

PERSATUAN GEOLOGI MALAYSIA

WARTA GEOLOGI

NEWSLETTER OF THE GEOLOGICAL SOCIETY OF MALAYSIA

Jil. 6, No. 5 (Vol. 6, No. 5)

Sep-Okt 1980

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CATITAN GEOLOGI (GEOLOGICAL NOTES)

AN ORNAMENTED POLYFRAMBOID FROM THE STANNIFEROUS PLACERS OF AYER HITAM, SELANGOR, PENINSULAR MALAYSIA

K.F.G. HOSKING, Camborne School of Mines, Pool, Redruth, Cornwall, U.K.

Introduction

In 1967, at the 15th. Inter-University Geological Conference at Leicester University, Love presented a paper entitled 'Sulphides of metals in recent sediments', (see Love, 1969, p. 31-56). During the discussion that followed, I mentioned that in a sample of heavy-mineral concentrates from the stanniferous placers of Bissoe (Cornwall) I had seen hemispheres composed of pyrite framboids and that I had noted spheres composed of pyrite framboids in samples from the Malayan alluvial deposits (Hosking, 1969, p. 57). Although it is not mentioned in the record of the discussion, at the time I likened the Malayan spheres to blackberries, a wild fruit that is well known in Britain. I did not know then, nor do I know now, whether the Bissoe hemispheres are entire bodies or whether they are halves of spheres that had been broken by natural causes or during their recovery by a suction dredge.

At the conference noted above, I was the only one who was aware of the occurrence of such pyrite bodies, but later Love (1971) found spectacular concentrations of them in the Wenlockian Denbigh Grit Group at Conway, North Wales. In this paper Love proposed that the bodies should be termed polyframboids. He also noted, in the same excellent paper, that the "Rogenpyrit", that Fabricius described in 1961 from the German Rhaetic strata, were polyframboids.

The Ayer Hitam ornamented polyframboid

The Ayer Hitam ornamented polyframboid, whose character and genesis are the reasons for writing this note, was found during the examination of a sample of sulphide (essentially pyrite) grains that was collected from the Ayer Hitam tin-shed in 1975. The sample was a random one from a pile of sulphides that had been separated by floatation from the concentrate from the dredges during the beneficiation which was routinely carried out to make a high-grade cassiterite product. In the sample, in which framboids were fairly plentiful, one polyframboid (or possibly a portion of one) was seen when the former was examined under the binocular microscope, but because the appearance of the polyframboid was unusual it was isolated and further examined under the Scanning Electron Microscope. This further examination showed that the body consisted largely of a mass of framboids, each of which was from c. 25-40 μm in diameter and composed of poorly ordered pyrite octahedra (Figs. 1 and 2). The individual crystals were c. 8 μm in length. What was of still greater interest was the fact that seated within the 'gutters' between the framboids were smaller spheres, from about c. 4-10 μm in diameter.

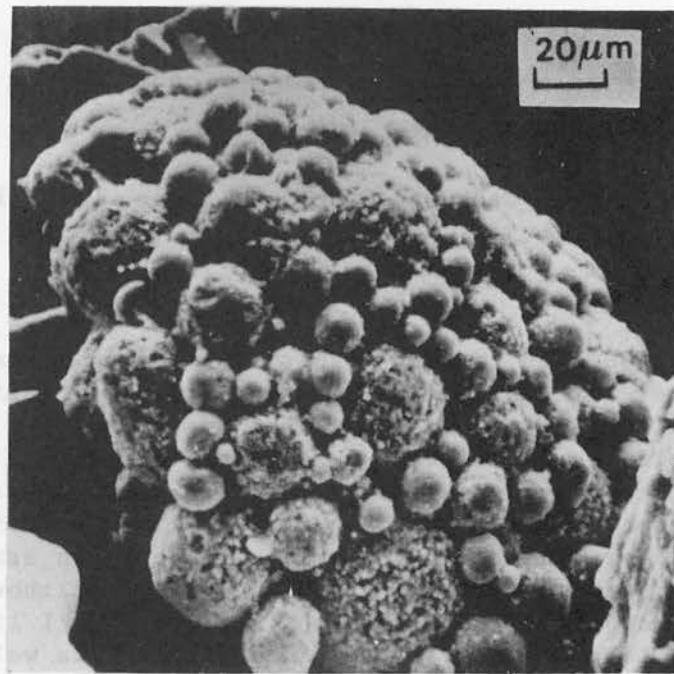


Fig. 1. Scanning electron photomicrograph of the Ayer Hitam ornamented polyframboid.

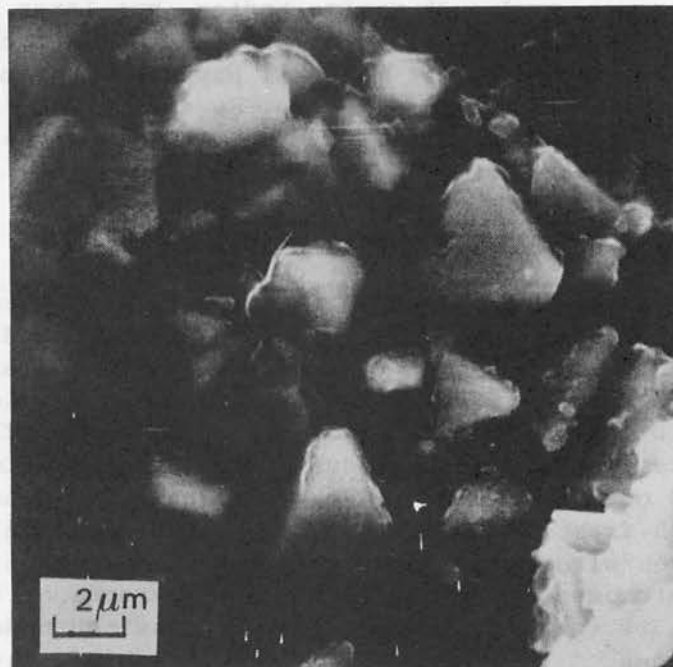


Fig. 2. Scanning electron photomicrograph of a portion of a framboid of the Ayer Hitam ornamented polyframboid. This photomicrograph reveals the octahedral habit of the crystals of pyrite that make up each framboid and it also demonstrates that the crystals are poorly ordered.

