

K E S A T U A N K A J I B U M I M A L A Y S I A
G E O L O G I C A L S O C I E T Y O F M A L A Y S I A

NEWS LETTER

Number 19

July 1969

Geologic Notes	Page
Iron-tin mineralization in the Gunong Muntahak area, Johore	1
Sunda-land Bauxites and Sea levels	5
Regional implications of the Lebir fault zone	6
Copenhagen Conference on Reflected Light microscopy	8
Mineralogical Sub-group provisionally accepted by IMA	10
News from the University of Malaya	
First Malaysian Geology Ph.D.	10
New Academic Staff	11
Programme of Meetings	11
Donations to the Publications Fund	12
Progress Report on Publications	12
Membership news:	
a) New members	14
b) Change of address	14

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MALAYSIA

GEOLOGIC NOTES

Iron-Tin Mineralisation in the Gunong Muntahak Area, Johore.

K. Ganesan

This is a preliminary note on the iron-tin mineralisation present in the Gunong Muntahak area, Kota Tinggi District, Johore, West Malaysia. Drummond (1962) mapped the part of the area under review that came within sheet 131, and his Progress Report contains a brief but good account of the geology of South Johore. A description of Pelepah Kanan Mines is found in Burton (1958). Grubb and Hannaford (1966) studied the magnetic properties of the cassiterite of Pelepah Kanan Mines and proposed that the dark fraction is magnetic because of the presence of anhydrous ferrous stannate which forms a series of compounds with haematite that is analogous to $Fe_{2-x}Ti_xO_3$. They also proposed that the genesis of cassiterite might be explained "in terms of colloidal systems following condensation of primary gaseous ore fluids"; in the writer's view this is still a very debatable question.

Metamorphic rocks: The oldest rocks present are the "Sisek Metasediments" which were originally deposited as a marine argillo-arenaceous sequence with subordinate carbonate rocks. The Sisek Metasediments are, in fact, rocks that display a relatively high-grade contact metamorphism superimposed on an earlier phase of low-grade regional metamorphism of Abukama-type.

The mineral assemblages present in the pelitic schists of the Sisek Metasediments indicate that a quartz-albite-muscovite-biotite-chlorite sub-facies (A 1.1 of Winkler, 1967) has been developed. Wollastonite (not parawollastonite or pseudowollastonite) has been found in the contact metamorphosed calc-silicate rocks. The presence of wollastonite, grossular-andradite, diopside hornfels indicates the development of ortho-amphibole sub-facies of K-feldspar-cordierite-hornfels facies of contact metamorphism. Hornfels with porphyroblasts of concentrically twinned cordierite are present in the outcrops in the bed of the Sungei Isa near the Pelepah Kanan Mine office.

Igneous rocks containing essential quartz: The igneous rocks present belong to the category of "Acid igneous Rocks" or "igneous rocks containing essential quartz" of Hatch, Wells and Wells (1961). Rosiwal modal analyses of stained thin sections of thirty-four representative specimens enabled two major types to be distinguished. The granodiorites form the earliest type and are separated from the later granite (now occurring as a stock) by a wrench fault. Mineralization is spatially related to the granites rather than to the granodiorites.

Deposits of iron-ore: Small deposits of iron-ore are found in the metamorphic rocks close to or at the contact of the granite. The ore mostly conforms to the foliation (nearly parallel to the bedding) of the metamorphic rocks and has coalescing layers that frequently parallel the colour banding (foliation) of the altered metamorphic rocks. The evidence gathered indicates that these iron-ore bodies are replacement deposits and are

pyrometasomatic in origin. The deposition of the iron-ore bodies indicates that they are developed along N-S-trending linear structural features.

Pelepah Kanan Mines: The most important iron-tin mineralization is seen in Pelepah Kanan Mines, where a lenticular ore-body, mainly of martite (which has been derived from the supergene alteration of magnetite), is found within altered metamorphic rocks. This martite body contains very fine-grained cassiterite especially in its lowermost region. This cassiterite was deposited subsequent to the formation of the iron ore and during the development of the stanniferous veins noted below.

