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# GEOLOGICAL NOTES

## Serpentinite occurrence at Telok Mas, Malacca.

K.K. Khoo, Geological Survey Federal Headquarters, Kuala Lumpur.

### Introduction

Recently, the writer examined a drill-core (size: NX) sample submitted by the Jabatan Kerja Raya, Kuala Lumpur. Two holes were drilled in connection with foundation studies for the proposed extension of the Henry Gurney School. The locality drilled is approximately 7 miles (11 km) southeast by road from Malacca town (see Fig. 1). Only one drill hole hit bedrock at 100 feet 2 inches and the other was unbottomed at 121 feet 6 inches. The drill core sample that was submitted to the writer for examination was taken from somewhere between 100 feet 2 inches and 101 feet 2 inches. The hole stopped at 101 feet 8 inches with approximately 67% recovery.

An examination of the drill-logs for both the holes revealed the presence of a fairly thick (approximately 18 m) cover of "dark brown" and "reddish- to purplish-brown" soil. Soils of similar colours are generally found mantling serpentinite.

### Description

The rock is yellowish-green with fine bands of opaque iron oxide and brownish iron-stained quartz. Poorly-developed schistosity is apparent in the hand specimen but this feature is obscure in thin section. A small hand magnet applied to that part of the rock with higher concentrations of iron oxide reveals that the rock is strongly magnetic.

Microscopic examination of thin sections shows that the rock is predominantly composed of flaky serpentine (antigorite) traversed by later veinlets of microcrystalline quartz. A larger veinlet has microcrystalline quartz lining the outer margins whereas its centre is occupied by microspherulites of chalcedony. Subhedral to anhedral magnetite crystals exhibit a preferential alignment. Some of the larger magnetite crystals are observed to have cores of fractured brown translucent chromite which are isotropic under crossed nicols. Plate 1 shows subhedral magnetite crystals (dark) in a groundmass of antigorite.

### X-ray diffraction studies

X-ray diffraction studies were carried out on a smear mount of

the powdered rock to confirm the presence of antigorite noted in thin section. Scanning was carried out from $3^{o}$ to $52^{o}$ using $CuK_{\alpha}$ radiation. Potassium bromate was used as an internal standard. The following settings were used during the experiment: power 40kV, 20mA; scanning speed $\frac{1}{2}^{o}$/min; chart speed 5 x 240 (1,200 mm/hr); ratemeter setting 4 x $10^{2}$; time constant 1 second.

The results show three distinct peaks at the following 2θ angles, and, using the potassium bromate peaks for correction, the d-spacings were obtained as shown in Table 1 below.

Table 1

| 2θ | d-spacing | Relative Intensity |
|---|---|---|
| $12.120^{o}$ | 7.30 Å | Strong |
| $24.543^{o}$ | 3.62 Å | Medium |
| $35.575^{o}$ | 2.52 Å | Weak |

From the JCPDS file, the d-spacings for the 3 most intense peaks of antigorite (6M) in decreasing order of intensity are 7.30 Å, 3.63 Å and 2.52 Å. This confirms the thin section examination that antigorite is the serpentine mineral present in the rock. Two minor peaks for quartz are also noted as quartz also occurs in the rock as veinlets. The third peak at 2.52 Å d-spacing also coincides with the most intense peaks of magnetite and chromite. In order to show that the third peak is contributed by antigorite, a crude attempt was made using a hand magnet to sift through the powdered rock thereby removing the magnetite and chromite inclusions. The experiment was repeated using a fresh smear mount from this "magnetite-chromite-free" powder. The results are similar except that the 2.52 Å peak was somewhat attenuated, indicating that antigorite is still influencing the 2.52 Å peak.

Polished section studies

Two polished sections were made of that portion of the rock with the highest concentration of opaque minerals. Magnetite is seen marginally replacing earlier chromite. Plate 2 shows a crystal of magnetite with "shattered" cores of chromite observed under high power-oil immersion objective. The chromite appears darker than the surrounding magnetite. Determination of the reflectance in air using green light at 546 nm and Vickers Hardness using 100 gm loads for circa 15 seconds, give the following results as in Table II:

Table II

| | air % $R_{546}$ | $VH_{100\ gm}$ |
|---|---|---|
| Chromite | 11.5 - 11.9 | 1290 |
| Magnetite | 19.6 - 20.0 | 765 - 870 |

## Conclusions

This serpentinite body so far as the writer is aware, is the first in situ occurrence to be reported west of the Main Range. From the data presented it is apparent that the serpentinite is derived from an ultrabasic rock. Whilst several attempts have been made in the past to interpret the origin of the serpentinite bodies lying to the east of the Main Range, in the light of palaeogeographic lines, this new discovery warrants a reassessment of previous interpretations. It is recommended that other areas flanking the western side of the Main Range should be carefully examined for the possible occurrences of ultrabasic or serpentinite bodies.

## Acknowledgements

The writer wishes to thank the Director-General, Geological Survey of Malaysia, Mr. S.K. Chung, for permission to publish this paper. Thanks are also due to Dr. T.T. Khoo and Mr. E.B. Yeap, both of the Geology Department, University of Malaya for technical assistance and Mr. S. Sandrasagaram, Miss Zohara Bee, Mr. K.L. Raj and Puan Rohani Abdullah for their help. The writer would also like to express his gratitude to Dr. D. Santokh Singh, Deputy Director-General, Geological Survey of Malaysia for his critical reading and comments on the paper. Lastly, the writer wishes to acknowledge his colleagues who was consulted at one time or another during the preparation of these notes.

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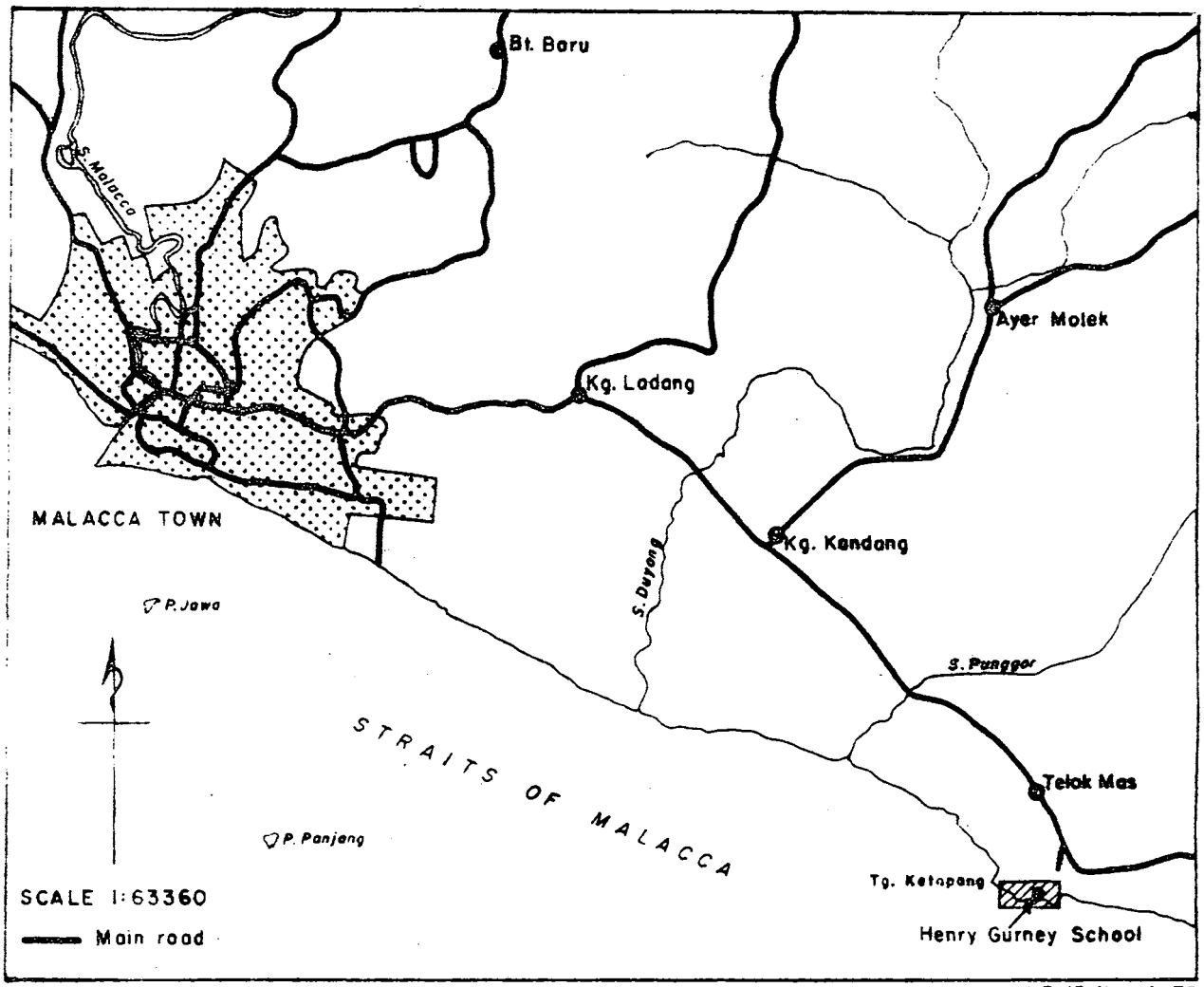
## Figure I. Location map