These smaller spheres, which were composed of iron sulphide, were not made up of an aggregate of pyrite crystals, indeed, under the highest magnification obtainable each displays a cumulus cloud texture.

As far as I am aware such an ornamented polyframboid has not hitherto been described in the literature.

Genesis

Doubtless framboids and perhaps only occasional polyframboids were generated within Malaysian lowland peat beds or other organic-rich sediments during their early diagenesis. Such beds accumulated locally during the development of the placers and often some of their pyritic bodies were transported by moving water to spots where tin-rich deposits were accumulating.

Love (op. cit., p. 1043) suggests that a polyframboid is generated from a globule of iron monosulphide, FeS, that separates into smaller globules which collectively preserve the original spherical shape and volume of the parent. Subsequently each of the small spheres converts to an aggregate of pyrite crystals. If this is how a polyframboid develops, and I think that the suggestion is likely to be correct, then the real problem, as Love observes, is to account for the formation of the large parent globule of the protosulphide. Love has not advanced a satisfactory explanation as to why and under what circumstances large globules of iron monosulphide form nor can I do so. In part, at least, it may depend on the ease with which globule forming agents can move to the site of globule formation, together with the space available for the globule to develop, or the ease with which a developing globule can make room for itself by pushing aside components of the host.

The Ayer Hitam polyframboid under review presents further genetical problems. Why is it composed of 'normal' framboids together with smaller spheres that lack a framboidal texture? If the smaller ornamenting spheres were developed very soon after the polyframboid proper was generated then it is surprising, and not understandable to me, why each did not convert to a small framboid. So, I am led to the conclusion that possibly these smaller spheres were developed very recently, indeed, in the tin shed. There, after the sulphides had been removed from the floatation cells the wet mass would contain xanthate floatation reagent which degrades liberating sulphide ions and also, almost certainly, iron would be present in a state capable of reacting with the sulphide ions to form iron monosulphide providing the Eh and pH were suitable. The curved surface of adjacent framboids of the polyframboid would form ideal supports for a developing globule of iron monosulphide gel.

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ON A REPORTED OCCURRENCE OF GLAUCOPHANE IN PENINSULAR MALAYSIA

T.T. KHOO, Jabatan Geologi, Universiti Malaya, Kuala Lumpur

It is reported in Bradford (1972, p. 61) that glaucophane occurs in metamorphosed quartzo-feldspathic sediments of the Jerai Formation in the Gunung Jerai area, Kedah. Other minerals present in the glaucophane-bearing rock are biotite and actinolite. The exact locality of the glaucophane occurrence is not indicated.

If the glaucophane has been correctly identified the occurrence will be unique in Peninsular Malaysia and will no doubt make the Gunung Jerai area petrologically (and tectonically?) more interesting. However, there is some doubt whether the mineral has been correctly identified. The association of glaucophane and biotite is very rare. In rocks of the glaucophane-lawsonite schist facies, biotite is absent (Winkler, 1967, p. 163) and in cases where biotite is associated with glaucophane such as in the Alps there is evidence that the glaucophane-bearing assemblage is being replaced by greenschist facies assemblages (Turner, 1968, p. 297). But experiments by Ernst (1961, 1968) indicate that the stability of glaucophane is variable and it can also be stable at rather high temperatures and also at rather low pressures depending on the composition of the rock. As the rock in which the glaucophane is said to occur in the Jerai area is quartzo-feldspathic and not basic, the occurrence may yet be real.

It is hoped that the glaucophane occurrence can be confirmed and the nature and locality of the rock made known.

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BULLETIN OF THE GEOLOGICAL SOCIETY OF MALAYSIA

KDN 0492/80

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BULETIN PERSATUAN
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BULLETIN OF THE GEOLOGICAL SOCIETY OF MALAYSIA

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K.R. Chakraborty

Editor
G.H. TEH



AUGUST 1980

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MESYUARAT PERSATUAN (MEETINGS OF THE SOCIETY)

P. LAZNICKA: Strata-related metallic deposits: the myth and the reality, the past and the future

Dr. P. Laznicka, Associate Professor, Dept. of Earth Sciences, University of Manitoba, Winnipeg, Canada, gave a talk titled "Strata-related metallic deposits: the myth and the reality, the past and the future", at 5.00 p.m. on 12th September 1980 at the Geology Lecture Hall, Department of Geology, University of Malaya. About 35 members were present.

What follows is a summary of the talk prepared by the speaker at the request of the Editor for the benefit of all members.

Strata-related metallic deposits are one of the several presently popular subjects of economic geology and metallogeny, as can be seen from the dramatic increase of related publications over the past 10-15 years. As is usual in geology, numerous simplified popular beliefs abound among the members of the geological community - both academic and industrial. Two widely held beliefs are:

- 1) That strata-related deposits are mostly a new class of mineralization, practically unknown and not utilized before;
- 2) That strata-related deposits are the metal source of the future.