Stanniferous quartz-felspathic veins: The stanniferous quartz-felspathic veins are false pegmatites (Janecka and Stempok, 1967). These veins may be simple with comby quartz and feldspar, but often they are found as symmetrical crustified veins 2-14 inches thick. Economically useful concentrations of zoned, slightly paramagnetic, crystalline cassiterite occur in quartz-feldspar-chlorite-fluorite veins cutting hornfels below the main martite ore body. These veins dip gently (8-15°) to the west and roughly parallel the eastern flank of Gunung Muntahak. The deeper western extremities of these veins extend into Waterfall Hill in Pelepah Kanan Mines.

A tentative paragenetic sequence of the minerals present in the stanniferous quartz-felspathic veins in Pelepah Kanan Mines is given in Fig. 3.

Conclusion: It is concluded that pyrometasomatic processes associated with the granite at temperatures above 550°C gave rise to a magnetite body which subsequently was converted by supergene agents to martite. The cassiterite-bearing veins are hypothermal in origin and were formed later, at temperatures less than 420°C.

Figure 3

Tentative Paragenetic Sequence of the Minerals present
in the Stanniferous Quartz-Felspathic Veins
in Pelepah Kanan Mines

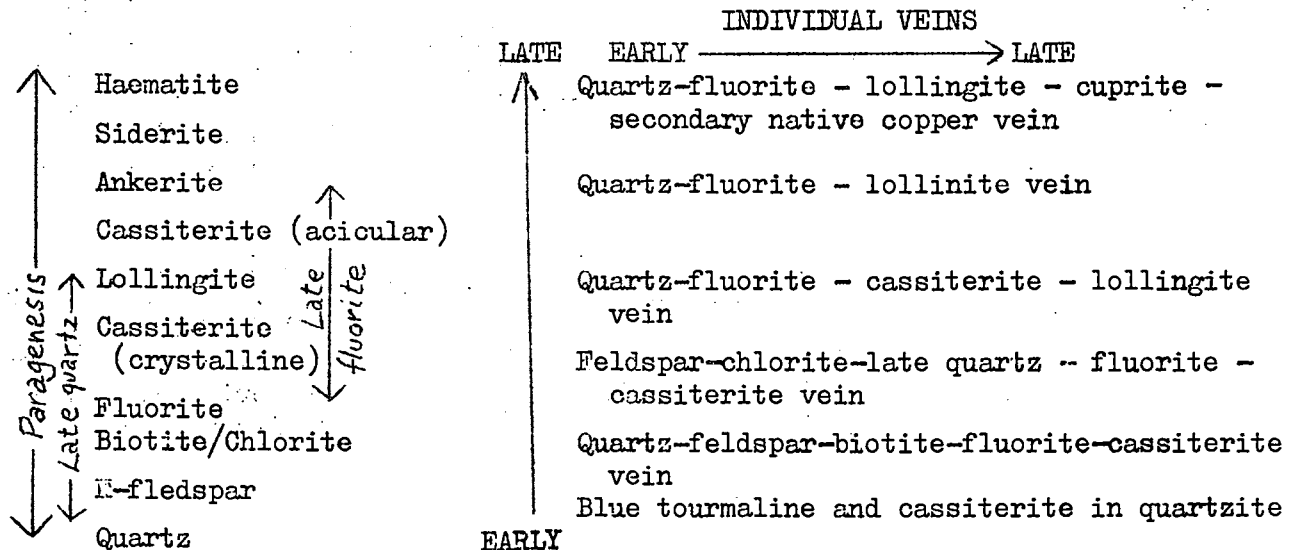
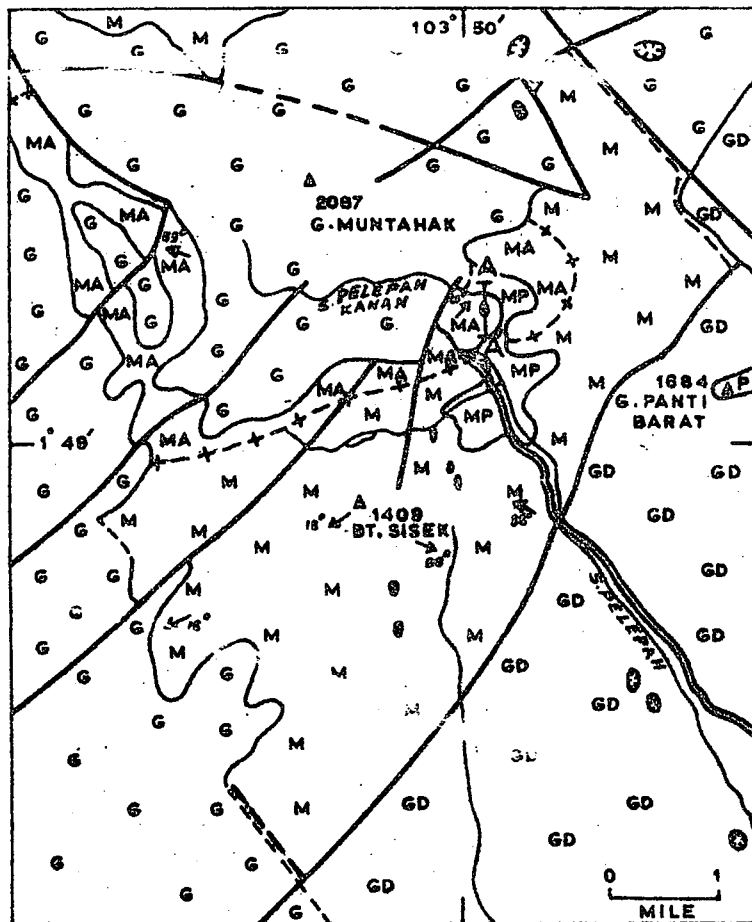


