8**.
- CHAND, F.
- 1965MS A review of the geology of sheet 61 in Trengganu. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E65.2G**, 5-6.
- CHIN, F.
- 1965MS *The Upper Triassic sediments of Pasir Panjang—Jurong area of Singapore*. Honours thesis, Department of Geology, University of Malaya.
- CHUNG, S.K.
- 1962MS Geology and mineral resources of south central Trengganu. To be published as *Map Bull. geol. Surv. Dep. W. Malaysia*, **48**, **51**.
- COURTIER, D.B.
- 1962MSa Note on terraces and other alluvial features in parts of Province Wellesley, south Kedah, and north Perak. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E62.1-T**, 6p., 3 figs.
- 1962MSb Geology and mineral resources of the Kulim area, Kedah, Malaya. To be published as *Map Bull. geol. Surv. Dep. W. Malaysia*, **2I/10**, **2I/11**, **2I/12**.
- DRUMMOND, P.V.O.
- 1963MS 1962 progress report on geological survey work done on the area of sheet 131 in south Johore. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E63.2G**, 28-32, 1 map 1 : 253,440.
- FERMOR, L.L.
- 1950MS *Report on coal and iron-ore studies*. Bangkok E.C.A.F.E.

FINOCANE, K.J.

- 1954MS *Geological report on the Raub Australian Gold Mine, Raub, Pahang.*

FOO, K.Y.

- 1964MS *Geology of the north central region of Pulau Langkawi.* Honours thesis, Department of Geology, University of Malaya.
- 1965MS 1964 progress report on Geological survey work done in north Perak. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E65.2G**, 7-9, 1 map 1 : 253,440.

FOO, Y.H.

- MS *Geology and mineral resources of the Kuala Lipis area, Pahang.* To be published as *Map Bull. geol. Surv. Dep. W. Malaysia* **20/13**, **20/14**.

GOPINATHAN, B.

- 1965MS *The geology of the Mahang district, Kulim, Kedah.* Honours thesis, Department of Geology, University of Malaya.

GRUBB, P.L.C.

- 1962MS *The geology and bauxite deposits of south-east Johore.* Ipoh: Geological Survey Department.
- 1963MS *Geology and mineral resources of the Pengerang area, Johore.* To be published as *Map Bull. geol. Surv. Dep. W. Malaysia*, **135**.

HUTCHISON, C.S.

- 1966MS *Tectonic and petrological relations within three rock associations of orogenic zones in Malaysia.* Ph.D. Thesis, University of Malaya.

JA'AFAR b. AHMAD

- 1960MS *The geology of Serendah area, Selangor.* Honours thesis, Department of Geology, University of Malaya.
- 1963MS 1962 progress report on geological survey work done in west Pahang. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E63.2G**, 18-19.
- 1965MSa 1963 progress report of geological survey work in western Pahang. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E65.1G**, 11-14.
- 1965MSb Annual report on regional mapping 1964 in Pahang. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E65.2G**, 10-12.

- 1966MS Geology and mineral resources of the area between Gunong Benom and Karak, Pahang. To be published as *Map Bull. geol. Surv. Dep. W. Malaysia* **3C/1**, **3C/5**, **3C/9**.

JONES, C.R.

- 1963MS 1962 progress report on geological survey work done in upper Perak. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E63.2G**, 7-12.
- 1965MSa A preliminary account of the results obtained during the combined mapping project (project Dip) on sheet 47 in southern Kelantan. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E65.1G**, 27-9.
- 1965MSb Recent advances in the interpretation of the geology of the Langkawi Islands sheet 150. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E65.1G**, 30-1.
- 1966MSa Geology and mineral resources of the area covered by Operation Dip. To be published as *Map Bull. geol. Surv. Dep. W. Malaysia*, **47**.
- 1966MSb Geology and mineral resources of the area covered by Operation Sat. To be published as *Map Bull. geol. Surv. Dep. W. Malaysia*, **59**.
- 1966MSc Geology and mineral resources of Perlis, north Kedah and the Langkawi Islands, Malaya. To be published as *Mem. geol. Surv. Dep. W. Malaysia*, **11**.
- MS Geology and mineral resources of the Grik area, Perak, Malaya. To be published as *Map Bull. geol. Surv. Dep. W. Malaysia*, **2J/9**.

JONES, W.R.

- 1913MS *Preliminary report of mining in the main granite range, Federated Malay States.*

KEE, T.M.

- 1966MS *Geology of Gunong Panti area, southern Johore, West Malaysia.* Honours thesis, Department of Geology, University of Malaya.

KOOPMANS, B.N.

- 1966MS *Aerial photograph interpretation of the Gunong Benom area.* Geology Department, University of Malaya.

LAW, W.M.

- 1961MS *The Batu Arang coalfield, Selangor.* Honours thesis, Department of Geology, University of Malaya.

LEDGERWOOD, E.

