

P E R S A T U A N G E O L O G I M A L A Y S I A

# WARTA GEOLOGI

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## G E O L O G I C A L N O T E S

## Replacement veins

K.F.G. Hosking. Calle Isla de Cuba 23, 1<sup>o</sup>, 3, Sitges (Barcelona), Spain.

"Things are seldom what they seem,  
Skim milk masquerades as cream".

(Sir W.S. Gilbert, (H.M.S. Pinafore).)

Introduction

It is all too often assumed that if an exposed part of a vein has more-or-less parallel walls the vein is a filled fissure. This, in spite of the fact that it was demonstrated years ago that this may not always be the case. Thus, Webb (1946) recorded that in the granite of South Crofty Mine, Cornwall, there are so-called pegmatite veins, with more-or-less parallel sides, that consist essentially of relict feldspar phenocrysts embedded in quartz. The feldspars often bridge a given vein and have been part-replaced by quartz and a little muscovite (Fig. 1). Studies of thin sections demonstrated that such a vein had developed by the complete replacement of the finer components of the granite along a knife-edge fissure and the partial, and often slight, replacement of those feldspar phenocrysts that had been intersected by the fissure which was the passageway for the ascending metasomatising agents.

Since Webb's observations were published I have found other examples of replacement veins in Cornwall and elsewhere, and in this note I shall confine myself to some of those occurring in granite cusps that contain greisen-bordered Sn/W veins. Those, which are briefly described and discussed below, have been chosen to show variations of the theme and also to emphasise two points. First, one must think twice before pronouncing that a given vein, particularly one with more-or-less parallel sides, is a filled fissure. Second, establishment of the true and detailed development of veins, whose morphology is such that it is likely that replacement processes have played a major role in their creation, can sometimes only be done by means of detailed mapping and follow-up laboratory work.

Examples

At Cligga, Cornwall, a granite cusp, which forms part of the coastline, contains numerous, so-called 'pseudo-bedded' greisen-

bordered veins containing cassiterite, wolframite, etc. (Fig. 2). These veins are believed to have developed as a result of mineralising agents ascending fissures parallel to the original granite contact. Although sections of these veins have approximately parallel walls, variations in the width of a given member, when traced down the dip, prove that it could not have developed simply by the infilling of a fissure: local wallrock replacement must have played a part in its genesis.

Cligga also provides a good example of a quartz replacement vein in porphyritic granite. The vein, which is exposed half-way down the cliff path and is about 3 mm wide, can be traced for several metres. It is bridged by feldspars of the granite which are white except for the portions that lie within the vein: the latter are orange (Fig. 3).

Examination of thin sections of the vein give no reason for thinking that it is the product of infilling of a fissure with quartz and feldspar, the latter having been deposited in optical continuity with feldspar exposed in the walls. On the contrary, the genesis of this vein is essentially the same as that of veins described by Webb and referred to above. The vein is essentially the product of replacement by quartz of the finer components of the granite adjacent to a knife-edge fissure. An interesting variation of this theme appeared in a block of granite in the Camborne area. This block contained a quartz replacement vein with bridging feldspars, but, unlike the examples described above, the quartz was drusy.

Carris wolfram mine is situated in the granite terrain of Northern Portugal. There, some twenty years ago I found replacement veins many of which were characterised by the presence of bridging feldspars. Some of these veins were more complex than those described above, either structurally and/or mineralogically. Figs. 4 - 11 show these variations and only the following brief comments are needed:- At Carris bridging feldspars often behaved as local impounding bodies during the subsequent stages of vein development, and ore-minerals, wolframite, etc., were frequently deposited immediately below such feldspars or within them. Fig. 8 shows an example of the latter. That bridging feldspars have acted as impounding bodies elsewhere is indicated by Fig. 12 which is a sketch of a specimen I collected from the small mineralised granite cusp that is exposed in Cameron Quarry, St. Agnes, Cornwall. (This specimen is now in the I.G.S. collection, London). It shows a quartz/tourmaline replacement vein in granite, in which the vein components have been impounded locally by a bridging feldspar.

Commonly at Carris one finds a vein that rapidly narrows and then opens out again, and the geometry of the feature is such that it cannot be accounted for by displacement of the walls. The mineralogy of the narrow part of the vein often differs markedly from that of the wider adjacent parts, and the former is usually enclosed within a wide pod of altered wallrock which may contain minerals that are not

found locally either in the wider parts of the vein or in their bordering wallrocks. Figs. 9 - 11 are typical examples. This curious vein pattern is not confined to Carris. I have described similar bodies that occur in the granitic cusp of St. Michael's Mount, Cornwall (Hosking, 1953-54). Fig. 13 is one such example. The mechanics of the development of this vein pattern is uncertain. I still adhere to the view I expressed when discussing the St. Michael's Mount veins. I assume that during the initial stages of the development of the pattern in question passageways for ascending mineralising agents only existed along those parts that are now extremely narrow. Within and adjacent to these passageways a variety of minerals were deposited from agents whose chemical character varied with time. One important product of this stage was the development of a marked envelope of altered wallrock around the fissure. Subsequently narrow fissures developed as prolongations of the original fissure and along these mineralising agents ascended which produced comparatively wide parts of the veins by wallrock replacement. These wider parts are usually mineralogically simple, often largely or wholly composed of quartz, and the wallrocks adjacent to them show no obvious signs of alteration. During the development of these wider parts the earlier narrow parts did not function as channelways for mineralising agents as they had already been effectively sealed by deposited minerals.

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#### Captions

- Fig. 1. - A quartz-feldspar replacement pegmatite from South Crofty Mine, Cornwall. The feldspars are stippled. Tracing from a photograph. X8/9. (After Webb, 1946).
- Fig. 2. - The coastal section at Cligga, Cornwall, showing somewhat diagrammatically, the 'psuedo-bedded' greisen-bordered veins in the kaolinised granite cusp.
- Fig. 3. - Sketch of a portion of a quartz replacement vein that is found on a platform, about half-way down the cliff, and near to the path from the quarry to the beach. (Cligga, Cornwall).
- Fig. 4. - Sketch of an unusually large bridging feldspar associated with a quartz vein in medium-grained porphyritic granite. Carris, North Portugal).