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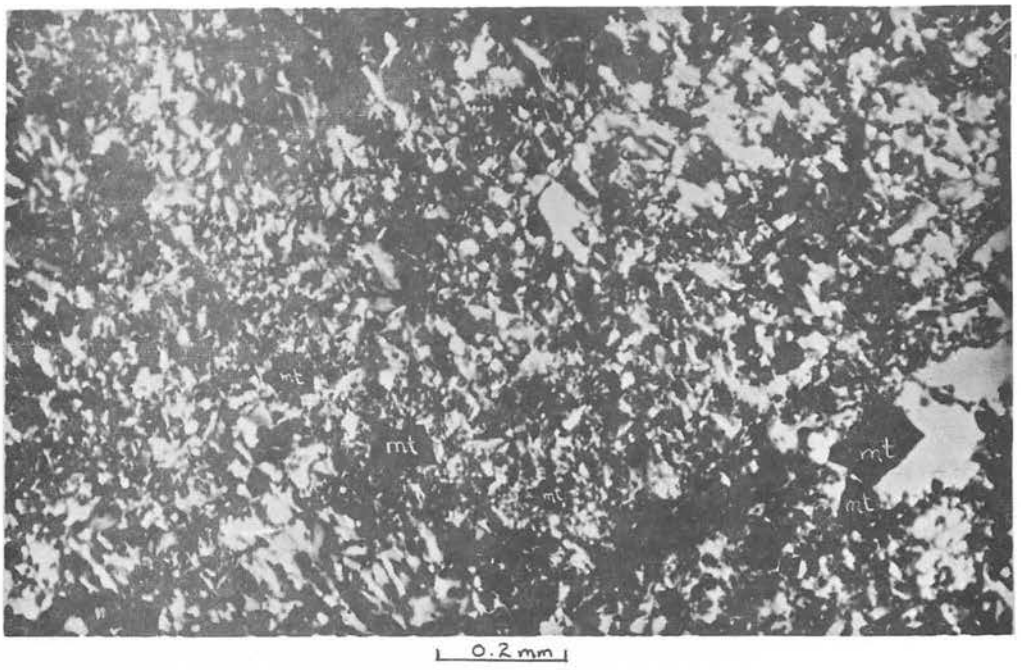


Plate 1. Subhedral magnetite (mt) disseminated in antigorite. X nicols.

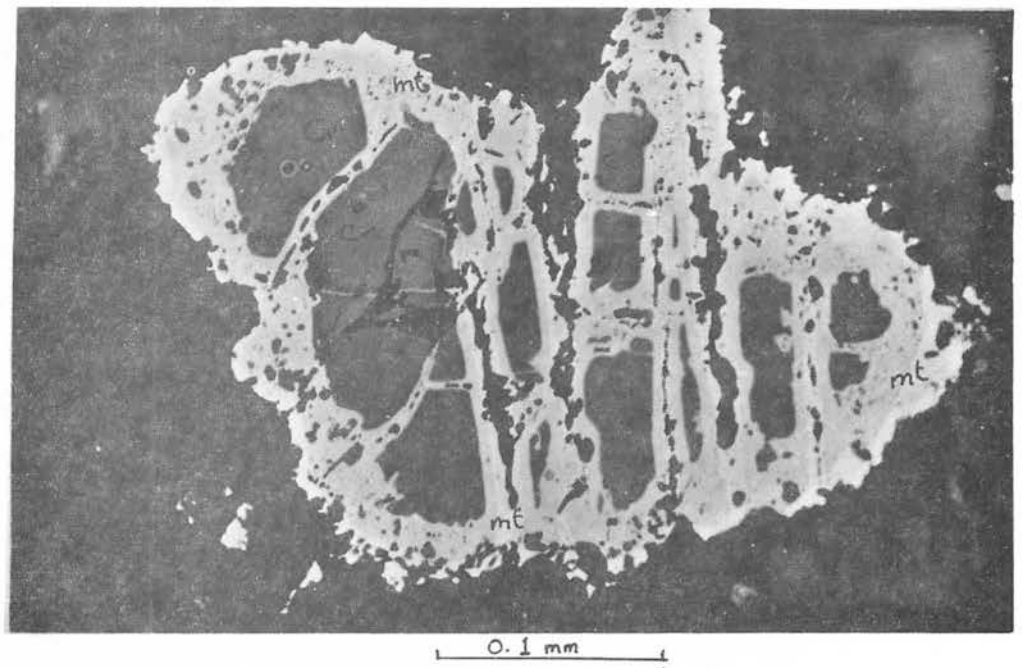


Plate 2. Brecciated chromite (Cr) rimmed by magnetite (mt). Oil immersion, plane light.

# Quaternary volcanic ash and associated sediments at Serdang, Selangor.

P.H. Stauffer & B. Batchelor, Dept. of Geology, University of Malaya.

Rhyolitic volcanic ash of Quaternary age has been known from the states of Perak and Pahang in Malaya for several decades (see review in Stauffer, 1973b, pp. 153-155) and was more recently discovered at Ampang, Kuala Lumpur (Stauffer, 1971, 1973a). The present note reports the finding of similar ash at Serdang, Selangor, 15 km south of Kuala Lumpur city centre. This new occurrence is of special interest because the ash there not only forms a clear separate layer in a stratigraphic sequence, as does the ash at Ampang, but also shows little evidence of having been disturbed or reworked since its fall. The ash at Serdang may therefore give more information about the eruption that formed it than the other known occurrences of this deposit.

The Serdang ash is exposed in the clay pit of the Selangor Brickworks (Syarikat Selangor Bakar Bata Sdn. Bhd.) at Mile 12, Serdang, about 0.7 km south of Serdang Old Town (Serdang Lama). On the 1:63360 Kuala Lumpur topographic map (Sheet 94, New Series, published by the Director of National Mapping, Malaysia, 1964) the pit is at grid reference 664804. This pit is presently about 80 m across and about 15 m deep. At last visit the ash layer was exposed along all or parts of three sides of the pit. It forms a distinct horizontal layer conspicuous by its light color, grayish yellow to white (5Y 8/4 to 2.5Y 8/1 on the Munsell Color Chart). The base of the ash lies 4 m below the surface of the road from Serdang Lama, and by estimation to a nearby benchmark is about 39 m above sea level.

The sedimentary succession observed in the clay pit can be conveninently divided into six units (I to VI; fig. 1). The lowermost horizon (Unit VI) exposed only at the base of the excavation, is a pale olive (5Y 6/3), friable clayey silt with occasional lignitic fragments. Its upper boundary, an ancient erosion surface, is marked by a thin brecciated laterite horizon and the underlying alluvium is mottled in consequence of soil-forming processes.

Determinations of remanent magnetism using a DIGICO Complete Results Magnetometer, showed all the laterite specimens collected from three coring positions to be normally magnetised and to have a fairly consistent direction of magnetisation not too different from the present field at the site.

This normal polarity, given the young aspect of the overlying alluvium, suggests the soil may have formed during the Brunhes Normal Epoch beginning 700 000 years B.P. There is good reason to believe (Batchelor, in preparation) that an important Pleistocene phase of lateritisation took place throughout Sundaland from about 800 000 to

550 000 years ago, based on the premise of a more seasonal, drier climate prevailing then as the result of a rather prolonged period of glacio-eustatic sea level lowering. If this is so, then the time of the Serdang lateritisation may reasonably be taken to be early Middle Pleistocene. The pre-existing alluvium of Unit VI is probably therefore of Early Pleistocene age and can be correlated with the lithologically similar "Old Alluvium" (of Walker, 1954-55 and Stauffer, 1973b) known from Perak and Johor.

Unconformably overlying Unit VI is a slumped sequence (Unit V) of light gray (5Y 6/1), partly loose to friable, coarse clayey sand (from 1 m to more than 4 m thick), coarsening downward to a pebble gravel, with abundant peaty material and large wood fragments (up to tree trunk size) towards the base. On the west side of the pit, this slumped sequence is draped over the laterite horizon, which slopes eastward. Geological maps of the Serdang area show the underlying bedrock to be Paleozoic limestone. It seems probable that dissolution of the limestone by percolating ground water has resulted in the slumping of these sediments. It is also possible that some of the relief on the laterite horizon is due to slumping, though the consistent paleomagnetic readings indicate that any such disturbance was minimal at the coring localities. The depositional environment appears to be fluvial, decreasing from one of high energy to low energy conditions towards the top.

A transitional boundary separates the overlying Unit IV, comprising a rather massive, light blue gray (5B 7/1), stiff clayey silt (4 to 4.5 m thick) showing indistinct but horizontal layering indicating that the slumping of Unit V probably took place before deposition of this overlying layer. Similar bluish-gray clays found at Dengkil, about 25 km to the south, have been interpreted, on the basis of contained pollen, as open water probably lacustrine deposits (R. Morley, pers. comm.). Dissolution of bedrock limestone and slumping of overlying sediments appears to have formed a small basin ideally suited for the accumulation of these lacustrine deposits at Serdang. The uppermost part of Unit IV, just below the ash layer, is occasionally marked by the occurrence of thin, dark gray to black carbonaceous clay and peat lenses.

The layer of ash (Unit III) has a thickness of 85-90 cm where the top is seen, and it is internally stratified. The basal contact is sharp but locally very irregular, with small load structures - balls of ash up to 5 cm across which have sunk into the underlying silt and corresponding lumps of silt in the basal few cm of the ash. The ash is generally composed of glassy materials - shards, bubble forms, and pumice fragments, with some crystalline material, mainly quartz. The lower part of the ash is relatively fine-grained (particles mostly less than 1 mm). From about 25 to 50 cm above the base, the ash is coarser with many fragments larger than 1 mm, some pumice fragments reaching several mm in size. This coarse middle layer is also characterized by the presence of abundant euhedral crystals of

biotite approximately 1 mm across. Above the 50 cm level the ash becomes finer-grained again and shows lenses and laminae suggestive of reworking and possibly mixing with other detrital material.

At one point in the pit, the basal surface of the ash shows a channel of about 25 cm depth and 1.5 m visible breadth (fig. 2). The internal layering within the ash shows a corresponding, though more subdued, dip into this channel. This draping of the ash, and the presence of abundant biotite in the coarser portion strongly suggest that the deposit of ash at the Serdang site settled from suspension and has suffered no reworking or transport (except for its upper part) after deposition. If this is true, then the composition, grain size distribution, and thickness of the Serdang ash may be taken to approximate those of the original ash fall.