FIGURE 1—GEOLOGY OF GUNONG MUNTAAK AREA



AGE	FORMATION	SYMBOL	LITHOLOGY
LOWER CRETACEOUS		P	SANDSTONE
JURASSIC	ACID IGNEOUS ROCKS	G	BIOTITE GRANITE AND MICROGRANITE
LOWER TRIASSIC TO PERMIAN?		GD	HORNBLende BIOTITE GRANODIORITE
UPPER PALAEOZOIC	SISEK METASEDIMENTS	MA	CALC-SILICATE HORNFELS
		MP	METASOMATISED CORDIERITE ROCK
		M	SCHISTOSE QUARTZITE QUARTZ PHYLLITE SERICITE SCHIST

	SURFACE SOIL	
	BOULDERS OF Fe ORE	
Fe	MAIN MAGNETITE/MARTITE ORE-BODY	
WMA	WEATHERED	QUARTZ DIOPSIDE ACTINOLITE HORNFELS ANDRADITE DIOPSIDE ACTINOLITE HORNFELS
MA	FRESH	STANNIFEROUS VEINS ETC.
MP	METASOMATISED PORPHYROBLASTIC CORDIERITE ROCK	
G	ACID IGNEOUS ROCKS ?	

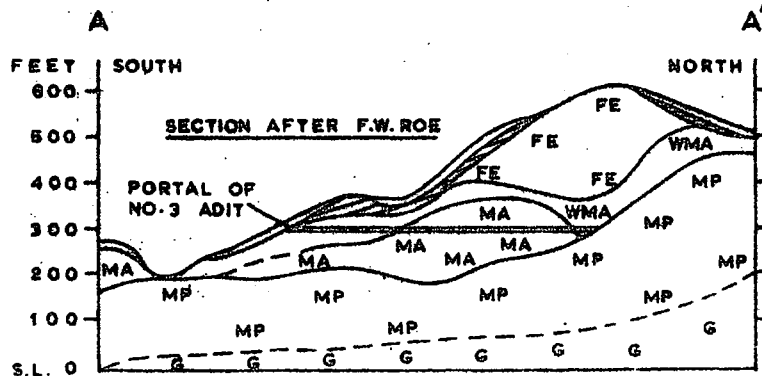


FIGURE 2—SECTION A-A' ACROSS PELEPAH KANAN MINES.

Notes: 1. Tin was introduced in more than one stage. A skarn rock in the vicinity of Pelepah Kanan Mines, and mainly composed of grossular-andradite (R.I. = 1.805; D = 3.73), axinite, calcite and hedenbergite, was found to contain about 1.6% Sn in the grossular-andradite and 0.3% Sn in manganous axinite. Cassiterite is not seen as inclusions, and the writer is of the opinion that the tin is contained within the lattices of the above mentioned minerals, and was introduced prior to the development of the stanniferous quartz-felspathic veins. The axinite occurs in veins and is clearly seen to replace the garnet.