- Fig. 5 - Sketch of a replacement vein consisting essentially of quartz, but containing some dark-green mica (M) (zinnwaldite?) and bridged by feldspars. The host is a medium-grained granite and near the vein its feldspars are markedly pinker than elsewhere. (Carris).
- Fig. 6 - Sketch of a quartz replacement vein in medium-grained biotite-granite. The vein is bordered, on either side, by a zone (P.F.) about 2.5 cm wide, in which all the feldspars of the granite are pink. Beyond this zone both pink and greenish feldspars occur. (Carris).
- Fig. 7 - Sketch of two quartz replacement veins. Elsewhere these veins contain wolframite and molybdenite. (Carris).
- Fig. 8 - Sketch of a quartz replacement vein with a bridging feldspar that has been incipiently replaced by chalcopyrite (Cpy).
- Fig. 9. - Sketch-plan of a narrow portion of a vein that consists of muscovite (M) and that is bordered by a zone of feldspathised granite in which molybdenite (lined) and coarse muscovite (stippled) occur. Where the feldspathised zone ends the narrow muscovite vein changes rapidly to a comparatively wide quartz vein lacking altered wallrock borders. The countryrock is medium-grained granite. All the feldspars present are white. (Carris).
- Fig. 10. - Sketch-plan of a quartz/feldspar replacement vein whose very narrow portion is enveloped by a mass of greenish mica (M). The vein and the mass of mica are enveloped by a zone (P.F.) in which the feldspars of the granite are pink. The host is medium-grained granite. (Carris).
- Fig. 11. - Sketch plan of a quartz replacement vein that is spatially associated with an earlier pod of coarse feldspar (C.F.). The quartz/mica (Q/M) core of the feldspar pod was probably formed during the early developmental stages of the quartz (Q) replacement vein and was followed by the formation of the wider parts of this vein. (Carris).
- Fig. 12. - Sketch of an orientated hand-specimen from Cameron Quarry, St. Agnes, Cornwall, showing a quartz/tourmaline replacement vein locally impounded beneath a bridging feldspar. The country rock is porphyritic granite.
- Fig. 13. - Sketch-plan of one of a number of greisen pods on the western side of the platform at St. Michael's Mount, Cornwall. The pod consists of an inner feldspathic, tourmalinised, mica-enriched zone (F.Gn.) and an outer envelope of slightly tourmalinised, but otherwise normal greisen (Gn.). The pod surrounds a narrow part of the vein that contains mica, topaz, cassiterite and wolframite. Beyond the pod the vein widens markedly and consists, as far as can be seen, solely of quartz (Q). Adjacent to the wide quartz parts of the vein the granite host has suffered no obvious alteration.

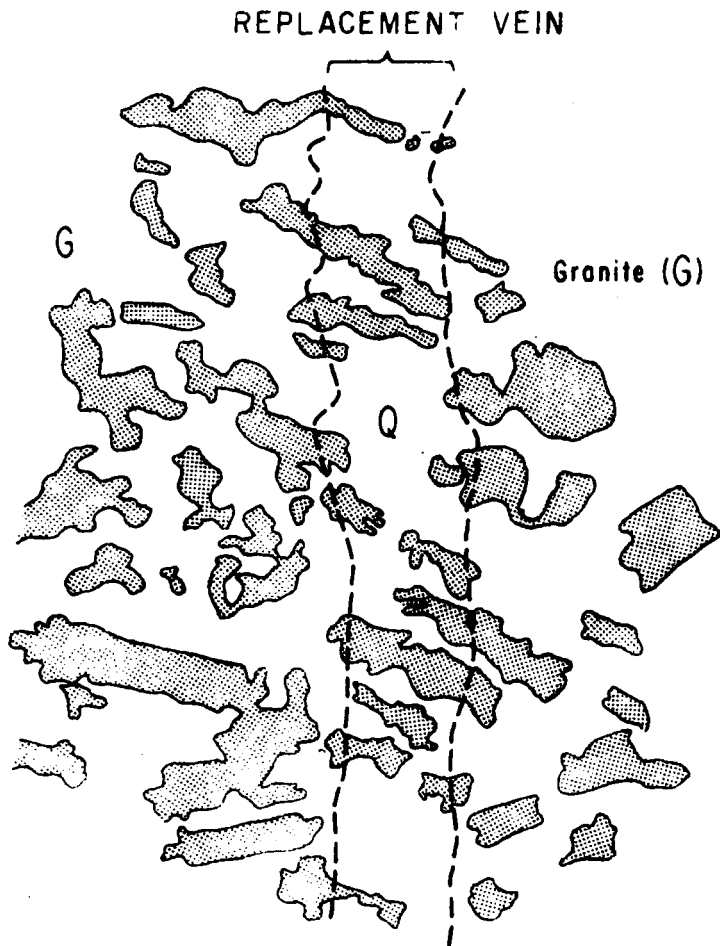
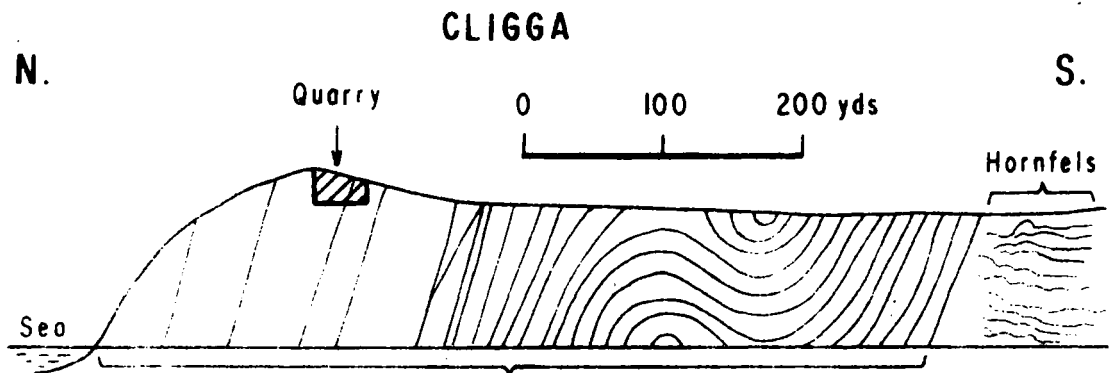


Fig. 1.



Kaolinised granite with many greisen-bordered veins containing cassiterite, wolframite, etc., in a quartz matrix.

Fig. 2.

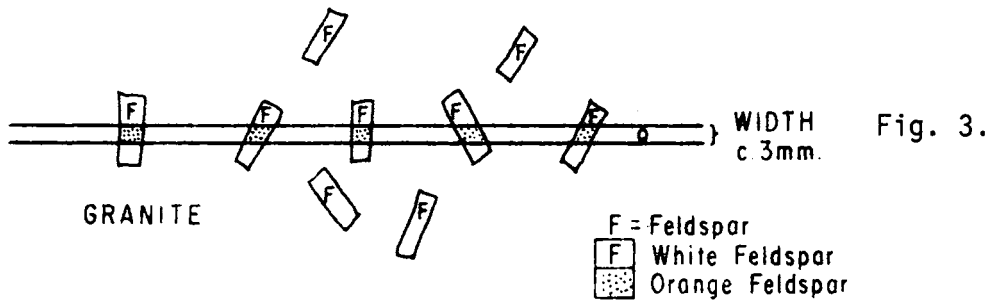


Diagram of quartz replacement vein in granite (Cligga, Cornwall).

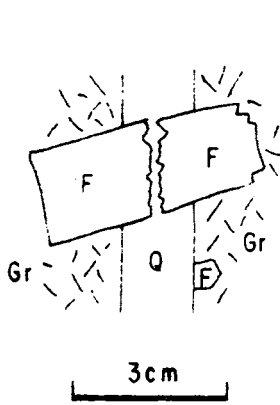


Fig. 4.