The relatively undisturbed nature of the ash also supports the idea that deposition took place in an open-water (lacustrine) environment, as has previously been suggested also for the Ampang ash (Stauffer, 1973a, p. 3). Since the ash layer was deposited rather rapidly and did not significantly change the local basin morphology, overlying sediments of Unit II (80 cm thick) are identical with those of Unit IV, except that the silty clays are slightly bleached in colour, drier and more friable, and that abundant penetrating roots descend from above, where minor peat development sometimes occurs.

Unit I, the superficial cover of hard, dry, light gray (5Y 7/1) silt (about 1.4 m thick), comprises material of similar composition to Unit II which has however, been modified by soil-forming processes and shows reddish yellow (7.5YR 8/6) mottling, especially along root zones. Disturbed soil and earlier artificial fill locally cap the section and cut down into the ash layer and even below.

Since Units I to V form a stratigraphic continuum above Middle Pleistocene(?) laterite, without a major intervening hiatus, and contain an ash layer probably contemporaneous with the 34 000 years B.P. Ampang ash (Stauffer, 1973a), these units most probably span the late Pleistocene-Holocene period. As such, they represent time equivalents of the "Young Alluvium" (of Walker, 1954-55 and Stauffer, 1973b) which Sivam (1969) believed dated from the same interval.

It is planned to make further studies of this ash occurrence, including dating of the ash and of the associated peat and wood. We are grateful to Syarikat Selangor Bakar Bata, and especially Mr. Yap, for permission to study and sample the exposures. The paleomagnetic determinations were made with the cooperation of N.S. Haile and T.H. Lee. N.S. Haile also suggested some improvements to the manuscript.

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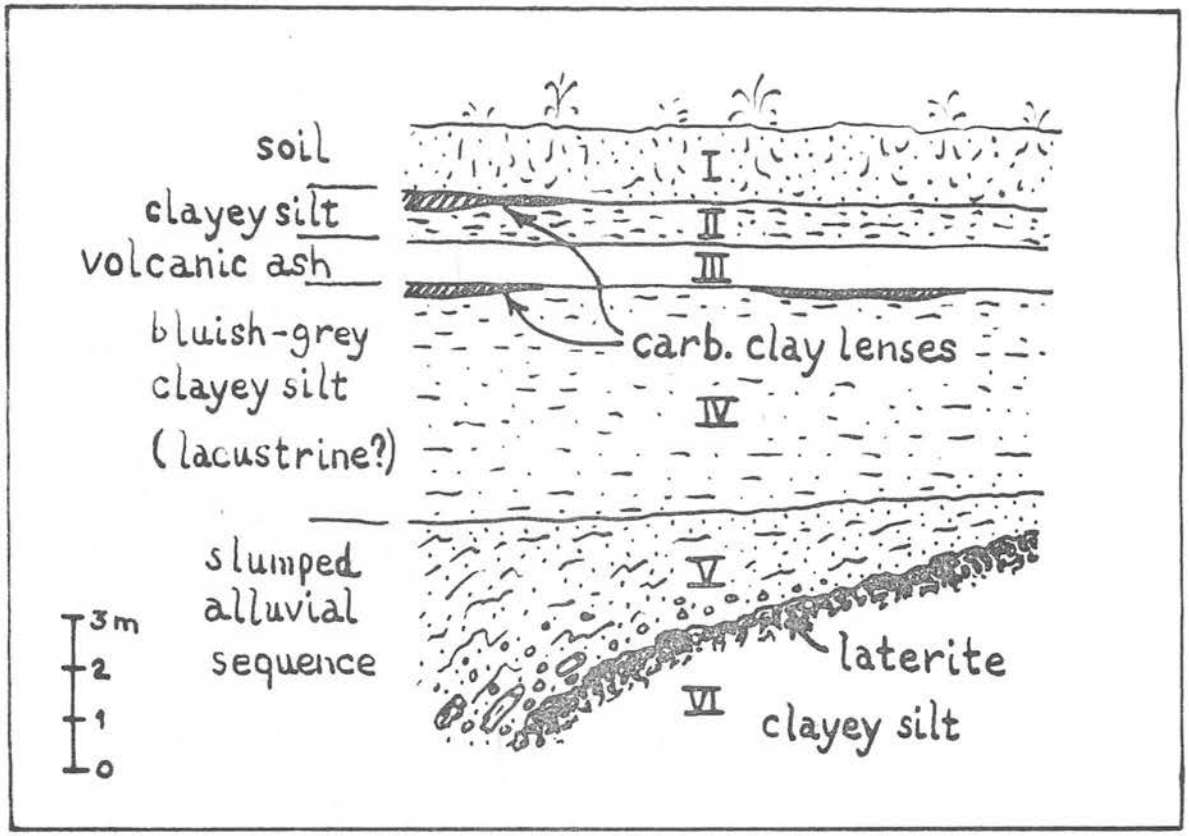


Fig. 1. Generalized stratigraphic profile of the south face of the Selangor Brickworks clay pit, Serdang, Selangor, showing position of the volcanic ash. I to VI refer to the units described in the text.

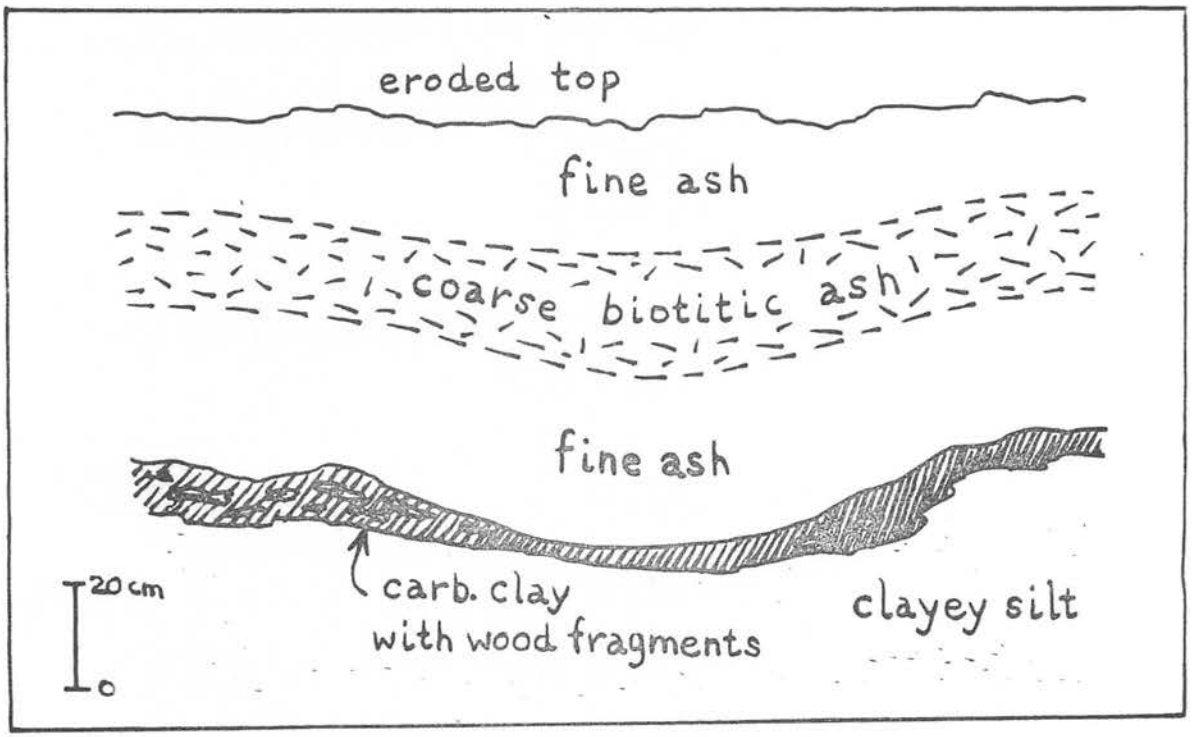


Fig. 2. Sketch of channel at base of the ash layer at Serdang, showing draping of the strata, suggestive of an unreworked suspension deposit.

# Tektites from Burma? A suspected new tektite locality in South-east Asia.

E.V. Gangadharam & P.H. Stauffer, Dept. of Geology, University of Malaya.

During the course of acquiring tektite specimens for the recently started University of Malaya Tektite Collection, we came across and acquired a sizable number of tektites which are alleged to come from localities in Burma. Although we have been unable so far to verify their origin, the characteristics of these tektites and the manner in which they were offered to us for sale give us reason to believe that they are likely to be genuinely from Burma. If this is so, they would represent the first known tektites from that country.

The tektites in question, numbering about 560, were bought from several itinerant Nepalese vendors of curiosities and semi-precious stones who plied their trade for some time during 1975 and 1976 on the sidewalks of Petaling Jaya, a large suburb of Kuala Lumpur. Having noticed tektites for sale, we inquired one day if they were from Thailand. The reply was that they came from Burma. Despite our expressing skepticism and questioning them independently and repeatedly, these several vendors insisted that the tektites they had at that time were originally from Burma and had been traded (smuggled?) across the border into Thailand, from where they had then been acquired by these vendors. One of the vendors even went to the extent of showing a picture of an old Burmese pagoda and mentioning the town of Mogok (located in central Burma, see fig. 2) during the course of describing to us the source of these tektites.

Although we were originally inclined to regard these tektites as probably being from some of the well-known source localities in Thailand, and this possibility is still very real, there are some reasons for thinking a Burmese origin probable. In the first place, the Nepalese vendors did not use the 'exotic' Burmese origin of the tektites as a ruse to raise their prices, which in fact were quite modest and comparable to those of ordinary Thai and Indochinese tektites. Secondly, the alleged Burmese origin was, as noted above, not advertised by the vendors, but only elicited upon questioning.