- 1961MS *Short geological report on the Muda River Project (irrigation)*, 16p., 19 figs. Ipoh: Geological Survey Department.
- 1963MS Some notes on the humid tropical weathering of granite and associated rocks in the Cameron Highlands area, Federation of Malaya. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E63.1G**, 21p, annexes A-H.

LENK-CHEVITCH, P.

- 1956MS Hydrological investigations of the western coastal belt of Malaya. *U.N. Report TAO/MAL/4*, 26 March 1956.
- 1959MS Geohydrological exploration of the coastal belt of Malaya. *U.N. Report TAO/MAL/8*. 12 May 1959.

MACANDIE, A.G. and CANAVAN, F.

- 1948MS *The iron-ore and manganese-ore deposits of Malaya*, 78p. Appendices A-D, 10 figs. Melbourne: Broken Hill Pty. Co. Ltd.

MACDONALD, S.

- 1956MS The geology and mineral resources of north Kelantan and north Trengganu. To be published as *Mem. geol. Surv. Dep. W. Malaysia*, **10**.
- 1959MS *Geology and mineral resources of part of south Pahang.* Ipoh: Geological Survey Department.

MAKOWIECKI, L.Z. and MASSON-SMITH, D.

- 1957MS *Report on a geophysical survey in Malaya.* London: Overseas Geological Survey.

MISKIN bin F. MOHAMMED

- 1964MS *The geology of Kuah and the surrounding areas, Pulau Langkawi.* Honours thesis, Department of Geology, University of Malaya.

MOHAMMAD b. AYOB

- 1965MS *Studies in bedrock geology and sedimentology of Quaternary sediments of Sungei Besi Tin Mines, Selangor.* Honours thesis, Department of Geology, University of Malaya.

MURUGIAH, S.

- 1965MS 1963 progress report on geological survey work done in the area of sheet 2M/4 in central Perak. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E65.1G**, 5-6.

PARAMANANTHAN, S.

- 1964MS *The geology of the Gunung Jerai massif, south-west Kedah*. Honours thesis, Department of Geology, University of Malaya.

PATON

- 1958MS *The intermediate, extrusive, and dyke rocks of central Trengganu*. Ipoh: Geological Survey Department.

PROCTER, W.D.

- 1960MS Geology and mineral resources of the area covered by Operation Col. To be published as *Map Bull. geol. Surv. Dep. W. Malaysia*, **79/88**.
- 1967MS *Project Col. A note on the fossil localities*. Ipoh: Geological Survey Department.

RENWICK, A.

- 1962MSa *Preliminary geological report on the area of the Batang Padang Hydroelectric Scheme*, 27p. 1 map 1:31,680. Ipoh: Geological Survey Department.
- 1962MSb Geohydrological investigations in the western coastal plain of Malaya. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E62.4W**, 8p.

RISHWORTH, D.E.H.

- 1963MSa 1962 progress report of geological survey work at the Malacca office. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E63.2G**, 20-7.
- 1963MSb Geology of Malacca and south Negri Sembilan. To be published as *Map Bull. geol. Surv. Dep. W. Malaysia*, **112**, **113**.
- 1965MSa 1963 progress report on geological survey work done in southern Johore. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E65.1G**, 15-19, 1 map 1:158,400.
- 1965MSb 1963 progress report of geological survey work at the Malacca office. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E65.1G**, 20-6, 1 map 1:253,440.

- 1965MSc 1964 progress report of geological survey work at the Johore Bahru office. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E65.2G**, 13-15, 1 map 1 : 253,440.

ROE, F.W.

- 1941MS *Deposits of tin-ore and iron-ore at Pelepah Kanan, Kota Tinggi, Johore*. Ipoh: Geological Survey Department.

SANTOKH SINGH, D.

- 1963MS 1962 progress report on geological survey work done in the area of sheet 34 in Kelantan. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E63.2G**, 13-17.

SERVICE, H.

- 1956MS *Geological report on Cameron Highlands Hydro-Electric Scheme, Stage 1*.

SERVICE, H. and PROCTER, W.D.

- 1958MS Geology and mineral resources of the Benta area, Pahang. To be published as *Map Bull. geol. Surv. Dep. W. Malaysia*, **2N/16**.

SHU, Y.K.

- 1966MS *Report on Kuala Lumpur water supply scheme*. Ipoh: Geological Survey Department.

SUNTHARALINGAM, T.

- 1966MS *Stratigraphy and palaeontology of the area west of Kampar, Perak, West Malaysia*. Honours thesis, Department of Geology, University of Malaya.

TOONG, K.S.

- 1965MS 1964 progress report of geological survey work done in the Kinta Valley in topographical sheet 2N/9. *Prof. Pap. geol. Surv. Dep. Fed. Malaya*, **E65.2G**, 16-19, 1 map 1 : 63,360.

UCHINO

- 1955MS *Report on the geology of the deposits of Temangan Iron Mine*.

WILLBOURN, E.S.

- 1936MS *Deposit of tin-ore in iron-ore prospected by the Ishihara Sangyo Koshi, at Pelepah Kanan, Kota Tinggi, Johore*. Ipoh: Geological Survey Department.