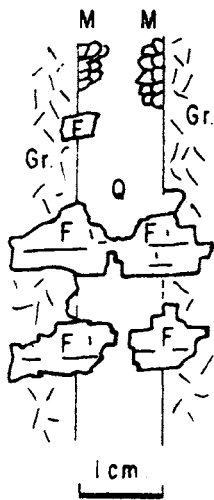


Fig. 5.

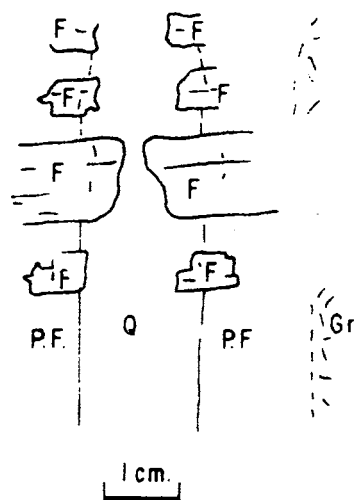


Fig. 6.

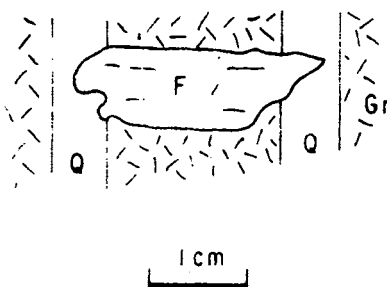


Fig. 7.

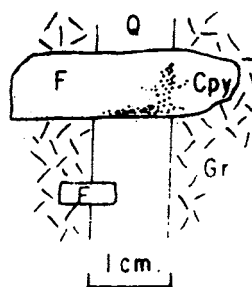


Fig. 8.



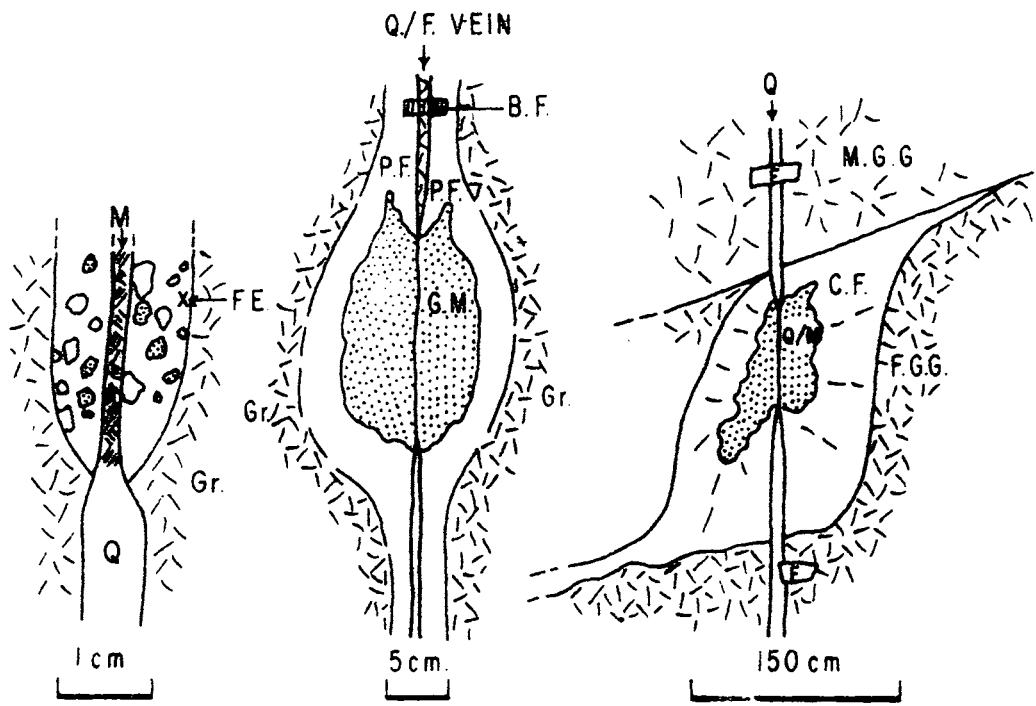


Fig. 9.

Fig. 10.

Fig. 11.

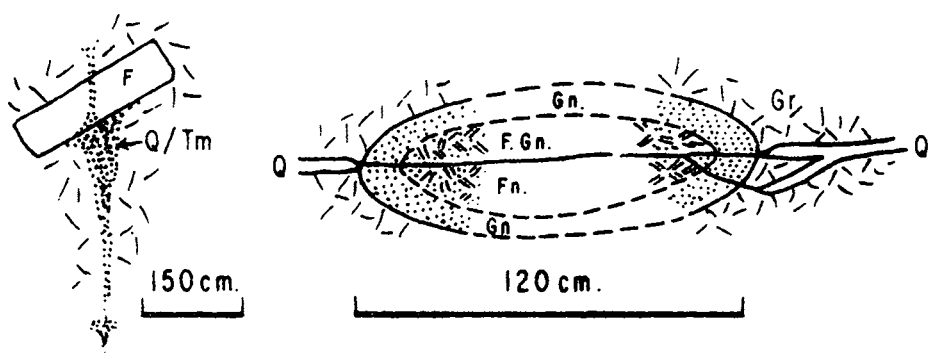


Fig. 12.

Fig. 13

The Geology of the Republic of Singapore: Comments on suggested correlations of the late Cainozoic stratigraphy.

B.C. Batchelor, Jabatan Geologi, Universiti Malaya, Kuala Lumpur.

In concurrence with Professors Haile (1977) and Hutchison (1977), I commend the authors of the "Geology of the Republic of Singapore" (dated 1976 but not printed till mid-1977) (hereafter referred to as PWD), particularly for their detailed mapping, description, and formalisation of stratigraphic units comprising the Cainozoic alluvium, of special interest to my present studies.

I hold alternative views however, on the extra-Singaporean correlation of the "Old Alluvium" (PWD, p. 54-55), which views I earlier submitted for consideration (written communication, May 1977) to Mr. G.D. Mansergh, a contributor to the relevant section of the publication.

According to PWD, the "Old Alluvium" is seen in all exposures to be a "clayey coarse angular sand", and Burton (1964) stated that his "Older Alluvium" in Johore and Singapore is often massive where sandy types predominate, and bedding is generally horizontal though occasionally dips at up to 20°. No mention of peat occurrences has been made by any authors writing on the Singapore deposits. These characteristics compare closely with those of the "Older Sedimentary Cover" (OSC), described by Aleva (1973) and Aleva, et. al. (1973) from the Pulau Tujuh and Karimata Islands of western Indonesia. There the OSC is typically found as a subhorizontal unit of clayey sand having a rather massive appearance with bedding planes far apart (and intercalations of peat only in the upper part). In all areas it directly overlies basement rocks, and a probable Miocene-Pliocene age is indicated from the contained pollen spectra. On the basis of similar lithology and stratigraphic relationships, I feel confident in correlating the Singapore "Old Alluvium" with the OSC. Such a correlation has previously been made for coastal exposures of "Old Alluvium" equivalents in the Lumut-Dindings area in Perak, assisted by detailed offshore shallow seismic data (Batchelor, 1976).