Thirdly, the tektites allegedly from Burma were kept by the vendors in lots separate from the other tektites which they were selling at various times. And, finally, knowing themselves that tektites occur in Malaysia and that they are quite scarce here, they did not claim that the specimens in question are from Malaysian localities. It should be remembered that for a lay purchaser, all tektites look pretty much the same.

The physical characteristics of these tektites also seem compatible with a Burmese origin. In general their sizes, shapes, and surface features are similar to Thai and Indochinese tektites. Figure 1 shows a selection of the allegedly Burmese tektites, including the largest in our collection (BU-267). Common shapes are biconcave discoids (BU-529); teardrops (BU-527), sometimes flattened (BU-49); dumbells (BU-563), sometimes nearly rod-shaped (BU-267); hollow forms (BU-278, BU-484); spheroids (BU-247); and irregular forms (BU-313, BU-505). Some of the allegedly Burmese specimens show evidence of ablation upon re-entry into the atmosphere. The ablation features consist mostly of flat, smoothened surfaces along the edges of discoid tektites. These surfaces are devoid of any of the usual tektites surface features such as pits and grooves. Sometimes two such surfaces meet to give a well-defined sharp ridge, much like those on 'einkanters' and 'dreikanters', names given to wind-worn pebbles with one and three edges, respectively. One specimen (BU-505) shows a small mass of material (just above the specimen's label in fig. 1) which appears to have flowed over part of the original pitted surface of the tektite and is tentatively interpreted as an unusual ablation feature. We have never yet seen such features as these on tektites from mainland Southeast Asia. These ablation features would seem to imply a greater distance from the site of the impact that may have formed the Australasian tektite strewnfield. If that impat crater was, as some evidence indicates, in the region of southern Viet Nam (Stauffer, in prep.), then the Mogok area of Burma would indeed be farther from the source crater than any of the previously known tektite localities of mainland Southeast Asia (fig. 2), thus logically accounting for the ablation features of the allegedly Burmese tektites.

Discovery of tektites in Burma would not be surprising, since thousands of tektites have been recovered from many localities in Thailand, Laos and Viet Nam, some in the northern regions quite close to the Burmese border (fig. 2). Barnes (1963, p. 35) expressed the opinion that tektites would eventually be found within Burma. Nonetheless, it would be very gratifying to confirm the source locality of the present specimens.

Attempts by us to obtain confirmation of tektite occurrences in Burma through varied and sometimes unusual channels have been generally unsuccessful. We have contacted university professors, professional geologists, diplomats, and press correspondents, either now in Burma or from Burma. Even a visiting Burmese sports team was approached! The only positive response was from a Burmese geology professor, now living in Thailand, who stated that he definitely recollects seeing some tektites kept as good luck charms by residents of central Burma, and that he believes these tektites were of local derivation.

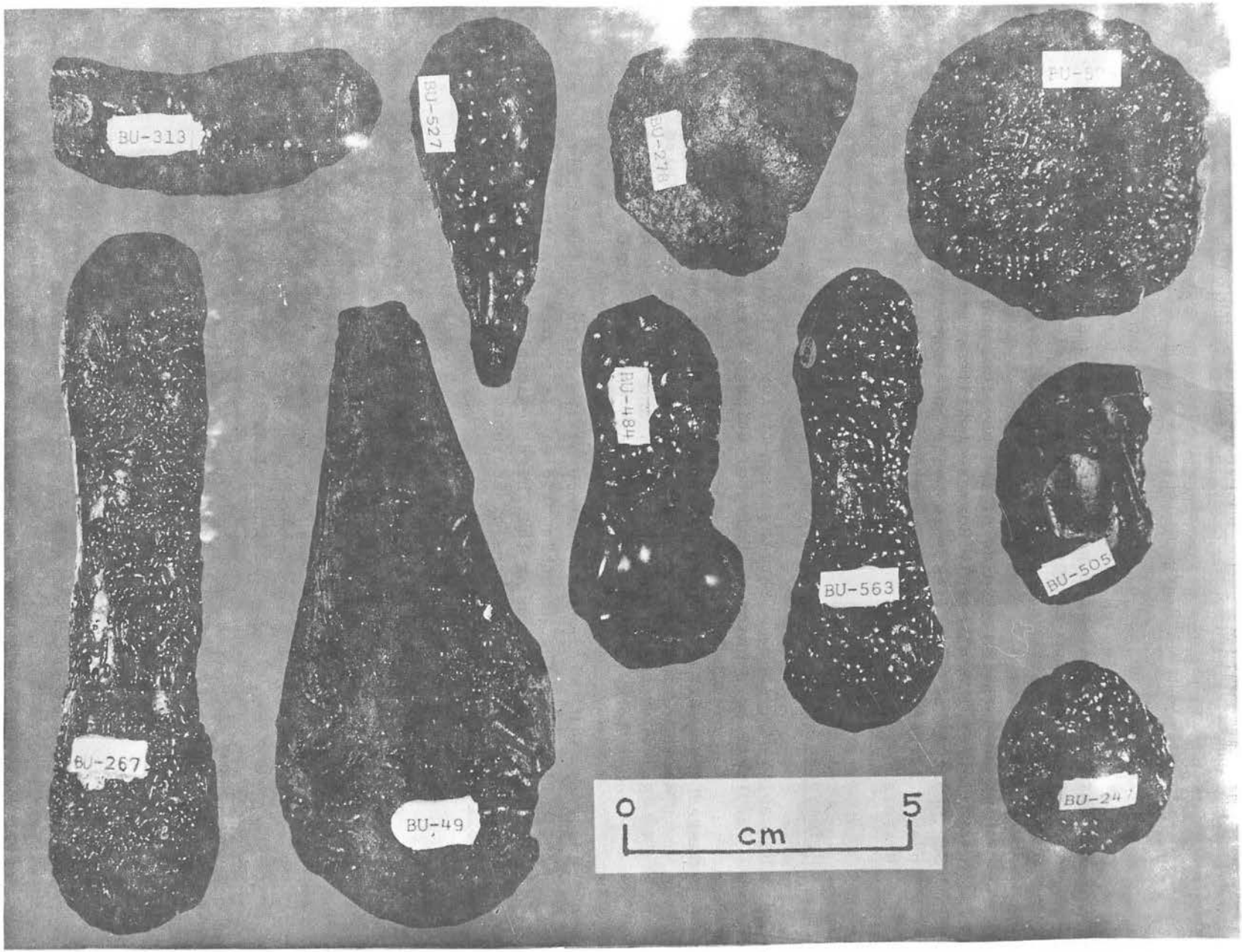


Fig. 1. Some examples of the tektites suspected to be from Burma.

The main object of this note is to communicate the existence of alleged Burmese tektites to a wider readership and to invite comments from interested persons. We would especially welcome correspondence from anyone who has any knowledge of tektites in Burma.

More detailed studies of the physical and chemical characteristics of the allegedly Burmese tektites, in comparison with other Southeast Asian teketites, are being undertaken (Gangadharam, in prep.) as part of a continuing progrom of tektite studies at the University of Malaya.

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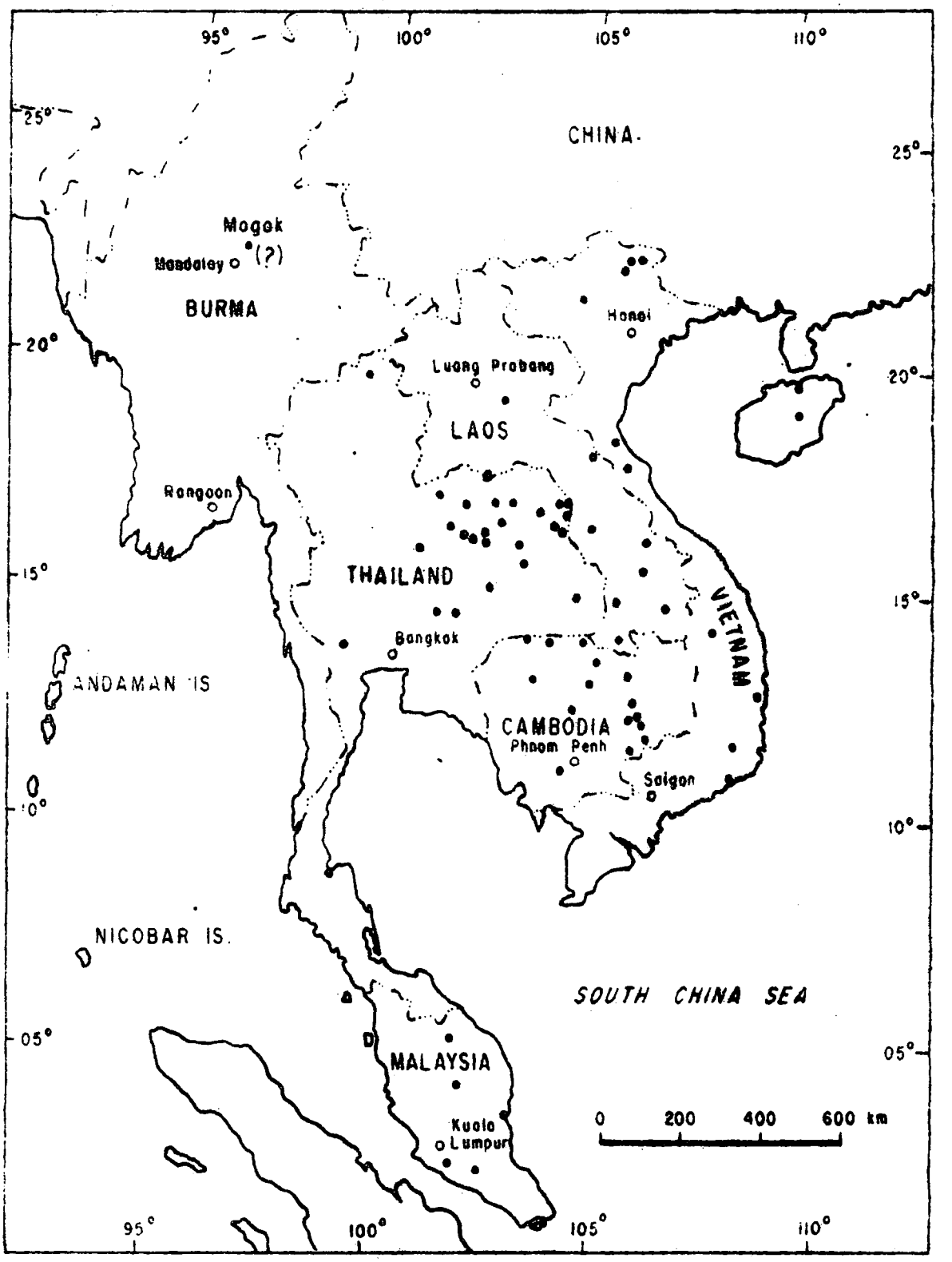


Fig. 2. Map of Southeast Asian mainland showing tektite localities (●) (after Barnes, 1963). Occurrence of tektites in the Mogok area of Burma, if confirmed, would constitute a logical extension of the strewnfield to the northwest.