To test the validity of these two beliefs, a factual analysis using available numerical data (production and reserve figures, rock geochemistry, etc.) has been undertaken. It is admitted that the reliability and completeness of the available data leaves much to be desired. In addition to it, the well known inaccuracy of many aspects of geology, the abundance of conflicting interpretations, the lack of universal agreement on the limits of categories, etc., has placed considerable limits on the accuracy of the figures obtained. It is, however, believed that the results show satisfactorily at least the general trend.

In tracing the history of the economic recovery of metals from ores into the earliest history of mankind, it can be safely concluded that out of the four most ancient metals (Au, Sn, Fe, Cu) the first two came initially almost exclusively out of strata-related deposits - placers.

In the times of Agricola and up to the period of the industrial revolution in the mid-1800's, the proportion of non-strata-related gold as well as tin deposits had sharply increased, due to the exhaustion of placers in the old mining areas. The large stratiform concentrations of both metals in the Witwatersrand and in the S.E. Asia tin belt, respectively, were yet to be found and utilized.

The modern times (1914 and later), have seen increasing demand for most metals, culminating in the periods of wars to satisfy the human destructiveness. The increasing demand for aluminium resulted in a switch from the initial source cryolite (=non-strata-related) to bau-

xite (strata-related) - a fact dramatically expressed on a diagram contrasting the strata- and non-strata-related sources of metals in the various periods. The proportion of many other strata-related metal sources did also increase. The strongest increase occurred in the ores of uranium (change from veins to low-grade deposits in conglomerates, sandstones, shales, etc.); lead, zinc and silver (veins and high-temperature replacements partly substituted by low-temperature deposits in carbonates and conformable, banded to massive sulphides in fine marine clastics, volcanoclastics and exhalites). The proportion of strata-related tungsten deposits has increased from zero in the 1930's to some 15% now, due to the discovery of mineralizations of the Felberthal (Austria) type, and realization that many scheelite 'skarns' are stratigraphically controlled at least to a degree. Minor decrease in the proportion of strata-related deposits has occurred only in the case of tin and copper.

The future importance of strata-related deposits as a source of metals has been approximately calculated only in terms of the expected decrease in the average grade of ores. A prediction when (in which year) such decrease will likely take place is impossible to achieve considering the nature of the existing data, so it has not been attempted.

If the ore grade drops to 50% of the present value, the proportion of strata-related sources of Fe, Mn, Ni, Cr, U, Zn, Pb and Ag will increase. For most of these metals the increase will be continuation of the historical trend. Most present protores of Fe and Mn, economically valuable only after weathering-generated enrichment, will become ores in their own way (e.g. siliceous iron formations). Strata-related sources of tin and copper will further decrease with the grade drop. Porphyry coppers will be the dominant source of copper and disseminated cassiterite in porphyries and apo-granites the dominant tin source.

Tin, with its two widely different average grades for ores: a lower one for unconsolidated surficial ores (alluvial, eluvial, beach placers) and a higher one for 'bedrock deposits' is especially difficult to average. The decrease in the proportion of strata-related deposits of tin in the future will to a considerable degree be caused by the worldwide exhaustion of unconsolidated deposits, regardless of the grade consideration.

At about 10% Al in ores, several sources other than bauxite will become aluminium ores. Most will be sediments, therefore strata-related (clays, shale, dawsonite), but non-strata-related alunite, some syenites, and anorthosites will alter the present complete domination of aluminium by strata-related sources.

The most marked change in the ratio of strata- to non-strata-related deposits will occur when the ore grade drops to 10% of the present average.

When this happens, the average grade of the low factor of concentration ores of iron, aluminium and titanium will become equal to, or lower than, the mean crystal content of these metals, so 50% or more of ordinary rocks will become Fe, Al and Ti ores. This will undoubtedly sharply diminish the dominance of Fe, Al and Ti ores by strata-related sources.

The proportion of stratabound nickel sources will also decrease sharply, because at about 0.1% Ni all ultramafics will become nickel ores. The strata-related tin sources will be further reduced, unless paleoplacers and modified paleoplacers (e.g. as in the Milluni district, Bolivia) and strata-related cassiterite accumulations in metamorphics (e.g. as in the Freiberg Dome, G.D.R.) will become a more widespread tin ore type.

The proportion of strata-related deposits of Pb, Zn, Cu, Au and Ag will increase, dramatically in the case of silver, because certain "special" sediments such as some black argillites and exhalites, now causing geochemical anomalies, will become ores.

Overall, this study does not support the belief that strata-related deposits are a recent category. Despite many new or reinterpreted types of such mineralizations introduced recently, most of the first known utilized sources of metals were of the stratiform nature. The belief that strata-related deposits constitute the metal sources of the future has, however, been substantiated for most metals. This will remain valid at least until the grade is further decreased drastically.

Dr. Ismail Mohd. Noor of Universiti Kebangsaan Malaysia proposed a vote of thanks to the speaker on behalf of the Society for the interesting talk.

GHT

G.H. MOH: Sulfidization of carbonates and silicates

On the 29th of October 1980, Prof. Günter H. Moh of University of Heidelberg, West Germany, gave a talk titled "Sulfidization of carbonates and silicates" to about 40 members of the Society, at the Department of Geology, University of Malaya.

Making full use of all the blackboard space available, he showed, by equations and phase diagrams, the sulfidization of various silicates which included olivine, hedenbergit, anthophyllite, serpentine and talc.