The younger "Alluvial Complex" (AC) of Aleva (1973) differs however, from both the Singapore "Old Alluvium" and the OSC in comprising a more differentiated sequence of sands and clays with abundant peat occurrences, showing evidence of repeated sedimentation and incision and considerable variations in erosional base level, pointing to vertical oscillations in relation to sea level (PWD, p. 54, incorrectly states that Aleva had assigned "repeated vertical movements of the erosional base level" to deposition of the OSC). The AC can hardly be described as 'massive' and the characteristics are entirely suggestive of middle to late Pleistocene glacio-eustatic sea level control of sedimentation.

I therefore believe the suggested correlation by PWD, of the

Singapore "Old Alluvium" with Aleva's (1973) AC, is in error. They appear to have made their correlation mainly because both units are found to fill deep troughs which lie at, or below 100 m below sea level. However, comparing similar levels within distant terrestrial deposits lying on sloping ground surfaces, is not convincing evidence for correlation, and the OSC is also found to fill deep bedrock channels in the Lumut offshore area in Perak.

If, as I believe, the OSC is the offshore equivalent of the Singapore "Old Alluvium", equivalents of the AC must be sought among the younger alluvial formations of Singapore, such as the "Kallang Formation" (PWD, p. 57-61) comprising five members, including the "Alluvial Member" found as valley fill throughout the Republic. Although the "Alluvial Member" has been assigned a Holocene age, I believe that at deeper levels within the Singapore river valleys, especially in their offshore extensions where deposits would be expected to thicken, late Pleistocene beds of similar character will be determined, conceivably extending the time range of the "Kallang Formation". On the Peninsula mainland, the lithologically similar "Young Alluvium" (of Walker, 1954-55 and Stauffer, 1973) overlies the "Old Alluvium" in the same geomorphological setting as the "Alluvial Member" in Singapore. The "Young Alluvium" is believed by Sivam (1969), to date from the late Pleistocene, based partly on radiocarbon datings of greater than 39000 years B.P. (Sivam, 1968). It should also be noted that a sea level 2 to 10 m higher than present around 120000 years B.P. has been well documented (Veeh, 1966; Broeker, et al., 1968) throughout the world. It is quite possible therefore, that parts of the "Kallang Formation" (e.g. the iron-cemented beach rock of the "Littoral Member", the "Reef Member", and the "Lower Marine Member") date from this period of transgression. C-14 and Th/U isotope dating on suitable samples would clarify these uncertainties.

It is hoped that further confirmation of the correlation of the "Older Sedimentary Cover" with the "Old Alluvium" will be forthcoming, once samples of both units, kindly supplied to me (by, respectively, Billiton Exploratie Maatschappij Indonesia B.V. and the Public Works Department, Singapore), have been fully analysed.

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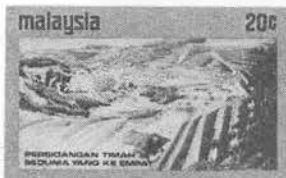
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## G E O L O G Y   O N   S T A M P S

## 4. Economic Geology

N.S. Haile, Jabatan Geologi, Universiti Malaya

There are many stamps showing mines, oil wells, and mining, but very few show imagination in design, or anything of geological interest.

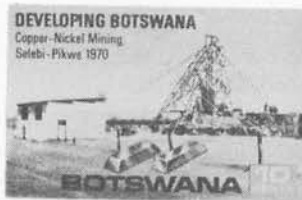


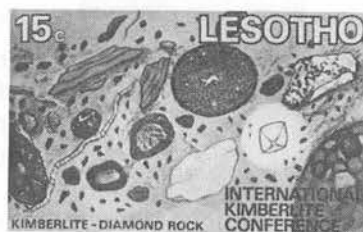
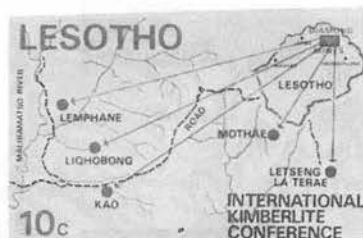
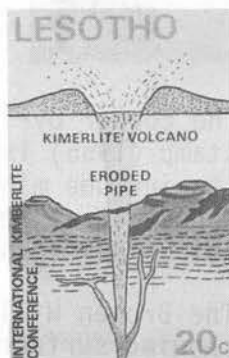
Tin mining is not represented by any outstanding stamp. The old Federation of Malaya 25c stamp (1957), shows a tin dredge which is also shown, superimposed on a tin ingot, on the 50c Malaysian stamp of 1974, in honour of the 4th International Tin Conference. The other two stamps of this series show photographic views of open-cast mines, the 15c stamp a small palong operation, the 20c apparently the large pit of Sungai Besi Mine. The Nigerian stamp (1953) has the added interest of a panner. Perhaps the best of an undistinguished lot is the Thai stamp for the I.T.C. meeting in 1969, showing a spectacular palong.



The patient and industrious Malaysian dulang washers have yet to be depicted on a stamp, but Canada has shown a gold panner (1958), New Zealand a gold-digger, and Sierra Leone a diamond washer (1961), carefully making it clear from the caption that he is a licensed one.

Diamonds have inspired other stamps, including the Ghana 4d (1959) and the Botswana set of 1970, which imaginatively shows the stages from the natural octahedral crystal of diamond, to its division (by sawing, in the position known as 'bishop's head') into two brilliants, next the partly bruted lower half, and finally two views of a faceted, brilliant-cut diamond. The other two stamps in this set show copper-nickel mining at Selebi-Pikwe.





Perhaps the best set of mining stamps, from a geologists' point of view, is the Lesotho set issued for the International Kimberlite Conference in 1974. The 15c stamp, showing a diamond crystal in a kimberlite matrix, and the 20c stamp, showing that a diamond pipe represents the feeder to a former volcano, since eroded, are particularly instructive. Through a draughting error, kimberlite is mis-spelled "kimerlite" on the 20c stamp. A splendid set which shows what can result when geologists are consulted in the design stage.

There are many rather uninspired stamps showing mines and mining installations for which, fortunately, space need not be found in a geological collection. For good measure, however, one of the best of these (the 7th Commonwealth Mining and Metallurgical Congress held in 1961 in the short-lived Federation of Rhodesia and Nyasaland) is shown below.





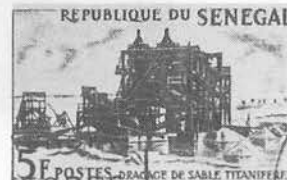
The copper pyrites mine shown on the Cyprus stamp (1955) is a good example of failure to include mineralogical interest, but I suppose it at least makes the point that spacious underground mines exist there.



The Broken Hill Centenary Stamp (1958) showing surface installations and an ore bucket, has the added interest of a frieze of aboriginal drawings, but in spite of this seems to me to be rather dull and uninteresting.