# G E O L O G Y  O N  S T A M P S

## 5. Erupting volcanoes, geysers, and fumaroles

N.S. Haile, Jabatan Geologi, Universiti Malaya
(Photographs: Jaafar bin Haji Abdullah)

The many representations of volcanoes on stamps range from mere geometric symbols to fully pictorial views of named volcanoes. Few set out to show any specifically geological aspects, an exception being the Lesotho 1973 International Kimberlite Conference 20c stamp showing an eroded Kimberlite volcano (already illustrated: Geology on Stamps 4). Stamps showing quiescent volcanoes seem to outnumber those showing active ones. Iceland probably has the most stamps showing erupting volcanoes; the 1948 set, showing three views of the eruption of Hekla in 1947 on seven values, is a good example. These are single-colour stamps, but the engraving is good and the tephra clouds are very striking. The 1965 set of Surtsey is multi-coloured and more interesting scientifically, since the three stamps show different dated phases: the explosive birth of the island in November 1963, with a great pillar of steam, ashes and bombs; the cinder cone erupting glowing lava flowing into the sea in April 1964; and the established island with moderate volcanic activity in September 1964. Other oceanic volcanoes shown in eruption include Yasur in the New Hebrides (1973) and the 1972 eruption of Karthala (Comores Archipelago, 1973).

Volcanoes along consuming plate margins include an Indonesian set of 1974 (8 values, all showing the same not very realistic view of Merapi). Taal volcano in the Philippines is shown quiescent in














its caldura lake in 1962 (Malarial Eradication Stamp), and the 1965 eruption is depicted on 1967 and 1968 stamps, the former showing the inhabitants escaping from the eruption in boats.

Tongariro (the National Park and Chateau) has appeared on at least three New Zealand stamps (1960, 1964 and 1967; the last illustrated here), whereas Galeras in Columbia appears on the 1954 stamp (1959 overprint) and Nicaragua shows Momotombo with two biplanes flying past the lightly steaming crater (1937).

On the other side of the "Pacific ring of fire", the Soviet 1965 set shows three volcanoes from Kamchatka; Klyuchevski, Karymski, and Koryakski (the first, 4 kopec, shown here). Japan's mountains are mostly volcanic, and many of these appear on stamps, but few are shown vigorously erupting; on the 1963 stamp, Sakurijima (in the Kinkowan "Quasi-National" Park) seems to be emitting some vigorous black smoke, heedless of pollution regulations.

The word geyser or geysir is Icelandic, and the prototype geysir is shown on the Icelandic stamp of 1938, although the classic U.S. stamp showing Old Faithfull of Yellowstone Park (1934) is perhaps the earliest geyser stamp. The 1972 stamp of Old Faithful is still better. By contrast the New Zealand 1967 stamp of Pohutu is rather unsuccess-

ful, because of the lack of tonal contrast; surely for NZ$2 one might expect a multicoloured stamp! The USSR stamp of 1966, showing a Kamchatka geyser is multicoloured, but wishy-washy all the same.

"Sulphur springs" (Dominica 1963), in grey and green doesn't show much; I should have thought that yellow was an obvious necessity for such a subject. But perhaps the sulphur springs of Dominica emits $H_2S$ rather than elemental sulphur?

Fumarolic activity is more commonly depicted. Japan has several, including Mt. Sowa-Shinzan (1971; not reproduced here). New Zealand shows fumaroles on several stamps including one of Lake Rotomahana (1972) and White Island (1974).






This is by no means a complete list of erupting volcanoes on stamps, but nevertheless there remain many opportunities for more stamps showing volcanic eruptions. Indonesia, with some 500 volcanoes, 177 of which have been active in historic times, has hardly exploited them philatelically. How about a stamp celebrating the centenary of Krakatoa, due on 27 August 1983? Hawaiian volcanoes have not yet appeared on stamps, unless I have missed them, and nor have the Mediterranean volcanoes been featured prominently in full eruption - Plinean, Vesuvian, Vulcanian, and Strombolian types of eruption all originate from Italy, as does the very word volcano. A stamp honouring Pliny the Elder, who died observing the eruption of Vesuvius in A.D. 79, and is thus the first martyr to geology, would be appropriate to mark the 19th centenial of his death next year!

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Prof. Chris. Amstutz of Heidelberg has kindly sent me two publications on geological stamps, of whose existence I was unaware. The first is by Hans Cloos (Geologie au Briefmarken: Geol. Rundschau, Bd. 29, 1938, 101-110), illustrating 34 stamps showing landscapes of geological interest, with scholarly notes thereto. I am indeed glad to learn that such a renowned geologist as Professor Cloos wrote on the subject. The second by Prof Dr Gutmann of Ettlingen is more recent (Mineralien und Versteinerungen in der Philatelie in Mythus, Brauchtum, Volksglauben, Medizin und Pharmazie. W. Spitzner, Ettlingen/Baden).

Dr. P.H. Stauffer has drawn my attention to a listing of a paper on geological stamps by P.A.M.A. Rolff (Geologia e filatelia. Ouro Preto, Brazil, Escola de Minas, Revista, vol. 32, 2, p. 35-37), but I have been unable to obtain a copy. Apart from a few articles in the publications of the American Topological Association, I know of no other writings on stamps and geology, and should be glad to hear of any known to readers.

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# MEETINGS OF THE SOCIETY

D.S. Coombs, February 2nd: Low grade metamorphic facies

The Society held a meeting at the Geology Department, University of Malaya, on the afternoon of February 2nd, 1978, to hear Prof. D.S. Coombs of the University of Otago, New Zealand, give a talk on the subject of low grade metamorphism, a field which Prof. Coombs has pioneered and for which he is internationally known. Prof. Coombs was visiting Kuala Lumpur in his capacity as External Examiner in Geology to the University of Malaya, and earlier in the same afternoon had presented a talk in the Department of Geology on the topic of 'Volcanic lineages.'

The Society's President, Prof. B.K. Tan, introduced the speaker. Prof. Coombs began his talk by pointing out that the subject of it was reactions and conditions which would be called 'diagenetic' in some people's definitions. They are lower than greenschist facies metamorphism, which studies have shown does not occur at temperatures below about 300°C. What happens at lower temperatures is of importance, since rocks may begin partial melting at about 650°C, and therefore the sub-greenschist realm covers about half the total temperature range of rock alteration. There is also a practical interest, for the 'liquid window' in petroleum generation occurs within this sub-greenschist temperature range.

Common products of very low grade metamorphism are, of course, zeolite minerals. In some saline lakes (e.g. Lake Tecopa) glass in volcanic ash is altered to a variety of zeolites in a zoned pattern, with the hypersaline water in the center causing dehydration of water-rich varieties to produce analcime and feldspars. The Green River Formation shows a similar zonation. Thus ionic concentrations represent one of the controls on the resulting mineral assemblage.

In the Wairakei geothermal field in New Zealand, a variety of zeolites are produced at different temperatures. But at the Salton Sea geothermal area in California, under similar conditions but with high partial pressures of $CO_2$, no zeolites result, but instead illite, chlorite, and calcite.

Zeolites in sediments were first recorded about 50 years ago, studied by Russian scientists in the 1940's, and more widely and intensively in recent years.

Prof. Coombs described the area at the south end of South Island, New Zealand, which he has studied in detail. Here a thick pile of volcanic greywackes and siltstones of Mesozoic age, generally quartz-

poor debris from an andesitic volcanic arc, shows progressive changes with increasing depth of burial. One of the first changes is the formation of heulandite, a very low temperature zeolite even found in sea bottom ash. In some beds analcime is the first zeolite formed, while in others it forms later from heulandite, which it pseudomorphs. With increasing depth of burial, heulandite is generally replaced by laumontite as the result of a dehydration reaction.

But not only volcanic ash beds contain such zeolites. Mottled sandstones, found in various parts of the world, commonly have laumontite cement in the mottles. Zeolites have even been observed replacing the calcite of brachiopod shells.

Prof. Coombs reviewed what is known of the stability fields of the zeolites and the slightly higher grade assemblages (prehnite, pumpellyite, etc.), which are transitional to the greenschist facies. There is still much uncertainty in this subject, and the presence of 'characteristic' minerals depends on several factors additional to temperature and pressure.

In discussion after the talk, the speaker was asked about the practical problem of identifying the zeolite minerals. He replied that some can be identified in thin section by an experienced worker (the section must be really thin), while the diffractometer is very useful, and for some zeolites, X-ray is necessary.

Prof. C.S. Hutchison proposed a vote of thanks to Prof. Coombs for his very enlightening talk.