The speaker then discussed the main sources of sulfur, which included the oxidising capabilities of acidic ferric ion solution, the sulfur-oxidising bacteria Thiobacilli, H_2S and SO_2 .

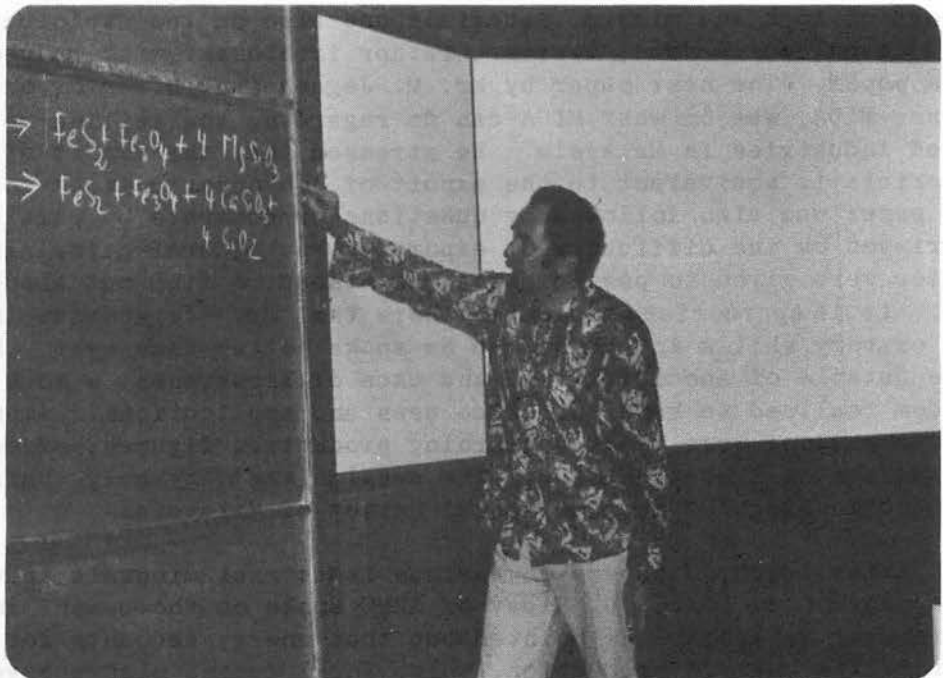
Next on the carbonates, he presented the 3 main forms of carbonates, namely dolomite, calcite and aragonite which invariably contain various amounts of Zn, Pb, Fe, Co and Mn. These being substantiated by analyses of carbonates from various parts of the world. The carbonates of Fe, Zn and Pb were experimentally shown to form sulfides rather than oxides because of their higher affinity for sulfur than oxygen. The speaker wound up his talk by showing the various possible assemblages in the system Fe-S-O-CO₂ and the simplified Fe-CO₃-S system.

Dr. Abdullah Hasbi, Director of the SEATRAD Centre, in proposing a vote of thanks on behalf of the of the Society, congratulated the speaker on so ably showing the importance of experimental studies to explain certain natural mineral occurrences.

GHT



P. Laznicka



G.H. Moh

ECONOMIC GEOLOGY SEMINAR 1980 - INDUSTRIAL MINERALS
10-11 October 1980, Hotel Merlin, Kuala Lumpur

Seminar

The Seminar was opened by YB Encik Bujang Ulis, the newly appointed Deputy Minister of Primary Industries. He read the address of YB Datuk Paul Leong, Minister of Primary Industries, who was away in Bangkok. About 130 participants, members and non-members, from the public and private sectors registered for the Seminar. The event was reported by the local newspapers and also reported in Television Malaysia's news.

The participants were welcomed by the Vice President as the President was away on official duties. In his welcoming address, the Vice-President spoke on the conformity of the Industrial Minerals Seminar to the Government's desire for diversification from alluvial tin deposits. In the opening address, the Minister, among other things, also spoke on the interdisciplinary planning needed in the development of all mineral resources and the role of future expansion of the Geological Survey Department of Malaysia.

Eight papers were presented (see programme). Mr. P.C. Aw delivered a keynote paper on present exploitation and future prospects of industrial minerals in Peninsular Malaysia. Numerous types of industrial mineral deposits in Peninsular Malaysia investigated by the Geological Survey were described and discussed. After the paper Mr. Aw masterfully answered questions from the floor ranging from the quality and quantity of barite deposits to the geology and stratigraphy of silica sand deposits. Several participants also took the opportunity to air their woes, e.g. concerning the Johore State Government's policy on export of rock and mineral materials and also on the exploitation of Batu Caves, which were, however, rather irrelevant with respect to Mr. Aw's paper. The next paper by Mr. M. Jegathesan, Director of Promotions, MIDA, was on what MIDA can do regarding the setting-up of resource-based industries in Malaysia. He stressed that the export of raw materials is equivalent to the export of job opportunities for Malaysians. His paper was also followed by questions or comments by participants aggrieved by the difficulty of exporting raw mineral materials and also advice were given to participants who wished to find out about taxation, etc. It is appropriate to mention here that Mr. Jegathesan is noted for his oratory skills in school and he spoke better than ever. Mr. A.P. Ng gave details of specifications and uses of limestones, a rock which is seldom realised to have such wide uses and applications. Among questions from the floor were those concerning production figures, effects of acidic waters on limestone, etc. The session was very ably chaired by Mr. D. Santokh Singh of the Geological Survey of Malaysia.