Bucket excavators and draglines are a favourite theme on stamps of opencast mines and one can see why, since without some machinery, opencast mines are usually devoid of much pictorial interest. Witness the wretched stamps showing the Havelock asbestos mine (Swaziland, 1961), and manganese mine (Gold Coast, 1952).

The most striking bucket excavator stamp is the Senegal stamp (1964) showing phosphate loading at Pallo. The stamp from the same set showing dredging of titaniferous sand, is also the most effective dredge stamp. The dredge seems to tower over the viewer in an ominous way, giving indeed, the overpowering effect that large tin dredges have when seen close to.

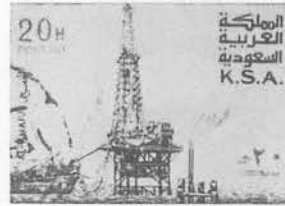
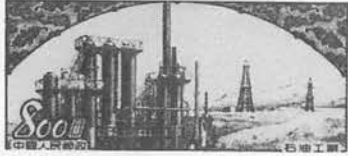






Christmas Island has a clamshell bucket loader on its phosphate stamp and a phosphate train (1963). Bucket excavators appear on the stamp showing the Fuhsin opencast coal mine (China, 1953), the Marampa iron mine (Sierra Leone, 1956), the British Guiana bauxite mine (1964), and the Cam Pha Coal Mines (North Vietnam, 1959), whereas the Jamaican bauxite stamp of 1964 shows a dragline excavator; the last is one of a set which also shows gypsum being loaded on the 9d value.

Salt springs forming terraces in the Philippines (1935), "raking salt" in the Turks and Cocos Islands (1938) and a highly nondescript salt pond in Anguilla (1953) depict another non-metallic mineral resource. Once again the Chinese have what seems to me to be the most interesting stamp of the series, the 8 fen stamp (1956) based on brick carvings of the Tung Han Dynasty, found at Chengtu, 25-200 A.D., showing "Salt Production". The stamp (see close-up) depicts a derrick with men drilling a well for brine or perhaps raising brine from a well already in operation. Once again the Chinese gently remind us that they were in the drilling business a millenium or so before the Texans.



Petroleum stamps are mostly of drilling or refining operations, as the three stamps here illustrated from China (1952), Pakistan and Saudi Arabia, show.

Still on the subject of hydrocarbons, "the discovery of Lake Asphalt by Raleigh" is shown on the Trinidad and Tobago stamp of 1953, while the less interesting stamp of 1960, shows "Pitch Lake".

Finally, geothermal power is featured on the New Zealand \$1 stamp of 1970. A fine, simple stamp of bold design. A pity it does not show what occurs beneath the earth's surface!



Many opportunities exist for stamps depicting themes in mining and petroleum exploration which get away from the hackneyed depiction of mine winching gear or oil wells and show the action where it is, in the underground structures, and rocks. Lesotho set is already referred to is a fine example of this. Geologists could play a part in suggesting designs to their national Post Offices, commemorating conferences, and celebrating their country's mineral resources.



## M E E T I N G S   O F   T H E   S O C I E T Y

Seminar on the Petroleum Geology of the Sunda Shelf, December 16th 1977, Hotel Equatorial, Kuala Lumpur.

This seminar was attended by approximately 160 participants mainly from the petroleum industry and staff and students of institutions of higher learning.

9 papers were presented, the abstracts of which are enclosed together with this Newsletter for the benefit of members who were not present at this seminar. Financial support for the organising the seminar was given by Petronas and Esso Exploration Malaysia Inc.

This seminar is the first meeting of the Society where geologists from the Petroleum Industry in Malaysia have contributed papers for discussions and also in some cases for publication in the Society's Bulletin. It is hoped that this trend would be continued in future and that similar such meetings could be held annually.

B.K. Tan

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N E W S   O F   T H E   S O C I E T Y

Election of 1978/79 Council

The following were nominated by the Nomination Committee and being unopposed are declared elected to serve in the 1978/79 Council of the Geological Society of Malaysia.

President	:	Tan Bock Kang
Vice President	:	Mohammad b. Ayob
Hon. Secretary	:	Andrew Spykerman
Hon. Asst. Sec.	:	John Kuna Raj
Hon. Treasurer	:	Chong Nai Hooi
Hon. Editor	:	Yeap Cheng Hock

Councillors: 2 Years: Gan Ah Sai  
 Khoo Kay Khean  
 Wan Fuad b. Wan Hassan  
 James Lau

1 Year : S. Paramanathan  
 Wong Yoke Fah  
 Yeow Yew Heng  
 Yew Chee Cheong

Brief notes on the councillors:

Tan Bock Kang: Ph. D. (London). Associate Professor, University of Malaya. Currently President.

Mohammad b. Ayob: Has lectured in University of Malaya. Ph. D. (New York State). Currently in charge of Petronas East Malaysian operation in Miri.

Andrew Spykerman: B.Sc. (Canada). Economic geologist in Associated Mines (M) Sdn. Bhd.

John Kuna Raj: B.Sc. (Malaysia), M.Sc. (ITC). Lecturer at University of Malaya.

Chong Nai Hooi: M.Sc. (Malaysia). Mine geologist at Sungei Besi Mines Ltd.

Yeap Cheng Hock: B.Sc. (Malaysia). Senior geologist in Associated Mines (M) Sdn. Bhd.

Gan Ah Sai: B.Sc. (Malaysia). Currently in Geological Survey of Malaysia.

Khoo Kay Khean: B.Sc. (Malaysia). Currently in Geological Survey of Malaysia.

Wan Fuad b. Wan Hassan: B.Sc. (Malaysia), M.Sc. (Leicester). Joined the National University of Malaysia as lecturer.

James Lau: B.Sc. Formerly with Geological Survey, Kuching, Sarawak. Currently Senior geologist, Petronas.

S. Paramanathan: B.Sc. (Malaysia), D.Sc. (Ghent). Joined the Agriculture Department.

Wong Yoke Fah: B.Sc. (Malaysia). Joined Valentine & Dunne (presently renamed Valdun Consultants) as an economic geologist.

Yeow Yew Heng: Ph. D. (Malaysia). Joined Esso Production Inc. as an exploration geologist.

Yew Chee Cheong: B.Sc. (Malaysia). Was in Geological Survey of Malaysia before joining Esso Exploration Inc.

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Annual General Meeting

The Society's Annual General Meeting will be held soon, most probably in late February. Details will be announced later.

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Field Excursion to Kuala Lumpur - Karak Highway

The Geological Society of Malaysia is organizing a one day field excursion along the new Kuala Lumpur - Karak Highway on Sunday, February 12 1978. The trip will be led by Prof. N.S. Haile of the Department of Geology, University of Malaya. Members interested in attending this excursion are requested to write in to the Asst. Secretary, Geological Society of Malaysia, c/o Dept. of Geology, University of Malaya, Kuala Lumpur 22-11.

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Symposium/Training Course: Geology of Tin DepositsSymposium

Further to the information given in Warta Geologi, Vol. 3, no. 5, about 2 months ago, there are a few more pieces of news and further progress have been made in the organization.