2. During the development of the stanniferous quartz-felspathic veins there was a polyascendant influx of Sn-bearing fluid. In general the paragenesis formulated by Hosking (1965) for the major hydrothermal lodes of Cornwall is also apparent here but there are no clear-cut zones and the telescoping effect is marked.

3. Comby quartz is earlier than feldspar but quartz also appears later. The late quartz may replace feldspar and even cassiterite.

4. Three generations of late quartz have been distinguished and there may be more. Late quartz often occupies the vein centres and often the C-axes of these quartz crystals are parallel to the vein walls.

5. Some fluorite is earlier than cassiterite, but late fluorite on occasion replaces early cassiterite.

6. Three generations of cassiterite have been recognised.

7. Siderite in vugs is often found in quartz-feldspar-chlorite-fluorite-cassiterite veins.

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Sunda-Land Bauxites and Sea Levels
G.E. Wilford, Bureau of Mineral Resources (Canberra)

Tjia in his Geological Note "Sunda-Land bauxites: Related to Cenozoic sea level." (Newsletter 18 May 1969) cites evidence (Allen, 1954) that bauxites in West Sarawak are probably related to Quaternary sea level changes. However Wolfenden and Haile (1963) have shown that the bauxites have formed on intermediate and basic igneous rocks in environments ranging from low hills (?Quaternary lava flow) to rugged hills of gabbro, greenstone and amphibolite up to 300 m above sea level. At none of the localities is a relationship between the formation of bauxite and planar Quaternary erosion features described or inferred. The bauxite formed on lava pre-dates alluvium deposited when base level was 10 to 15 m above its present level. There is no evidence in West Sarawak to support the suggestion that Bukit Gebong (240 m) has been upwarped to its present level relative to the surrounding area.

Nature of bedrock and not relationship to erosion surface appears to have been of prime importance in the formation of the West Sarawak bauxites.

It would be interesting to know the degree to which potential source rocks, identical to those from which the main bauxite deposits have formed, are present above the 60 m level in Johore and Indonesia.

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Regional implications of the Lebir fault zone.

H.D. Tjia, University of Malaya

Recent fieldwork in the vicinity of Temangan, Kuala Krai, Manek Urai and along a stretch of Sungai Lebir in Kelantan has established beyond doubt the transcurrent nature of this part of the remarkable lineament that is occupied by almost the entire Lebir river. Burton (1967), probably impressed by the rectilinearity of the river, already suggested that the lineament represents a wrench fault, although no proof was advanced. Provenance studies in upper Triassic-Jurassic sediments in the Berantai syncline, Pahang, by Mohammad Ayob (1968) led him to interpret a N-S trending gravity fault along the eastern limit of the syncline. Intermittent uplifts of the block east of this fault produced several conglomerate banks in the basin west of it (the present Berantai syncline). The same writer believes the "Berantai fault" to extend northwards along a few known, more or less N-S oriented, faults in North Pahang into the Lebir fault zone up to Temangan. Movements along this fault have been assumed to be vertical ("block faulting").

Along S. Lebir from the vicinity of Pahi Halt south till 2 km upstream from Manek Urai, outcrops of brecciated metasediments, flaser mylonite, and phyllonite have been mapped. The fracture zone is at least 20 m wide as measured across the foliations (340/essentially vertical). Tension fractures arranged en echelon fashion within the fracture zone indicate left lateral displacement. Below the railway bridge near Manek Urai a drag fold several meters long again indicates sinistral movement. Smaller faults, traversing the metasediments of the drag fold, strike more or less parallel to the trend of the fracture zone and also indicate left lateral offsets amounting to 2 m.

Shales intercalated with fine-grained sandstones outcropping in a strip between the abandoned Temangan iron mine and Aw's (1967) ignimbrite dyke north of Kuala Krai strike approximately N-S, and parasitic folds, where present, always indicate left lateral movement of the area in the east with respect to that in the west.

Attempts were made in two rivers to locate the remarkably straight granite boundary east of the Lebir River as is shown by maps of the Geological Survey, but the efforts have been unsuccessful.