After lunch, 3 papers on various industrial minerals industries were presented. Mr. E.U. Kidav of APMC spoke on the cement industry in Peninsular Malaysia. He pointed out that energy accounts for a very large part of the cost of production. Also local cement plants have made improvements to cut down dust pollution. Details of cement manufacture were also given. Among questions from the floor was one of current interest on why cement in Singapore is cheaper than in Peninsular Malaysia. Mr. Kidav pointed out that the lower price is due to dumping from Japanese and Korean sources. Mr. K.F. Cheong of Kooperatif Bersatu

Kaolin Industries spoke on the kaolin industry in Peninsular Malaysia and discussed problems faced by the industry. A Thai participant was most interested in the talk and asked numerous questions which Mr. Cheong answered readily. The next speaker was Dr. B.M. Sedalia, the ceramic advisor to Kraftangan Malaysia. He gave details of many minerals in Peninsular Malaysia which can be used in the ceramic industry. Numerous interesting questions were answered by him including one on why sometimes we get warped tiles which brings to mind frustrating dinner plates with warped bases.

The last session featured 2 papers. The first was by Mr. K.N. Murthy who gave a talk on the quality and occurrence of gem and ornamental stone materials in Peninsular Malaysia. The talk was very well illustrated and caught the attention of the local Press (both English and Chinese languages). The possibility of a local gemstone industry was suggested. The last paper of the day was on conservation delivered by Mr. Conservation, Dr. B.H. Kiew, from Universiti Malaya. He stressed that conservation considerations should not be loss sight off in our eagerness to exploit natural resources. An active and lively discussion followed his talk. The Seminar closed at 5.00 p.m.

SEMINAR PROGRAMME

8.30 - 9.00 a.m.	:	Late registration
9.00 - 9.10 a.m.	:	Address by Acting President, Geological Society of Malaysia
9.10 - 10.00 a.m.	:	Opening address by The Honourable Deputy Minister of Primary Industries
10.00 - 10.30 a.m.	:	Tea
10.30 - 11.15 a.m.	:	Present exploitation and future prospects of industrial minerals in Peninsular Malaysia - P.C. Aw (Geological Survey Malaysia)
11.15 - 12.00 noon	:	Policies and facilities for investment in Malaysia with special reference to resource-based industries - M. Jegathesan (MIDA).
12.00 - 12.30 p.m.	:	Uses and specifications of limestones - A.P. Ng
12.30 - 2.00 p.m.	:	Lunch for all registered participants
2.00 - 2.30 p.m.	:	Cement industry in Malaysia - E.U. Kidav (APMC)
2.30 - 3.00 p.m.	:	Kaolin industry in Malaysia - K.F. Cheong (Koperatif Bersatu Bhd. Kaolin Industries)
3.00 - 3.30 p.m.	:	Minerals in Malaysia for the ceramic industry - B.M. Sedalia (Kraftangan Malaysia)
3.30 - 4.00 p.m.	:	Tea
4.00 - 4.30 p.m.	:	Occurrence and quality of gem and ornamental stone materials in Peninsular Malaysia - K.N. Murthy (Geological Survey Malaysia)
4.30 - 5.00 p.m.	:	The exploitation and conservation of natural resources - B.H. Kiew (Universiti Malaya)

Field Trip

The field trip was organized almost single-handedly by Dr. E.B. Yeap, a member of the Organizing Committee, and despite eleventh hour cancellations of places scheduled to be visited he managed to draw up

a wholesome and interesting programme.

About 40 registered participants of the Seminar went on the field trip (see programme). Most of the participants on the field trip were from the private sector. It provided participants opportunities to be together for exchange of ideas, see some industries utilizing industrial minerals and also visit exploitation sites. It supplemented the Seminar in particular, the participants obtained first hand knowledge of the important glass industry which unfortunately did not feature in the Seminar.

It was a very worthwhile day for those who participated and the Society would like to thank all those companies we visited for their cooperation and hospitality.

Field Trip - Programme

8.15 a.m.	Assemble at Geology Dept., Universiti Malaya
8.45 a.m.	General Ceramic, Petaling Jaya.
10.10 a.m.	Malaysian Sheet Glass Sdn. Bhd., Sungai Buloh
12.00 noon	Malaysian Sheet Glass Silica Sand Treatment Plant, Kuang
1.30 p.m.	Lunch
3.00 p.m.	Y.C. Chin Quarry Sdn. Bhd., Sungai Besi
4.15 p.m.	Nanyang Limestone and Powder Sdn. Bhd., Jalan Kuchai Lama
5.00 p.m.	Travel back to Geology Dept., Universiti Malaya

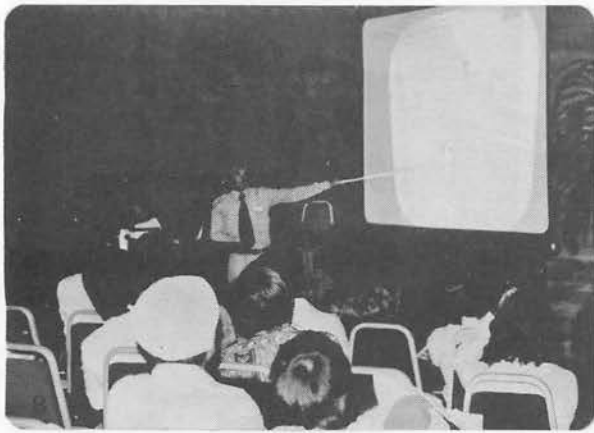
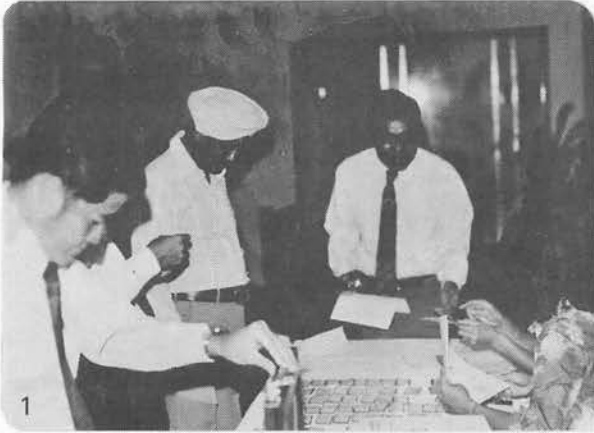
Support