The following papers have been offered after the publication of the previous Warta Geologi:

- (a) J.G. Wilson (Australia): The major controls of tin mineralization in the Bushveld Igneous Complex, South Africa.
- (b) C.S. Hutchison & K.R. Chakraborty (Malaysia): Tin: A mantle or crustal source?
- (c) R. Rivera (Venezuela): Geology of the tin province in the Amazonas Territory, Venezuela.

In addition several geologists have indicated that they may be able to present papers on tin deposits in Bolivia (2), Burma, India and Malaysia (2).

With reference to the list of papers given in the previous Warta Geologi, there are several changes:

- (a) C.S. Hutchison and S. Lerdthusnee have withdrawn their paper.
- (b) K.F.G. Hosking's keynote paper is entitled "Tin distribution patterns".

- (c) M.B. Katz's paper is co-authored with K. Tuckwell who will be presenting the paper.
- (d) In the paper by S. Ishihara, H. Sawata, S. Arpornsuwan and others, the "others" are P. Busaracome and N. Bungbrakearti.
- (e) B.C. Batchelor's paper should be entitled "Geological characteristics of certain coastal and offshore placer deposits as essential guides for tin exploration in the Sunda Shelf area, Southeast Asia".
- (f) A.H.G. Mitchell's paper should be entitled "Rift, subduction and collision related tin belts".
- (g) S. Pitragool's paper is co-authored with S. Panupaisal.

The Commonwealth Foundation has very generously promised to provide financial support to enable two very eminent Commonwealth geologists to participate in the symposium.

#### Training Course

For the Course, there will be 20-25 participants. More than 20 applicants were not successful with their applications to participate in the Course. The selected participants are from Bolivia, Brazil, Nigeria, Burma, Thailand, Indonesia, Malaysia and possibly also Venezuela and Australia.

The Course will start on 27 March and end on 15 April 1978 in Phuket, Thailand. The course from 27-31 March 1978 will be lectures and practicals on geology, mining, exploration and evaluation of tin deposits. After that there will be field courses in the East Coast, Kuala Lumpur, Kinta Valley and Phuket. The Phuket part of the course will be organized with the cooperation of the Dept. of Mineral Resources, Thailand and the Geological Society of Thailand.

The instructors for the Course in Malaysia will be from the Geological Survey, the tin industry and local universities.

T.T. Khoo

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#### Ipoh Discussion Meeting

The Society plans to hold a discussion meeting in August 1978 in Ipoh. This meeting will be general and it is hoped that members from various fields of geology will come forward with their papers for discussion. Those intending to present papers are requested to write in to the Secretary of the Society.

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### 1978 Seminar on the Petroleum Geology of the Sunda Shelf

Following on the success of the recent seminar on the Petroleum Geology of the Sunda Shelf, the Society will hold a similar seminar in 1978. This seminar is planned for early December and those intending to present papers are requested to write in to the Secretary of the Society.

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### Donations to the Society

A cheque for 1000 Malaysian ringgit was given to the Society by PETRONAS as their contribution towards the organization cost of holding the Seminar on Petroleum Geology of the Sunda Shelf. This presentation was made during lunch at Hotel Equatorial on 16th December 1977.

ESSO PRODUCTION MALAYSIA Inc. donated 1500 Malaysian dollars to the Society's Speakers' Fund. The cheque was presented on behalf of Esso by Mr. J.H. Armitage, Manager, Exploration Dept. Esso's past donations to the Society's Publication Fund are acknowledged both in Bulletin 8 and 9 which were published in late 1977.

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### New Library Additions

New Library additions are given below:-

1. Institution of Mining and Metallurgy, Transactions/Section B, vol. 86, May & August, 1977.
2. Institution of Mining and Metallurgy, Transactions/Section A, Vol. 86, July, 1977.
3. Institution of Mining and Metallurgy, Transactions/Section C, Vol. 86, June & September, 1977.
4. Institution of Mining and Metallurgy, Bulletin no. 852 and 853, 1977.
5. Geology of Indonesia: Publications 1958-1975 and a few earlier publications by H.D. Tjia.
6. Commonwealth Geological Liaison Office Newsletter No. 10 and 11, Oct. 1977.
7. Mineral based industries of Sri Lanka by M.M.J.W. Herath. Oct. 1977. (Commonwealth Geological Liaison Office, Liaison Report 131).
8. Journal of Research of the United States Geological Survey, Vol. 5, no. 5, Sept-Oct 1977.

9. Study group on landsat imagery for Commonwealth Countries in the African region, 5-10 Sept. 1977; Lobatse, Botswana by M.M. J.W. Herath. Nov. 1977. (Commonwealth Geological Liaison Office, Liaison Report 132).
10. Mesozoic fossils from Yunnan, China, vol. I & II, 1977.
11. Acta Palaeontologica Sinica, vol. 16, no. 2, 1977.
12. Geosurvey Newsletter, vol. 9, no. 30-36, and vol. 10, no. 1, 1977.
13. Scripta Geologica, no. 42 & 43, 1977.
14. Bulletin du Bureau de Recherches Geologiques et Minieres, section IV, no. 3, 1977.

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### News about Members

Members are requested to write in and inform about their movements, such as attendances at courses, seminars, transfers, etc.

- W.O. Gigon - Has left Sarawak Shell, Sarawak for home in Switzerland after 27 years abroad. He has taken up Life Membership and will keep in touch with this region.
- K.M. Leong - Has completed M.Sc. course in Petroleum Geology at Imperial College in London and is back at the Geological Survey in Sabah.
- 

### Membership

#### New Members

The following were elected to:

#### Full Members

C.N. Curnow  
Esso Production  
P.O. Box 857  
Kuala Lumpur

Wan Ismail b. Wan Yusoff  
PETRONAS  
P.O. Box 2444  
Kuala Lumpur

Wm. Don Neville  
Union Texas Asia Corp  
1505 Shaw Centre  
Scotts Road  
Singapore 9

Dr. Ausafur Rahman  
Geography Department  
University of Singapore  
Bukit Timah Road  
Singapore 10



Dr. F.C. Scherer  
c/- Sarawak Shell Bhd.  
Lutong, Sarawak.