Recapitulating, the following picture is obtained from the Lebir lineament near Kuala Krai. The lineament appears to consist of a 2 to 3 km wide fracture zone within which are contained a number of transcurrent fault zones (subsequently designated as shear zones in order to separate them from the main fracture zone) each a score of meters thick and more. Minor structures within the tectonic breccias and drag folds imply left lateral movements. The westernmost shear zone is located between the Taku Schists and the adjoining low grade metasediments. At Temangan this shear zone is occupied by iron ore deposits. The next shear zone is indicated by the more than 20-km long ignimbrite dyke. The third shear zone cuts through low grade

metasediments and follows the Lebir river. A fourth and easternmost shear zone is most probably indicated by the rectilinear granite boundary.

Up to Ulu Lebir the lineament amounts to almost 200 km. Its rectilinear character favours transcurrent faulting, possibly accompanied by some vertical displacements. Northward the fracture zone disappears below the Kelantan floodplain but it may continue as the fault zone in the Gulf of Thailand and farther north into the Chao Phraya depression.

Shu (1969) has made the important observation that the NW to NNW and WNW trending fault zones in Selangor and adjacent states all show sinistral displacements. The large fault west of Karak has been cited as an exception. However, the unpublished geological maps of the Karak and Temerloh areas indicate inconsistent sense of lateral offset of the geological boundaries involved. This fault appears to be a normal fault, downthrowing the area east of it.

From these data the following comprehensive fault-movement picture emerges. The prevalence of NW to NNW striking wrench faults in Malaya, the considerable size of the Lebir fault zone, and the sinistral displacements by these faults suggest one common cause. The Malay peninsula appears to have moved counterclockwise as NNW-SSE elongated crustal slabs. Either the westernmost slab has lagged in a northerly movement of the entire peninsula, or the easternmost slab has been left in a general southward movement. Secondary stress systems set up by sinistral movements along the primary NW to NNW transcurrent faults have imparted left lateral displacements along major faults trending between W and NW (like Stauffer's (1968) Kuala Lumpur fault zone). Other major faults trending within the NE - approximately east sector will have dextral horizontal displacements. The N60°E striking Kabang fault in the Sungai Lembing mining concession, Pahang, possesses dextral offset in lateral sense (Fitch, 1951) and seems to corroborate the theory.

The present account is meant as a pre-publication communication and complete details of the minor structures associated with the Lebir fault zone will be published later.

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COPENHAGEN CONFERENCE ON REFLECTED LIGHT MICROSCOPY

The Third Annual Regional Conference entitled 'Study of Minerals and Artificial Minerals in Polished Sections on the Micro Scale' was organized jointly by the Mineralogical-Petrological Club of the Geological Society of Denmark and the Mineralogical Society of Great Britain (Committee on Applied Mineralogy). This took place in Copenhagen during the first week of May, 1969. Two centers were used for the conference, namely the Mineralogical Institute, Technical University of Denmark, Lyngby, and the Geological Institutes and Mineralogical Museum of the University of Copenhagen, Ostervoldg. The conference was attended by 84 participants representing 16 countries.

After the welcoming speeches by Professor Dr. E. Knuth-Winterfeldt (head of the Technical University), Professor Dr Tove Birkelund (President of the Danish Geological Society), and Professor Dr. A. Berthelsen (head of the Geological Institutes), an opening lecture was delivered by Professor Dr. Arne Noe-Nygaard. This was followed by the presentation of papers under the main headings of 'Reflectance Standards and Silicon', 'Polishing Procedures', 'Data on Minerals', and 'Special Methods'. A special period was also devoted to a discussion on optics.

The Commission on Ore Microscopy of the International Mineralogical Association also met during the conference. This replaces the meeting of the Commission originally scheduled for Frague during the XXIII International Geological Congress. Mr J.H. Leow represented Malaysia at the Commission's meeting, minutes of which will appear in Economic Geology.