PHS

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Field Excursion to the Kuala Lumpur - Karak Highway: February 12th

Eighteen members of the Society participated in this excursion held on the 12th of February, 1978 and led by Prof. N.S. Haile. Deep slope cuts along this highway provided participants with a geological profile across the Main Range and also showed excellent exposures of the lithology and complex structure and stratigraphy present.

Along the western and central sections of the highway were exposed a generally eastward dipping sequence of schists, bedded cherts and argillites with sandstone, and rhyolites, which were bordered to the west by the Main Range granite and to the east by a porphyritic microgranodiorite (which is separated by the Tanglir fault zone from the Main Range granite further east). Along the eastern section of the highway (in the eastern foothills of the Main Range) were exposed a sequence of banded metamorphic rocks and schists that have been

intruded by the Main Range Granite to the west. Apart from the exposures of bedrock, well-developed weathering profiles were also seen at the slope cuts.

The early part of the day was spent in the western section of the highway and a traverse made from the granite across the schists, bedded cherts and argillites and into the conglomerate.

The Main Range granite as exposed along some slope cuts is a porphyritic biotite granite with phenocrysts of potash feldspar and biotite-rich clots. In places, the granite was seen to be cut by veins of epidote and quartz/feldspar with tourmaline and dykes of aplite and leucocratic microgranite. Towards the margins of the batholith however a fine to medium grained leucocratic granite with tourmaline was found.

The schists ("Selut Schist") of probable Palaeozoic age which were seen to be intensely folded and faulted are largely quartz mica schists and often show the presence of quartz pods. The bedded cherts and argillites ("Gombak Chert") which are probably unconformable on the schists were seen to be generally dipping towards the east, though at some cuts imbricate faulting has brought into contact fault slices of the cherts/argillites/sandstones and schists.

The conglomerates ("Sempah Conglomerate") which are interbedded with mudstones, sandstones and tuffs are probably of upper Palaeozoic age and are unconformable on the "Gombak Cherts". At the exposure near the tunnel, a fault slice of schist was seen within the conglomerate.

In the afternoon, along the eastern section of the highway, banded metamorphic rocks (which have been called amphibole schists) were seen in an intrusive contact with the marginal fine grained leucogranite of the Main Range. Further east quartz mica schists with quartz veins were exposed.

The Tanglir fault zone was then visited and the distinct fault contact between the granite on the east and the microgranodiorite to the west was seen along the Tanglir river. Driving back towards the tunnel, stops were made to examine the porphyritic microgranodiorite and the rhyolites which appear to be similar in composition and texture.

Prof. N.S. Haile should be thanked for leading the trip and for providing the participants with a knowledge of the complex lithological, structural and stratigraphic aspects of the bedrock exposed along the Kuala Lumpur - Karak Highway.

JKR

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## Annual General Meeting: February 24th

The Geological Society of Malaysia held its 12th Annual General Meeting at the University of Malaya Guest House (Rumah Universiti) on the afternoon of Friday the 24th of February 1978. After a sumptuous tea, the meeting was called to order by the Society's President, Prof. B.K. Tan, at 5.00 o'clock. There were 22 members present.

The business of the meeting was dealt with fairly briskly, though the Treasurer's Report as usual evoked some questions and lively discussion. The reports of all the officers were accepted by the meeting, though with the proviso that a fuller explanation of a few items in the financial accounts be distributed to members later. These reports, also to be distributed to members, show the Society to be generally in a gratifying state of health.

The officers and councillors for the Society's 1978/79 Council were announced. They are:

| | | | |
|---|---|---|---|
| President | : | Tan Bock Kang | |
| Vice President | : | Mohamed Ayob | |
| Hon. Secretary | : | A. Spykerman | |
| Hon. Asst. Secretary | : | John K. Raj | |
| Hon. Treasurer | : | Chong Nai Hooi | |
| Hon. Editor | : | Yeap Cheng Hock | |
| Councillors | : | Gan Ah Sai | ) |
| | | Khoo Kay Khean | ) elected to serve |
| | | Wan Fuad b. Wan Hassan | ) 2 years |
| | | James Lau | ) |
| | | S. Paramananthan | ) |
| | | Wong Yoke Fah | ) Councillors from |
| | | Yeow Yew Heng | ) 1977/78 who will |
| | | Yew Chee Cheong | ) serve one more year |

A proposal submitted by a member, Mr. Seet Chin Peng, that the Society transform itself into a fully professional and official body, was discussed at some length. It was agreed that the new Council would look into this proposal and perhaps solicit the views of the membership.

The meeting was adjourned, after a vote of thanks to the chair, at about 6.00 o'clock.

PHS

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Mineral Engineers Act

Following the Annual General Meeting, a meeting was held on the Mineral Engineers Act. The chairman, Mr. W.K. Lee and his Committee, Mr. S. Paramananthan and Encik Wan Fuad bin Wan Hassan, explained the latest positions regarding the Act. It appears that the Act is now in its final draft and changes to it will be unlikely. There was a lively discussion on the relevant sections of the Act, particularly relating to membership and representation. It was suggested that the membership provisions of the Society's Constitution be reviewed and that possibly a new class of membership be created which will meet the requirements of the Act, thus allowing the members concerned to register when the Act is finally promulgated.

CHY

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## N E W S  O F  T H E  S O C I E T Y

### Symposium on Tin Deposits - Reminder

The International Symposium on the Geology of Tin Deposits, organized by the Geological Society of Malaysia, will be held during 23-25 March 1978 at the University of Malaya, Kuala Lumpur. The Second circular for the symposium has been sent to all members, and judging by the list of papers and field trips planned, it promises to be a rich and rewarding meeting.

Anyone interested who has not received the circular for the tin symposium can obtain information about the meeting by writing to:

The Organizing Secretary, Tin Symposium
Geological Society of Malaysia
c/o Jabatan Geologi
Universiti Malaya
Kuala Lumpur 22-11, MALAYSIA.

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### GSM Cooperation with SIRIM

The Geological Society of Malaysia has over the years parti-

cipated in some of the work of the Standards and Industrial Research Institute of Malaysia (SIRIM). Members may be unfamiliar with this activity of the Society and may therefore be interested in the following summary of some aspects of this work.

Dr. Y.H. Yeow who has represented the Society on the "Technical Committee on Rocks and Clays and their Products", reports that the committee has prepared three drafts for Malaysian Standard Specification of china clay, commercial sand, and limestone for making colourless glasses. These drafts are still being discussed before submitting to the public for comments. The 10th meeting of the Committee was attended on March 26, 1976.

Dr. F.E.H. Haser has represented the Society on various committees of SIRIM since July 1969. During this activity he has prepared for that body the following Codes and Technical Specifications concerning Site Investigation and Building Works.

Codes:

Mis 1002 Description and Classification of Common Malaysian Soils. (Site Investigation). 14 pages.
(Mis 1002 was prepared together with Mr. S.P. Sivam of the Department of Geology, University of Malaya and Mr. Ignatius Wong of the Department of Agriculture, Malaysia).

Mis 1010.2 Records of Stratification and Identification of soils and rock types. (Site Investigation). 16 pages.

Mis 1010.3 Records of Stratification and Identification of soils and rock types. (Water boring and ground water observations). 16 pages.

Mis 1010.4 Presentation of Drawings and Logs, recording the results in Site Investigation and Water Borings. 8 pages.

Specifications:

Mis 1500 Contract Procedures for Building Works.
Part C: General technical specifications (Earthworks).
22 pages.

Mis 1501 Contract Procedures for Building Works.
Part C: General technical specifications (Boring Works). 8 pages.

Mis 1502 Contract Procedures for Building Works.
Part C: General technical specifications. (Well Construction Works). 11 pages.

Mis 1503 Contract Procedures for Building Works.
Part C: General technical specifications. (Foundation trench sheeting works). 9 pages.

Mis 1504 Contract Procedures for Building Works.
Part C: General Technical specification (Piling Works).
15 pages.

Mis 1505 Contract Procedures for Building Works.
Part C: General Technical Specifications. (Dewatering Works). 9 pages.

One copy of each of these reports is in the GSM Library.

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New library additions

The following works have been added to the Society's Library and are available to members at the Klompé Reading Room of the Department of Geology, University of Malaya.

1. Sporen van het Landijs in Nederland by H.A. Visscher
2. Grondboor + Hamer, nos. 3-6, Jun-Dec 1977
3. Scripta Geologi 44, 1977
4. Institution of Mining & Metallurgy, Transactions/Section A, vol. 86, Oct 1977
5. AGID Report No. 5, 1977
6. American Museum Novitates, nos. 2633 & 2639, 1977
7. Journal of Research of the U.S. Geological Survey, vol. 5, no. 6, Nov-Dec 1977
8. IMM Bulletin, no. 855, Feb 1978
9. Commonwealth Geological Liaison Office, Newsletter 1, 1978
10. Commonwealth Geological Liaison Office, Liaison Report 133, 1978
11. RRI News, January 1978
12. Bulletin du Bureau de Recherches Geologiques et Minieres, section IV, no. 4, 1977
13. Bulletin of the National Science Museum, series C, vol. 3, no. 4, Dec 1977
14. Bulletin of the American Museum of Natural History, vol. 159, article 3, 1977
15. Journal of the Faculty of Science, vol. 19, no. 4, 1977
16. Institution of Mining & Metallurgy, Transactions/Section B, vol. 86, Nov 1977

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## Membership

The following persons have joined the Geological Society of Malaysia:

### Full Members

Reghubir Rampal
1126 Jalan Pegawai
Kelang

Dr. Kiyoo Kawada
ESCAP/CCOP
41 White Inn
Sukhumvit Soi 4
Bangkok, Thailand

Prof. D.S. Coombs
Geology Dept.
University of Otago
Dunedin, New Zealand

Noordin Wan Daud
Soil Div., RRIM
P.O. Box 150
Kuala Lumpur

John Michael Pek
Petronas
P.O. Box 2444
Kuala Lumpur

### Associate Member

Syed Salim Agha
Perpustakkan
Universiti Pertanian Malaysia
Serdang, Selangor

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## Change of address

The following members have informed the Society of new addresses as indicated:

Dr. Karl W. Stauffer
c/o Chevron
Apartado 93
Maracaibo, Venezuela

Richard A.S. Cayzer
9199 D Catmon St.
San Antonio Village
Makati
Metro Manila, Philippines

W.F. Hooper
Coastal States Gas Corp.
5 Greenway Plaza East, Room 860
Houston, Texas 77046

Lai Kok Hoong
Geological Survey Office
P.O. Box 1015
Ipoh, Perak.