Numerous companies and organizations in the private sector have given financial support for the holding of the Seminar and publication of the papers. They are as follows:

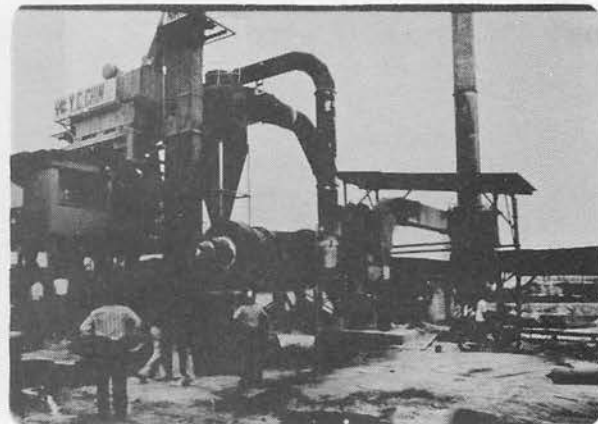
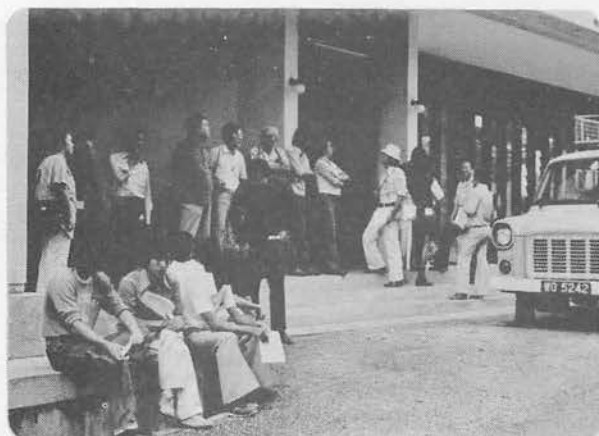
Associated Pan Malaysia Cement Sdn. Bhd.	\$250
Associated Tile Works Sdn. Bhd.	100
Binnie dan Rakan (Malaysia)	200
Chim Lee Tin Mine Sdn. Bhd.	200
Datuk Keramat Smelting Sdn. Bhd.	150
Guthrie Sdn. Bhd. (Guthrie Kimia)	250
Hargill Equipment Sales and Service Division	300
Pacific Refractory Industries Bhd.	200
Rock Chemical Industries (M) Sdn. Bhd.	500
Specmin Sdn. Bhd.	100
Tin Industry (Research & Development) Board	2000
J. Whyte & Co. (M) Sdn. Bhd.	100

Also the Society received an unsolicited contribution of \$25 from Exim Enterprise, Kepong for the Seminar.

INDUSTRIAL MINERALS SEMINAR



INDUSTRIAL MINERALS FIELDTRIP



Captions to FiguresIndustrial Minerals Seminar

- Figs. 1 & 2: Participants registering for the Seminar.
- Fig. 3 : The Deputy Primary Industries Minister being welcomed on arrival.
- Fig. 4 : The Deputy Minister declaring open the Seminar.
- Fig. 5 : The Deputy Minister viewing the GSM Publications on display.
- Figs. 6 & 7: Participants listening attentively to the papers being presented.
- Fig. 8 : Mr. P.C. Aw delivering his keynote paper.
- Fig. 9 : Question time. Mr. Sedalia putting forward a question to Mr. Aw.

Industrial Minerals Fieldtrip

- Fig. 1 : Participants assemble at the Geology Dept., Universiti Malaya.
- Figs. 2-5 : Visit to General Ceramic, Petaling Jaya.
- Fig. 6 : Being briefed on the processes adopted by Malaysian Sheet Glass Sdn. Bhd., Sg. Buloh.
- Fig. 7 : In the limestone quarry of Y.C. Chin, Sg. Besi.
- Fig. 8 : A look at the premix plant at Y.C. Chin Quarry Sdn. Bhd.

The Society is indeed grateful for so much kind support. Thanks are also due to the Acting Head, general staff and students of Jabatan Geologi, Universiti Malaya for their cooperation.

After-thought

From the support for the Seminar and the interest shown by those involved in the economic geology and mining sectors there appears to be a crying need for an annual Economic Geology Seminar which may become a parallel series to the annual Petroleum Geology Seminar. Many participants have indeed asked members of the Organizing Committee for a Seminar next year and expressed support for future Seminars.

TTK

ECONOMIC GEOLOGY SEMINAR 1980 - INDUSTRIAL MINERALS Abstracts of Papers

PRESENT EXPLOITATION AND FUTURE PROSPECTS OF INDUSTRIAL MINERALS IN PENINSULAR MALAYSIA

P.C. AW

Geological Survey of Malaysia

Peninsular Malaysia is rich in certain industrial minerals. Out of more than 30 types of industrial minerals present, minerals which are being exploited on various scales of magnitude include barite, bauxite, clays, corundum, dolomite, ilmenite, limestone, quartz, crushed stone, sand/gravel, silica sand, xenotime and zircon. Some of these are exported, but the bulk is used locally in the construction industry and in various other industries.