Mineralogists, microscopists and economic geologists may be interested to know that two international standards of reflectivity have been approved by the Commission on Ore Microscopy. They are a black glass of reflectivity about 4% and a basal section of a black carborundum of reflectivity of about 20%. Work is now in progress to ascertain whether titanium carbide is a suitable standard for the range of reflectivity around 50%. A section of rhodium is also being examined for reflectivity around 80%. Mr J.H. Leow of the Department of Geology, University of Malaya currently has a black carborundum standard, and has arranged for the black glass standard to be posted to him. Any reflected light microscopist who wishes to calibrate his equipment for quantitative measurements or who is interested in calibrating his internal sub-standard can now do so through Mr Leow. Arrangements have been made for the supply of the titanium carbide and the rhodium standards to be sent to him if these are found suitable as reflectivity standards by the Commission.

Regarding polishing procedures, the meeting generally agreed that the numerous methods of polishing adopted by various workers all produce acceptable results. A few basic principles are common to the methods adopted. The grinding stage with fine carborundum (e.g. emery 305) should be lubricated with an excess of water; this eliminates the presence of pits

in the finished product. Diamond paste of $\frac{1}{4}$, 1, 3, and 6 microns is now commonly used for the different stages of fine grinding and polishing. A control on the amount of oil lubricant is important; a very thin film of the lubricant is sufficient as too much lubricant tends to destroy the quality of the finished product. The final stage should be finished with MgO or polishing Al_2O_3 in water. There should not be excessive lap speed.

It was also found that textures, even of silicate rocks, can usefully be studied in reflected light. Textural relationships of grains down to 5 millimicrons can be observed with clarity in reflected-light on polished sections. Transmitted light microscopy with thin sections can resolve textural relationships of grains only down to 50 millimicrons. It is therefore urged that petrologists should adopt reflected-light microscopy as a technique particularly in the study of fine-grained silicate rocks (e.g. the basalts).

It is also interesting for mineralogists and economic geologists in Malaysia to note that a new Sn-Ta mineral has been found in northeastern Brazil. This new mineral, "staringite," has been found as inclusions in tapiolite. Microscopically it resembles cassiterite. However, cassiterite has a "monorutile" structure, whereas staringite has a "trirutile" structure. It should be interesting to re-examine some of the pleochroic cassiterites from Malaysia to ascertain whether these are in fact staringite. Examination of pleochroic cassiterites in the Department of Geology shows that some of them are characterised by two sets of polysynthetic twins (?), quite unlike the simple twins of normal cassiterite. Staringite is chemically intermediate between SnO_2 and $(Fe,Mn)(Ta,Nb)_2O_6$.

A couple of new techniques are worth mentioning. B.D. Cervelle of Paris is actively studying opaque minerals in transmitted infrared light. He noted that some sulphides and sulphosalts are transparent in the infrared at a wavelength of approximately 1,000 millimicrons (10,000 Å). The equipment used is an ordinary polarizing microscope (fitted with nicols rather than polarizing film) coupled with an infrared image-converter. This allows observations to be made on a fluorescent screen. This method is an useful adjunct to the study of opaque minerals in polished sections.

A paper was also presented on the laser-microprobe as an excitation source in emission spectrography. This method allows the observation of the material under study with a microscope: with the optics of the microscope removed, the specimen is fired with a laser beam and the vaporized material recorded on a spectrograph. The detection level of trace elements by this method is good but the area of study is 'macro' compared to the electron-microprobe. It can, however, measure the very light elements.

Much data on the opaque minerals was produced during this meeting. The Commission is now gathering the data for inclusion in its international tables.

The organisers have to be congratulated for this very well run conference and the hosts thanked for their generous hospitality. This

meeting confirms the idea that small specialised meetings are in general more beneficial than large congresses.

Some of us tasted for the first time succulent reindeer steak at the 'Seven Small Homes', a restaurant which is highly recommended for anybody to have at least one meal in while in Copenhagen.

- JHL

MINERALOGICAL SUB-GROUP PROVISIONALLY ACCEPTED BY IMA

The International Mineralogical Association (IMA) has recently accepted the Mineralogical Sub-group of the GSM as a Member Society on a provisional basis. Membership cannot be finally confirmed until the next Council Meeting of the IMA, which will be held in Japan at the end of August, 1970.