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# OTHER NEWS

## Government of Bolivia seeks visiting tin expert

The Society has received a letter from the United Nations Division of Earth Sciences asking us to help find a high level expert in prospection of alluvial polymetallic tin deposit for a one month mission to Bolivia.

The expert would be asked to perform some field work with the students of the University of La Paz. It would be preferable if the person selected has a good knowledge of Spanish.

Further information and forms can be obtained from the Society's Secretary.

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## News from the University of Malaya Geology Department

### Professor Neville S. Haile

Professor Haile has announced that he will retire in May 1978. Although he could have a further five years before compulsory retirement, he has decided to accept the earliest retirement option at age 50.

Professor Haile joined the University in August 1964 and has been Head of the Geology Department since that time. In February 1978 he gave up the headship and Professor Charles S. Hutchison has been appointed his successor.

Before joining the University of Malaya, Neville Haile had spent a considerable number of years in the Borneo Geological Survey, both in Sarawak and Sabah. He is well known for his memoirs on Borneo, and with his subsequent journal publications is now undoubtedly the foremost authority on Borneo geology.

While in the University of Malaya, Neville served a period as Dean of the Faculty of Science. Within the department, he planned and set up the paleomagnetism laboratory, and he has been responsible for making a solid foundation to the field of paleomagnetic research in Southeast Asia. The present geology building, the equipment, the high quality of teaching and research have all been planned and put into practice under the inspiring leadership of Professor Haile.

Upon retirement he will return to south England and on behalf of the Society membership I offer him our best wishes.

## Associate Professor Chan Siew Hung

By unhappy coincidence, Professor Chan Siew Hung will also leave the University of Malaya in May, 1978, not on retirement, but on resignation to take up a new career. His departure leaves a vacuum in the department which will be difficult to fill, for almost single-handedly Professor Chan Siew Hung built up the whole field of geophysics in the University of Malaya. His achievement is very remarkable when we consider that the majority of Malaysian geophysicists now active were all formerly his students. Many have built on his excellent geophysical teaching and have gained Ph.D. degrees from universities overseas.

Dr. Chan Siew Hung joined the University of Malaya Geology Department in June 1964, having been a company geophysicist and geologist before taking up his academic career. Apart from the high quality of teaching and research which he has planned and put into practice, Siew Hung has been the most respected mathematician in the department and staff and students greatly valued his advice and help in mathematics and computer programming.

On behalf of the Society membership I offer him our best wishes in his new career.

The present staff and students and former graduates of the Geology Department of the University of Malaya are planning a party for late April 1978 at which we will give both Professor Neville S. Haile and Professor Chan Siew Hung an appropriate farewell. Anyone wishing to be connected with this occasion is invited to contact either Professor C.S. Hutchison or Mr. Tan Chin Tong at the Department of Geology, University of Malaya, Kuala Lumpur.

CSH

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## Publications available from CCOP/SOPAC

The following publications are now available from the office of the United Nations (ESCAP) Committee for Co-ordination of Joint Prospecting for Mineral Resources in South Pacific Offshore areas (CCOP/SOPAC).

| | | |
|---|---|---|
| 1. | Report of CCOP/SOPAC Preparatory Meeting & Proceedings of CCOP/SOPAC First & Second Sessions | US$8.00 |
| 2. | Proceedings of the CCOP/SOPAC Third Session | US$6.00 |
| 3. | Proceedings of the CCOP/SOPAC Fourth Session | US$5.00 |
| 4. | Proceedings of the CCOP/SOPAC Fifth Session | US$3.00 |
| 5. | South Pacific Marine Geological Notes Vol. 1 Nos 1-6 available (Continuing series) | complimentary |

6. CCOP/SOPAC Technical Bulletin No. 1 - Bibliography of Geology & Geophysics of the South Pacific US$6.00
7. CCOP/SOPAC Technical Bulletin No. 2 - Papers presented at the I.D.O.E. Workshop Suva, Fiji, 1-6 September 1975 US$6.00

Prices include surface postage. Air mail at extra charge.

Order from: The Publication Officer
CCOP/SOPAC Technical Secretariat
c/o Mineral Resources Division
Private Mail Bag
G.P.O. Suva
Fiji.

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Tenth world mining congress

The tenth world mining congress will be held in Istanbul from 8 to 12 October, 1979. Papers are grouped in four major categories: utilization of low calorific resources, problems of small ore deposits, progress in mining under adverse conditions, and feasibility and profitability studies of deposits. Congress arrangements include an exhibition of mining equipment and technical and sight-seeing tours. Further details are available from Dunya Madencilik Kongresi Turk Milli Komitesi, Ziya Gokalp Cad. No. 17, Kat 8, Ankara, Turkey. Those who propose to submit papers are invited to inform the Editor, Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, as soon as possible.

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Geology and Paleontology of Southeast Asia Symposium, Tsukuba, Japan

On the occasion of publishing the "Geology and Palaeontology of Southeast Asia, Vol. 20", the Geology and Palaeontology of Southeast Asia Symposium, Tsukuba '78 is being organized. Anyone who is interested in this symposium is welcome to attend. This symposium will be held under the sponsorship of the Toyota Foundation and The University of Tsukuba. Financial support from the Scientific Research Fund of the Ministry of Education, Japanese Government is also expected.

The symposium will be held at University Hall, The University of Tsukuba, Ibaraki, Japan, from October 2-9, 1978.

The objectives of the symposium are to schematize the results

obtained by members of the Association of Palaeontological Research of Southeast Asia (APRSA) and other research projects for the future advancement of the regional geology, stratigraphy, palaeontology, geologic development and their application in Southeast Asia. The official language of this symposium will be English.

Original papers are invited on the following topics: Regional Geology, Stratigraphy, Palaeontology, Geochronology, Structural Geology and Geotectonics, Geologic Development including Paleogeography, Paleoclimatology and Ore-genesis of metal and fossil fuels.

Authors are requested to send an English abstract of about 600 word equivalents excluding maps, text-figures and tables to Secretary General before July 20, 1978. These abstracts will be printed before the symposium. Concerning the information on post-symposium proceedings will be announced in the second circular.

Anyone interested in this symposium should contact the following as soon as possible:

Dr. Hisayoshi Igo
GPSEA SYMPOSIUM, TSUKUBA '78
c/o Institute of Geoscience
The University of Tsukuba
Ibaraki, 300-31, Japan.

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## Seventh Annual Convention of the Indonesian Petroleum Association

We have now received the timetable for the submission of abstracts and the preparation of manuscripts for this convention to be held in Jakarta, June 6-7, 1978 (and noted in the previous issue of Warta Geologi):

- abstracts should be received on or before March 1, 1978
- selection of papers will take place shortly afterwards and the author(s) of accepted papers will be notified before the end of March 1978.
- completed manuscripts must be returned by May 1, 1978.

Acceptance of papers will depend to some extent on the balance of subject matter covered by the submitted abstracts. It is wished to cover a broad range of subjects in order to stimulate the maximum interest in this year's convention.

Contact address: IPA Lecture Committee
Jalan Menteng Raya 3
Jakarta, Indonesia.

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## Calendar

Under this column the Society will note coming events on meetings, courses and symposia of interest to members. Date in parentheses gives the issue of Newsletter containing more information pertaining to the event.

### Geological Society of Malaysia

**1978**

March 23 - Apr 15 : Geology of Tin Deposits: An International Symposium and Training Course. Secretary, Organizing Committee, Symposium/Training Course on Tin Deposits, c/o Department of Geology, University of Malaya, Kuala Lumpur 22-11, Malaysia. (Sept-Oct 1977).

Aug : Discussion Meeting, Ipoh. Secretary, Geological Society of Malaysia, c/o Dept. of Geology, University of Malaya, Kuala Lumpur 22-11. (Nov-Dec 1977).

December : Seminar on "The Petroleum Geology of the Sunda Shelf", Kuala Lumpur. Secretary, GSM, c/o Dept. of Geology, University of Malaya, Kuala Lumpur 22-11. (Nov-Dec 1977).

### Other Events

**1978**

Mar 5 - 10 : Oceanology International 78 Conference and Exhibition, Brighton, England. Conference Organisers, BPS Exhibitions Ltd., 4 Seaford Court, 220-222, Great Portland Street, London W1N 5HH. (Jul-Aug 1977).

Mar 13 - 17 : International Geodynamics Conference, Tokyo. Secretariat: c/o K. Kobayashi, Ocean Research Institute, University of Tokyo, 1-15-1, Minamidai, Nakano-ku, Tokyo 164, Japan.

Apr 14 - 20 : Seventh international geochemical exploration symposium to be sponsored by the Association of Exploration Geochemists in Golden, Colorado, USA. (Sept-Oct 1977).

Apr 24 - 28 : Regional Conference on Technology for Rural Develoments, Kuala Lumpur. Secretary, Malaysia Scientific Association, P.O. Box 911, Kuala Lumpur, Malaysia. (Nov-Dec 1977).

May 6 - 12 : Eleventh Commonwealth Mining and Metallurgical Congress in Hongkong. Secretary, The Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, England. (Mar-Apr 1977).

May 8 - 11 : Offshore Technology Conference, Houston, USA. 6200 N. Central Expressway, Dallas, Texas 75206, USA.