Dr. Aung Khin  
Room 901 Malayan Credit House  
96 Somerset Road  
Singapore 9

Dr. George G. Leckie  
BP Petroleum Development  
P.O. Box 288, Tanglin P.O.  
Singapore 10

Md. Zin Che Lah  
Petronas  
P.O. Box 2444  
Kuala Lumpur

Dr. S. Ishihara  
Geological Survey of Japan  
Hisamoto 135  
Takatsu-Ku, Kawasaki  
Japan

Ab. Wahab Suboh  
Dept. of Petroleum  
Universiti Teknologi Malaysia  
Jalan Gurney  
Kuala Lumpur

Mohamed Zohari Shahrarun  
Faculty of Mechanical Engineering  
University of Technology  
Kuala Lumpur

#### Associate Members

Shamsuddin Hj. Ibrahim  
Pernas Mining Sdn. Bhd.  
Tingkat 2, Block B  
Damansara Height  
Kuala Lumpur

Lim Hock Boon  
Brown & Root  
P.O. Box 104  
Killiney Road P.O.  
Singapore 9

Toon Kam Meng  
Brown & Root  
P.O. Box 104  
Killiney Road P.O.  
Singapore 9

Chin Beng Khoon  
Brown & Root  
P.O. Box 104  
Killiney Road P.O.  
Singapore 9

Abdul Razak b. Sheikh Mahmood  
c/- M/x Razak & Ramli  
17 Jalan Malacca  
Kuala Lumpur

Moid B. Yahya  
Bintang Paratek Sdn. Bhd.  
Bilek 1, Tingkat 3  
Bangunan Bank Bumiputra  
Kuala Lumpur

#### Student Members

Bong Sai Siah  
12, SS2/86  
Petaling Jaya

S. Chandra Kumar  
Dept. of Geology  
University of Malaya  
Kuala Lumpur

Samsudin Hj. Taib  
c/- Dept. of Geology  
University of Malaya  
Kuala Lumpur

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Change of address

The following changes of address have been notified to the Society:

D. Jerry Patrick  
c/- Hendrickson & McFarland  
Suite 732, The Main Building  
1212 Main Street  
Houston, Texas 77002, USA

Sumio Sakagami  
Dept. of Earth Sciences  
Faculty of Science  
Chiba University  
Yayoi-Choi 1-33, Chiba  
Japan

Dr. W.O. Gigon  
Waldegstr. 33  
3800 Interlaken  
Switzerland

Tang Ming Kheong  
14B Jalan Barat  
Off Jalan Imbi  
Kuala Lumpur

Ajaib Singh  
47 Prospect Road  
Leicester  
England

Abdul Latif b. Din  
5A4, Flat UDA  
Jln. Pantai Baru  
Kuala Lumpur

Lindsay S. Denholm  
35 Mudies Road  
St. Ives, NSW 2075  
Australia

J. Stocklin  
United Nations  
P.O. Box 1555  
Tehran, Iran

C.H. Leigh  
P.O. Box 482  
Camberwell, Vic. 3124  
Australia

Teoh Lay Hock  
Geological Survey  
P.O. Box 1015  
Ipoh, Perak

Arend L. Scholten  
Helper Esweg 10  
Groningen  
Netherlands

J.F. Lambert  
Australian Anglo American Ltd  
110 Charles Street  
North Perth, W.A. 6006

Cathy Connor (Miss)  
Branch of Alaskan Geology  
United States Geological Survey  
Menlo Park, Ca. 94303  
USA

Gan Lay Chin (Miss)  
AlpenstraBe Nr. 6  
A-8707 Goss  
Leoben, Austria

Address Unknown

The Society would like the address of the following members:

Aminuddin b. Yusoff  
Zaiton Bt. Harun

D. I. Hollis  
Takehiro Sakimoto

## O T H E R   N E W S

Regional Conference on Technology for Rural Development

The Malaysian Scientific Association and COSTED (Committee on Science and Technology in Developing Countries) in cooperation with other Malaysian scientific and professional organisations and development agencies are organising a 5-day regional conference on technology for rural development from 24 to 28 April 1978 at Kuala Lumpur. The theme of the conference is to review advances in technology for rural development.

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7th Annual Convention of the Indonesian Petroleum Association

The Indonesian Petroleum Association will hold its Seventh Annual Convention in Jakarta June 6th and 7th 1978. The Convention Technical Sessions will once again provide an excellent opportunity to disseminate information on a wide variety of subjects affecting the Indonesian Petroleum Industry.

For further information, please write to:

Chairman  
I.P.A. Lecture Committee  
Jalan Menteng Raya 3  
Jakarta, Indonesia.

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Report on Meetings1. International Tin Symposium, La Paz, Bolivia, 14-22 November 1977

The International Tin Symposium organized by the Ministry of Mineral and Metallurgy, Bolivia was held at the Sheraton Hotel, La Paz in November 1977. This meeting attracted a total of about 400 participants. The importance of tin to the Bolivian economy is evident from the support given to the symposium by the Bolivian Government. Several participants went to Bolivia from Southeast Asia as guests of the Bolivian Government. The President of Bolivia, in his opening remarks said that the economic development and industrial future of his country depend on the production of tin. Judging from the great interest shown by mining companies and consultants at the symposium, the country's potential for greater tin production appears to be very good.

The papers presented during the 5 days of the symposium cover a wide range of topic from tin exploration to marketing and uses for tin. Only two half-day sessions were on papers concerned with the geological aspects of tin. Most of the papers deal with the Bolivian Tin Field and the question of whether or not some of the deposits are of volcanic origin appears to be still unresolved. The meeting was followed by field trips to mining areas near La Paz.

A fairly large Malaysian delegation attended this meeting. The participants from Malaysia include Dr. Abdullah Hasbi (Mines Research Institute), Mr. Yong Swee Kee (Geological Survey), Mr. Chan Yew Kee and Mr. Tan Loong Keat (Associated Mines), Mr. Chan Wau Choon (Selangor Dredging), Dr. Tan Bock Kang (University of Malaya) and Mr. Soo Yuen Yin (Conzinc Riotinto). Papers on some aspects of tin mining in Malaysia were presented by Abdullah Hasbi (Treatment of Alluvial Tin Ore from gravel pump mines), Yong Swee Kee (Search for off-shore Cassiterite in Peninsular Malaysia) and Chan Yew Kee and Tan Loong Keat (Sungei Besi Mine).

Participants from Malaysia were entertained to a lunch by the Bolivian Ambassador to Malaysia prior to their departure. The introduction to Bolivia and the advice given on the health hazards of going to La Paz proved to be useful to many of the participants who took a few days to get used to the high attitude of about 4000 metres above sea level.

Copies of all the papers presented were distributed during the meeting to the participants. It appears that there are no plans to produce a symposium volume. Papers are mainly in Spanish and English. The excellent simultaneous translation service throughout the symposium makes it easy for those not knowing either Spanish or English to follow the talks and discussions.

B.K. Tan

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2. Symposium on mineral exploration techniques in tropical rain-forest region. Caracas, Venezuela, Nov. 19-Dec. 3 1977

This international symposium was organised by the Association of Geoscientists for International Development (AGID) to focus attention on the problems of geological exploration in tropical rain forest region. Most of this region are in developing countries and comparison of the mineral resources exploited from this forested terrain with other regions of comparable size and with similar geology indicates that relatively very few large mineral deposits have been found in this area. The symposium was held in conjunction with the South American Geological Congress and the South American Geophysical Congress

at the Caracas Hilton and was attended by an international gathering mainly coming from developing countries.

The 5 days meeting had separate sessions on geophysical exploration, geochemical exploration, remote sensing techniques and a general session on exploration strategy. For many of the participants it offered them a chance to hear for the first time how practical problems encountered by them in the field are overcome by geologists from other continents.