At present the Mineralogical Sub-group includes the following GSM Members:

Ahmad bin Jantan	Ng, A.P.
Allbrook, R.F.	Scrivenor Club
Aw Pek Chin	Singh, D. Santokh
Chand, Fateh	Spykerman, Andrew
Choi Chee Chai	Tan Han Thor
Choy Kam Wai	Tan Teong Hing
Hall, H.H.	Teh Guan Hoe
Haser, Felix	Toh Swee Cheng
Hutchison, C.S.	Wong Lee Cheong
Lee, David	Yeap Cheng Hock
Leow, J.H. (chairman)	Yeap Ee Beng

Any other member who wishes to join the sub-group should contact its chairman, Mr J.H. Leow, Department of Geology, University of Malaya, Kuala Lumpur.

NEWS FROM THE UNIVERSITY OF MALAYA

First Malaysian Geology Ph.D.

Dr Chan Siew Hung, a Lecturer in the Department of Geology, University of Malaya, has recently been awarded the Degree of Doctor of Philosophy in Geophysical Engineering at the University of Missouri - Rolla. Dr Chan is believed to be the first Malaysian geologist to gain a Ph.D. degree. He is continuing with post-doctoral research in mathematical analysis of geophysical data and will return to Malaysia next year.

New Academic Staff

Dr H.E. Haser joined the department as a Lecturer on 17 June 1969. He holds a Ph.D. from the University of Innsbruck, Austria, with specialization in mineralogy and petrofabrics. He has had 6 years experience in engineering geology including highway construction and was Chief Geologist on the Transalpine 40-inch crude oil Pipeline Project from Triest (Italy) to Ingolstadt (W. Germany)

Mr P. Sivam joined the department as Assistant Lecturer on 1 May 1969. He is a graduate of the University of Malaya, and is completing his M.Sc. thesis on tin-bearing Quaternary sediments in the Kinta Valley, Perak.

Mr Tan Bock Kang has accepted an appointment as Lecturer, and is expected to arrive in September 1969. He was the first graduate to be awarded First Class Honours in Geology from the University of Malaya. He is at present completing a Ph.D. at the Imperial College of Science and Technology University of London, in structural geology. He previously completed a course in airphotograph interpretation at Delft, Holland.

- NSH

PROGRAMME OF MEETINGS

The following meetings have been planned by the Council:

Ordinary meeting venue: Geology Department, University of Malaya
time 5 p.m. on Friday 22nd August 1969 (subject to modification)
Probable speaker Mr Leo Stach, Head of the ECAFE Mineral Resources
Division.

Discussion meeting venue: Geological Survey Headquarters, Ipoh.
Date and time not yet confirmed, but is scheduled for mid-November, perhaps Friday 21 and Saturday 22 November. The meeting will be scheduled to coincide with the end of the Geological Survey Officers' Annual meeting. It is expected that Friday will be a day of discussions, and Saturday will be occupied by field excursions in the Ipoh area and a demonstration of the work of the Geological Survey Headquarters.

Annual General meeting

The annual general meeting and combined discussion meeting will be held in the Geology Department of the University of Malaya on Friday 30th and Saturday 31st January 1970.

The tentative programme is:

Friday morning 30th January "X-ray and other instrumental methods in Geology" - we expect to have Dr R. Jenkins (from Philips in Holland) for this meeting.

Presidential address, 12 noon.

Friday afternoon: geological session with invited papers.

Friday night: Annual dinner

Saturday morning: geological session and discussion.

DONATIONS TO THE PUBLICATION FUND

Response to an appeal by the President for contributions towards the Society's publication fund has been very encouraging. The following generous donations have been received from:

1. Anglo-Oriental (Malaya) Sdn. Bhd.	\$990.00
2. Conzinc Riotinto Malaysia Sdn. Bhd.	\$500.00
3. Esso Exploration Malaysia Inc.	\$6000.00
4. Pacific Tin Consolidated Corporation	\$200.00
5. Messrs. Vallentine, Dunne and Co. Sdn.	\$100.00

The Council hopes that the list is still incomplete. Although appeals have been sent to all companies which we think may be interested in supporting the Society, the Council is nevertheless prepared to be pleasantly surprised by donations, no matter how large or small, from companies who have not been approached but whose directors have read this announcement.

These donations will allow the Society to publish Bulletin 3 this year and to go ahead with Bulletin 4. The money will also be used towards the printing of a coloured geological map of West Malaysia, for inclusion in the "Geology of the Malay Peninsula" to be published by John Wiley, and for separate sale by the Society. Without the financial support, this programme of publications could not be followed and we are accordingly very much indebted to the above companies for making this possible.