Jun 6 - 7 : Seventh Annual Convention of the Indonesian Petroleum Association in Jakarta. Chairman, I.P.A. Lecture Committee, Jalan Menteng Raya 3, Jakarta, Indonesia. (Nov-Dec 1977).

Jun 23 - 28 : International Symposium on World Oil and Gas Occurrence, sponsored by Canadian Society of Petroleum Geologists: Facts and Principles of World Oil and Gas Occurrence. Calgary, Alberta. Information: J. Browning, General Chairman, International Symposium '78, c/o 612 Lougheed Building, Calgary, Alberta T2P 1M7, Canada.

Jul 2 - 4 : Fifth Southeast Asian Conference on Soil Engineering, Bangkok, Thailand. Dr. A.S. Balasubramaniam, Secretary, 5SEACSE, Asian Institute of Technology, P.O. Box 2754, Bangkok, Thailand. (May-June 1977).

Jul 5 - 6 : International Symposium on Soft Clay, Bangkok, Thailand. Dr. R. Peter Brenner, Secretary ISSC, Asian Institute of Technology, P.O. Box 2754, Bangkok, Thailand. (May-Jun 1977).

Jul 18 - 22 : 3rd Inter-Congress of the Pacific Science Association in Appropriate Technology, Bali, Indonesia. Miss Sjamsiah Achmad, Indonesian Institute of Sciences, Tenka Cik Ditiro 43, P.O. Box 250, Jakarta, Indonesia. (May-Jun 1977).

Jul 30 - Aug 4 : Second Circum-Pacific Energy and Mineral Resources conference, Honolulu, Hawaii, c/o AAPG, P.O. Box 979, Tulsa, Okla., 74101, USA. (May-Jun 1977).

Oct 2 - 9 : Geology and Palaeontology of Southeast Asia Symposium, Tsukaba, '78. Dr. Hisayoshi Igo, GPSEA Symposium Tsukuba, '78, c/o Inst. of Geoscience, University of Tsukuba, Ibaraki, 300-31, Japan. (Jan-Feb 1978).

Oct 11 - 13 : Gulf Coast Association of Geological Societies (Gulf Coast Section, AAPG and Gulf Coast Section, SEPM) - Annual Meeting-New Orleans, Louisiana (Jules Braunstein, Shell Oil Company, Box 60775, New Orleans, Louisiana 70160). (Jan-Feb 1978).

Nov 14 - 17 : Third Regional Conference on Geology and Mineral Resources of Southeast Asia, Bangkok, Thailand. Conference Secretary, IIIGEOSEA, Division of Geotechnical & Transportation Engineering, Asian Institute of Technology, P.O. Box 2754, Bangkok, Thailand. (Jul-Aug 1977).

1979

1979 : 14th Congress of the Pacific Science Association USSR. B.G. Gafurov, Chairman of the Soviet National Pacific Committee, Academy of Sciences of the USSR, Moscow. (Jul-Aug 1977).

May 10 - 26 : Ninth International Congress of Carboniferous Stratigraphy and Geology, Washington, USA. President or Secretary-General, IX-ICC, 1979, Museum of Natural History, Washington, D.C., 20560, USA. (Sept-Oct 1977).

Oct 8 - 12 : Tenth World Mining Congress, Istanbul, Turkey. Dunya Madencilik Kongresi Turk Milli Komitesi, Ziya Gokalp Cad. No. 17, Kat 8, Ankara, Turkey. (Jan-Feb 1978).

1980

Jul 7 - 17 : 26th International Geological Congress in Paris, France. Secretariat General du 26eme Congres geologique international, Maison de la Geologie, 77-79, rue Claude Bernard, 75005, Paris, France. (Nov-Dec 1977).

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New cover

Readers may notice that with this issue the cover of Warta Geologi assumes a new format, with a slightly changed design and a different color. We hope you will agree that these cosmetic changes are an improvement and make the newsletter more attractive.

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PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)

Tujuan Persatuan Geologi Malaysia adalah untuk memajukan sains bumi, terutamanya di Malaysia dan tempat-tempat berhapiran. Sesiapa yang ingin menjadi ahli Persatuan sila dapatkan borang-borang daripada Setiausaha Kehormat.

The aim of the Geological Society of Malaysia is to promote the advancement of geological sciences particularly in Malaysia and nearby areas. Anyone interested in becoming a member of the Society should obtain the necessary forms from the Hon. Secretary.

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Annual Dues

The annual dues of Full Members and Associate Members shall be M$15/- if paid in advance before the first day of each calendar year, M$16/- if paid between 1 January and 1 March, or M$17/- thereafter. The annual dues for members elected after June 30 shall be M$7.50 that year. An entrance fee of M$5/- shall be payable on election.

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Some Bahasa Malaysia (Malay) geographical terms

| | | | | | |
|---|---|---|---|---|---|
| Bukit (Bt) | - | hill | Kuala (K) | - | mouth of river |
| Genting (Gtg) | - | pass | Pulau (P) | - | island |
| Gunung (G) | - | mountain | Sungai (S) | - | river |
| Jalan (Jln) | - | road, street | Tanjung (Tg) | - | cape |
| Kampung (Kg) | - | village | Teluk (T) | - | bay |

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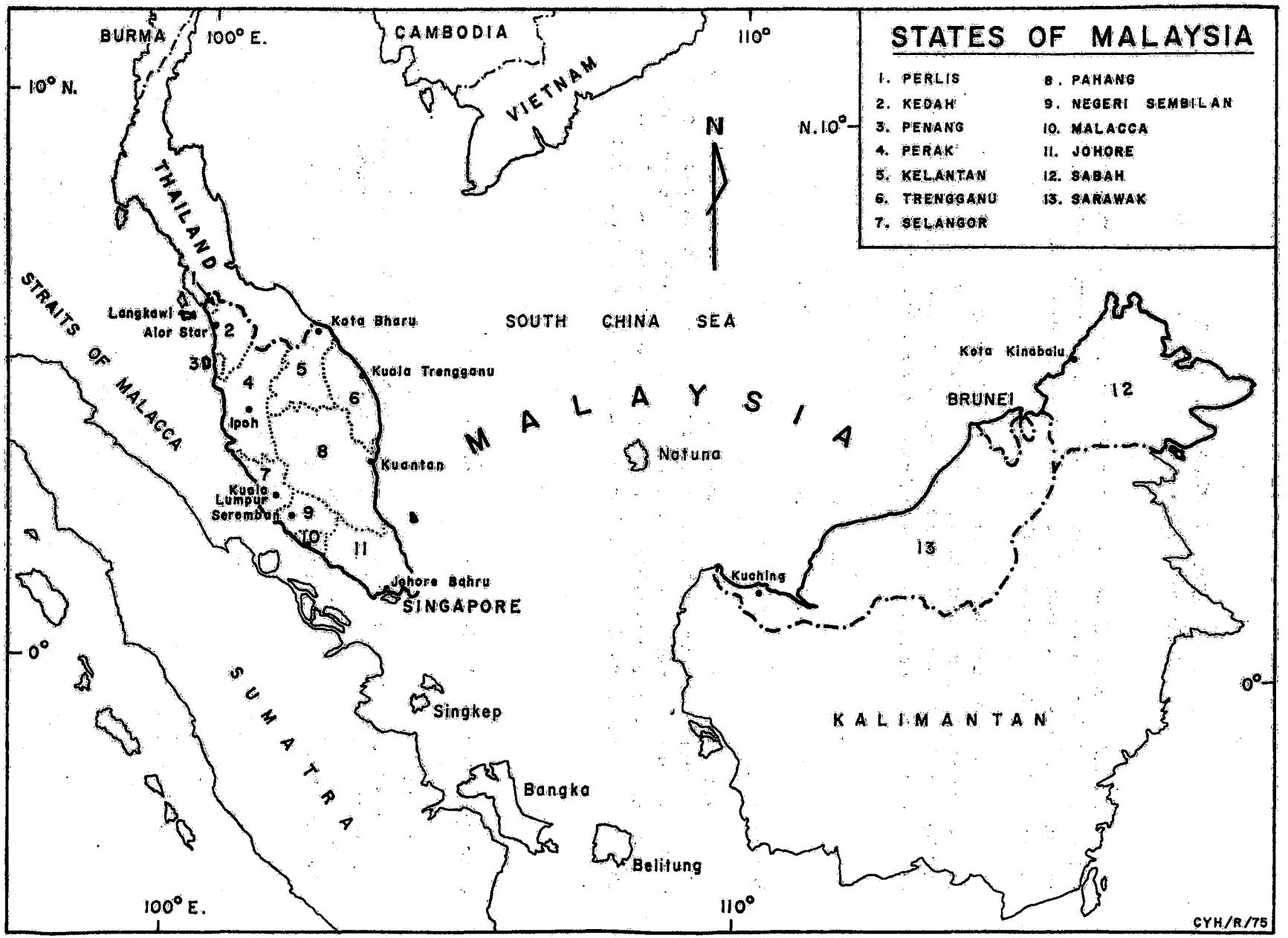
STATES OF MALAYSIA
1. PERLIS
2. KEDAH
3. PENANG
4. PERAK
5. KELANTAN
6. TRENGGANU
7. SELANGOR
8. PAHANG
9. NEGERI SEMBILAN
10. MALACCA
11. JOHORE
12. SABAH
13. SARAWAK
BURMA
100° E.
CAMBODIA
110°
VIETNAM
10° N.
N
N. 10°
THAILAND
STRAITS OF MALACCA
SOUTH CHINA SEA
Langkawi
Alor Star
Kota Bharu
Kuala Trengganu
Ipoh
Kuantan
Kuala Lumpur
Seremban
Johore Bahru
SINGAPORE
MALAYSIA
Natuna
Kota Kinabalu
BRUNEI
Kuching
KALIMANTAN
0°
Singkep
Bangka
Belitung
SUMATRA
100° E.
110°
CYH/R/75