Papers presented at the meeting are at the moment being compiled by the local organising committee of AGID and a symposium volume is expected to be published later this year. Enquires can be directed to the Secretary, AGID, c/o Geology Department, Memorial University, St. John's, Newfoundland.

Several young geoscientists from developing countries were sponsored to attend this symposium and the workshop and field trips which followed. Mr. Yeap Ee Beng (University of Malaya) and Mr. Teoh Lay Hock (Geological Survey of Malaysia) were specially invited to take part in their training programme. Other Southeast Asian participants were Miss Somsri Sertsrivanich from Chiangmai, Thailand and Mr. Lino Coloma from Philippines.

The interest aroused at this meeting on this major topic has led AGID to look into the possibility of developing an International Geoscientific Institute for Mineral Exploration in tropical rain forest regions, with special reference to specialised training and applied research for the benefit of developing countries.

B.K. Tan

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#### AAPG-SEPM 1979 Annual Meeting

The AAPG- SEPM 1979 Annual Meeting will be held in Houston, Texas, USA.

The theme of the 1979 meeting is "OUR IDEAS FIND OIL" and a first call for papers is being made.

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#### 26th International Geological Congress

The 26th International Geological Congress will take place in Paris, France, from 7 to 17 July 1980.

There will be twenty sections which include Petrography, Mineralogy, Paleontology, Stratigraphy, Tectonics, Sedimentology, Geophysics, Geochemistry, etc.

Seven colloquia will be held on Mineral resources, Resources of raw materials of energy, Geology of continental margins, Geology of the Oceans, Geology of Alpine chains descended from the Tethys; Geology of Europe from the Precambrian to the Post-Hercynian sedimentary basins; and Geology of France.

Those interested in attending the Congress should write to:

Secretariat Général du 26ème Congrès géologique international  
Maison de la Géologie  
77-79 rue Claude Bernard  
75005, Paris, France.

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### Tin in 17th Century China

Tin is produced in many places in southwestern China, but in very few in the northeastern parts of the country. Tin is called ho in ancient books, because it was produced most abundantly in Lin-ho Commandery (in modern Kwangsi). Eight-tenths of today's tin supply comes from Nan-tan and Hp-ch'ih in Kwangsi, followed by Heng-chou and Yung-chou (both in Hunan); large quantities are also produced in Ta-li and Ch'u-hsiung (in Yunnan), but these places are too remote and not easily accessible.

There are two kinds of tin ore: mountain tin (tin stone deposits on hillsides) and stream tin (alluvial deposits). Mountain tin includes two varieties, the "melon tin" and the "granular tin". Melon tin is about the size of a small gourd, while granular tin is the size of beans. Both kinds are close to the earth surface and are therefore obtainable without deep underground mining. Sometimes a tin ore vein in the ground becomes full, causing the hillside to collapse, so that people can freely pick up the exposed tin ore. Stream tin is produced in the rivers of Heng-chou, Yung-chou, and in the river at Nan-tan, Kwangsi. Stream tin is black and powdery, having the consistency of double-bolted flour. The inhabitants of Nan-tan recover the tin ore from the river by first working from the south northward and then from the southward alternately at ten-day intervals (Fig. 1). Panned in this way, the ore supply will continue without exhaustion. One day's sluicing and smelting, however, will not yield more than one catty (of tin), which is not much considering the cost of the fuel.

Mountain tin produced at Nan-tan is found in the shady side of the mountain there. As there is no water for concentration of the ore, some hundred lengths of bamboo are connected to form an aqueduct.

Water is conducted here from the sunny side of the mountain and the gangue materials of the ore are washed away (Fig. 2). The concentrated ore is then smelted in a furnace.

For smelting tin, a blast furnace is fed with several hundred cattles each of tin ore and of charcoal in alternate layers. When the right temperature is reached and the ore does not melt immediately, a small amount of lead added to the mixture will induce it to flow out freely. Sometimes (instead of lead) the residual waste of tin refining is used for this purpose. The bottom of the furnace is a horizontal basin covered with charcoal ash and porcelain fragments in which an iron pipe is placed that leads the molten tin to flow into a low receiving pit outside the furnace (Fig. 3). When it first comes out of the furnace, the metallic tin, being pure white in color, is very brittle and breaks into pieces when hammered. Some lead must be added to soften it, after which the tin (pewter) can be used for making utensils. If tin objects bought in the shops contain too much lead and purification is desired, these objects should be immersed in vinegar and let boil eight or nine times, thereby eliminating the lead.

The process described above is the only way of producing tin. The magicians' books mention obtaining "grass tin" from the grass Portulaca oleracea. This is nonsense. The notion that arsenic is the outcropping of tin is also erroneous.

Reproduced by kind permission of the Director of the Pennsylvania State University Press. From T'ien-Kung K'ai-Wu: Chinese Technology in the Seventeenth Century by Sung Ying-Hsing, translated by E-tu Zen Sun and Shiou-Chuan Sun, The Pennsylvania State University Press, University Park, Pennsylvania, 1966.

N.S. Haile

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Figure 1: Recovering tin ore from the river at Nan-tan, Kwangsi.





Figure 2: Concentrating mountain tin ore by washing, Ho-ch'ih, Kwangsi.



Figure 3: Smelting tin ore with the addition of lead.

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 Malaysia1978

- Mar 23 - Apr 15 : Geology of Tin Deposits: An International Symposium and Training Course. Secretary, Organizing Committee, Symposium/Training Course on Tin Deposits, c/o Dept. of Geology, University of Malaya, Kuala Lumpur 22-11, Malaysia. (Sept-Oct 1977).
- Aug : Discussion Meeting, Ipoh. Secretary, Geological Society of Malaysia, c/- 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/- Dept. of Geology, University of Malaya, Kuala Lumpur 22-11. (Nov-Dec 1977).

Other Events1978

- 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).
- 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 Developments, 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/- 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-Jun 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/- AAPG, P.O. Box 979, Tulsa, Okla., 74101, USA. (May-Jun 1977).
- 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. (Jun-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).

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.
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## DONATIONS TO THE SOCIETY



Plate 1: Donation from Petronas. The President (first from the right) receiving a cheque from a Petronas representative (middle). Poolside, Hotel Equatorial, Kuala Lumpur.



Plate 2: Donation from Esso Production (Malaysia) inc. The President (left) receiving a cheque from Mr. Jack Armitage (right). Poolside, Hotel Equatorial, Kuala Lumpur.

## THE SEMINAR ON THE PETROLEUM GEOLOGY OF THE SUNDA SHELF



Plate 3: The President (first from left) giving his opening address. Others in picture, Mr. James Lau (centre) and Mr. K.K. Khoo, both members of the Organizing Committee. Anggerik Room, Hotel Equatorial, Kuala Lumpur.



Plate 4: A scene from the Seminar. Mr. Y.K. Lim (Petronas, standing extreme left) listening attentively to a question by Prof. C.S. Hutchison (University of Malaya). Anggerik Room, Hotel Equatorial, Kuala Lumpur.

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 majadi 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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