PROGRESS REPORT ON PUBLICATIONS

Members will receive with this Newsletter the Second Presidential Address, "Petroleum Exploration in West Malaysia - 1969" by H.C. Olander, the 1968 President. This paper, on a very timely topic and illustrated by the author, will be of special interest to those Malaysian members who were not able to attend its presentation in January. Extra copies can be obtained at M\$0.50 each for members (\$1.00 for non-members).

Also distributed with this Newsletter is a classified list of contents of Newsletters 1-15 (1966 through 1968). This will be of some convenience to those members who keep a complete file, and to libraries who may wish to bind their copies.

In the Bulletin series, Bulletin 3 is now taking shape as a collection of papers on topics in Malaysian geomorphology, paleontology, and stratigraphy. We hope to go to press before too many weeks have passed. Some material is in hand for Bulletin 4, but more is needed to make a suitable size of publication. The papers already submitted are mainly in petrological topics, and it is hoped to make Bulletin 4 a collection centered on petrology and economic geology. Manuscripts are invited.

A complete list of GSM publications now available is given below:

Publications of the Geological Society of Malaysia

Prices given below include postage by surface mail (those in M\$ within S.E. Asia, those in US\$ and £ anywhere in the world). Airmail postage is extra. Prices to GSM members shown in parentheses.

BULLETIN SERIES:

Bulletin 1: "Studies in Malaysian Geology" ed. by P.H. Stauffer 79 p. illus. Papers presented at a discussion meeting in January 1967, 1968
US\$ 1.50 or £0.12.0 or M\$ 3.00 (1.00)

Bulletin 2: "Bibliography and index of the geology of West Malaysia and Singapore" by D.J. Gobbett, 152p. 1968

Paper cover - US\$ 4.00 or £ 1.13.0 or M\$ 10.00 (5.00)
Hard cover - US\$ 5.75 or £ 2. 8.0 or M\$ 15.00 (7.00)

PRESIDENTIAL ADDRESSES:

1968: "Meaning and quantification in geology" by N.S. Haile 10 p.

1969: "Petroleum exploration in West Malaysia - 1969" by H.C. Olander 12p.

Each US\$ 0.40 or £ 0. 3.6 or M\$ 1.00 (0.50)

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MEMBERSHIP NEWS

New Members:

At its meeting on July 25th, 1969, the Council elected the following to membership in the GSM:

Full members

Dr Ian Douglas, Department of Geography, University of Malaya
 Dr Felix Haser, Department of Geology, University of Malaya
 Mr A.L. Scholtens, Helpersweg 10, Groningen, Holland

Associate members

Mr H. Terwogt, Billiton Maatschappij, 30 Jalan Venning, Kuala Lumpur
 Thailand Gulf Oil Co., P O Box 979, Bangkok, Thailand
 The Scrivenor Club, c/o Department of Geology, University of Malaya

Student members

Ahmad bin Jantan, c/o Department of Geology, University of Malaya			
Choy Kam Wai,	-	do	-
Tan Teong Hing	-	do	-
Teh Guan Hoe	-	do	-
Wong Lee Cheong	-	do	-
Yeap Ee Beng	-	do	-

Change of Address:

Mr C.K. Burton: from Chulalongkorn University, Bangkok to Hemleigh,
 141 Forest Road, Coalville, Leicester, UK

Mr H.B. Lulofs; from Kuala Ketil, Kedah, to c/o Malakoff Estate,
 Kepala Bates, P.W. (Penang State)

Mr Samuel T. Pees: from Meadville, Pa., to Magellan Petroleum Corp.,
 G.P.O. Box 455, Brisbane 4001, Australia

Mr S. Subramaniam: from Rio De Janeiro to Associated Mines, P O Box
 2125, Kuala Lumpur

Mr Swai Sundharavat: from Geologisk Museum, Oslo, to 13 Songpra Road,
 Sephyra, Bangkok, Thailand

Mr R. Sweatman: to OSIRO Division of Soils, Prive Bag No. 1, Glen
 Osmand, South Australia

Dr R.A.M. Wilson: from West Vancouver to c/o H.R. Gunner, Esq.,
 Telmore Lea, Petersfield, Hampshire, UK