Prospects for increased exploitation of industrial minerals are good. More of the resources are now known. Both quantitatively and qualitatively, resources are available in certain industrial minerals to meet the demand for the local and export markets in the 1980s.

Industrial minerals which have abundant reserves/resources are aggregates, common clay, dolomite, limestone (marble), kaolin, quartz and silica sand. Barite, ball clay and refractory clay have potential for increased exploitation. Industrial minerals with potential for future development include andalusite, chert and feldspar.

Industrial minerals are available as raw materials for the following industries: abrasives, ceramics, cements, chemicals, glass, fillers (for paper, plastics, paint and rubber), refractories and mineral pigments.

Industrial minerals such as barite, ball-clay, cements, calcium carbonate, kaolin, dolomite and silica sand are also in demand in the export market.

USES AND SPECIFICATIONS OF LIMESTONE

A.P. NG.

In the paper, the uses of limestone, shell (and marl) have been grouped under Metallurgical, Chemical, Agricultural and Construction industries. Specifications or requirements are indicated generally in terms of mineral grade and physical size; local prices and market practices are also included.

Metallurgical applications are discussed under ferrous and non-ferrous operations. Chemical applications are listed as glass, paper, ceramic, insulation, etc. Agricultural applications are mentioned as feeds, fertilizers and neutralizers. Construction applications are described as aggregates and powders in cement concrete, asphalt premix and other products for buildings and roads.

KAOLIN INDUSTRY IN MALAYSIA

CHEONG KONG FUAT

General Manager, Koperatif Bersatu Bhd. Kaolin Industries, Penang.

Although kaolin is a high-bulk low-value commodity, it is a useful industrial mineral. As an important raw material in a number of industries, it can attract foreign capital and expertise in setting up joint-venture projects in Malaysia. It also has an export market for the high grade product.

Kaolin industry in Malaysia can be said to be in the developing stage. Although kaolin had been exploited since the early 1930s, the industry did not progress beyond the cottage level. Most of the producers used simple methods producing low grade kaolin for local consumption. It was only in the early 1970s that modern machinery was used to produce high grade kaolin for export. Total production of kaolin in 1979 was about 45,000 tonnes, and about 30 percent of this was exported.

There is good demand for high grade kaolin in the export market. With the availability of kaolin resources and technical know-how, Malaysia is in a position to capture some of the foreign market. However, in order to achieve this, there are a number of problems to overcome, one of which is that both the private and public sectors should make kaolin deposits available to the bonafide producers.

MINERALS IN MALAYSIA FOR THE CERAMIC INDUSTRY

B.M. SEDALIA

Ceramic Adviser

Commonwealth Fund for Technical Cooperation

Pusat Kemajuan Kraftangan Malaysia

Kuala Kangsar, Malaysia.

The ceramic industry which covers the manufacture of diversified types of products such as whitewares, refractories, structural clay products, glass, enamel, abrasives and abrasive products, technical ceramics, cement, lime and plaster and artwares, use a wide variety of naturally occurring raw materials and minerals. These minerals are of various categories and origin. Main minerals are china clays, quartz and feldspar which are extensively used in whiteware and artware bodies and glazes. Fire clays are used for making refractory firebricks. For high temperature use, high alumina refractories are made with use of high aluminous materials such as bauxite and diaspore. Anhydrous aluminosilicate materials such as kyanite, sillimanite, andalusite and pyrophyllite are also used to make refractories with alumina content of 50% and above as well as mullite refractories. Shales and slates and other redburning clays are used for manufacture of structural clay products such as building bricks, facing bricks, paving bricks, roofing tiles, paving tiles, drain pipes and terracotta wares.

Magnesium minerals such as talc and steatite are used for whiteware bodies of wall tiles and electrical insulators. Magnesite is used for making basic refractories which are extensively used by iron and steel industry. Lime bearing minerals limestone and dolomite are used for whiteware bodies and glazes in the form of marble, whiting and calcite. The limestone and dolomite are used for making basic refractories. Dolomite and limestone are the main constituent of glass batches.

Quartz and silica, relatively low in iron content, is used for glass as well as whiteware bodies and glazes. Feldspar and nepheline syenite, which are alkali bearing minerals, are extensively used as flux in whiteware bodies and glazes. Also borax, a boron mineral, is used as an active flux for the whiteware bodies and glazes.

Rutile, ilmenite, anatase which are titanium minerals and zircon and zirconia which are zircon minerals, are used as opacifiers in whiteware glazes. Zircon due to its high fusion point find use as refractories for glass melting tank blocks. Graphite, which also has a very high fusion point and inertness to molten metal, is used for making crucibles and carbon refractories used for iron and steel making. Fluor-spars are used as whitening agent in glass and enamel batches. Coal and mineral oils are the main fuels used by the ceramic industry.

The geology, mineralogy, the physical and chemical characteristics as well as occurrence in Malaysia for all these minerals used by ceramic industry, are discussed in detail in this paper.

THE OCCURRENCE AND QUALITY OF GEM AND ORNAMENTAL STONE MATERIALS IN PENINSULAR MALAYSIA

K.N. MURTHY

Geological Survey of Malaysia

This paper gives a brief account of the occurrences and quality of gem and ornamental stones found in Peninsular Malaysia. Most of these minerals of gem quality are found in mines and quarries. Those found in alluvial tin mines represent the residual products of weathering of mineralised country rocks. Owing to their hardness and resistance to weathering, these minerals have withstood decomposition.

The most important parent rock of these gemstones is the pegmatite. It is the source of most of the topaz, beryl, garnet, tourmaline, quartz crystals, sapphire, feldspars and cassiterite. Others are found in metamorphic rocks such as gneiss, schist, marble and skarn rocks, while opal, agate and chrysoprase occur as cavity fillings in sandstone and volcanic rocks.

A brief account of the most important occurrences is given in my paper entitled "Some Gem Materials of Peninsular Malaysia" in the 1972 Annual Report of the Geological Survey of Malaysia. The present report updates the list to include minerals discovered since then. It is hoped that with better knowledge of the gem minerals available in this country, a viable gemstone industry based on local raw materials would be developed in the future.

Since sapphires, rubies, spinels and garnets are associated with Tertiary basalts in Thailand, a search for such minerals in the Tertiary basalts of Kuantan and Segamat could prove to be fruitful.

THE EXPLOITATION AND CONSERVATION OF NATURAL RESOURCES

KIEW BONG HEANG

Universiti Malaya

The industrial minerals in Malaysia is finite. As a non-renewable resource its total depletion in the future is inevitable. For its long term utilization in relation to national development a conservation policy is essential. To allow for growth at the optimum sustained output level a long term plan in the development of industrial minerals at the national level should be given more emphasis than the short term interest to the states. In conserving our industrial minerals, there should be a prevention of wastages, regulation of speed and ways of exploitation and the minimization of environmental damages to neighbouring renewable resources such as the top soils, water, forest, national parks, and wildlife and recreational areas. Pollution should be avoided where possible or minimized. Industrial minerals unexploited can only appreciate in value in this world of diminishing natural resources.

BERITA PERSATUAN (NEWS OF THE SOCIETY)

RESIGNATION AND COPTION OF COUNCILLOR

Prof. H.D. Tjia tendered his resignation as Councillor since he is away on sabbatical leave for 9 months.

The GSM Council regretfully accepted his resignation and co-opted Mr. Y.F. Wong to fill in the vacancy.

PETROLEUM GEOLOGY SEMINAR 1980

We are pleased to announce that positive response has been received from various organizations and individuals indicating their willingness to present papers at the above Seminar. To date, a total of 15 papers have been tentatively offered for presentation:-

1. Direct hydrocarbon indicators on seismic data in the Malay Basin by Khee Koe Kean, T.G. Carson, G.G. Phipps and R.J. Steele (Esso Production Malaysia Inc.)
2. Review of principal hydrocarbon — bearing basins around the South China Sea by Ernest P. Du Bois (CCOP Project Office)
3. Baram Delta Geology and hydrocarbon occurrences (Sarawak Shell Bhd)
4. Gamma ray and MWD (Measurement-while-drilling) logging by Trevor Pickinson (Gearhart-Owen Industries)
5. Petroleum exploration in Thailand by Boonrasri Yansan (Dept. of Mineral Resources, Thailand)
6. Abnormal pressure occurrence and detection techniques in the Malay Basin by C.H. Ford, R.G. Bellis, & J.F. Wallace (Esso Production Malaysia Inc.)
7. History of the Tapis Field by R.S.S. Koe, D.L. Bostwick & D.F. Wetherbee (Esso Production Malaysia Inc.)
8. The stratigraphic relationship of the Reed Bank, N. Palawan and Mindoro Blocks to the Asian Mainland by N.H. Holloway (Phillips Petroleum, Singapore)
9. Oil source bed hydrocarbon analysis - some methods and interpretations by S. Thompson (Robertson Research, Singapore)
10. Computer applications in petroleum exploration by J.F. Jemfry & Noridah Ibrahim (Esso Production Malaysia Inc.)
11. The petroleum geology of Brunei by D.W. Ellenor (Brunei Shell Petr. Co. Ltd.)
12. Utilization of repeat formation tester in formation evaluation by D. Krishnan, R.G. Bellis, & S.E. Sabatka (Esso Production Malaysia Inc.)
13. Enhanced analysis of 3D seismic surveys over a carbonate province by Mangat Thapar (Cities Services, Singapore)

14. Palaeofacies development in the Lower Miocene to Pliocene of Western Offshore Sabah (Sabah Shell Petroleum Co.)
15. Stratigraphy of the offshore area south of Kalimantan, Indonesia by M. Cater (Deminex, Germany)

The contents of these papers will definitely improve our knowledge and understanding of the petroleum geology of the region and the various successful exploration techniques employed. All participants will soon be informed of the detailed programme of the Seminar.

As a large turnout is again expected this year, all intending participants are advised to register early for the Seminar. The venue for the two-day Seminar will be at the International Hall, Hotel Merlin, Kuala Lumpur. The Seminar is also open to the public and non-members of the Geological Society of Malaysia.

The following registration fees will apply:

	<u>Advance registration</u>	<u>Late registration</u>
All Members	\$15.00	\$25.00
Non-Members	\$50.00	\$75.00
Student Members (Seminar only)	Free	Free
Student Non-Members (Seminar only)	\$ 4.00	\$ 5.00

Advance registration will be accepted until 6th December 1980. Lunches will be provided on both days to all participants.

AS

GSM GEOTECHNICAL ENGINEERING SEMINAR '81

CALL FOR PAPERS

Date: Friday, 13th Feb., 1981

Venue: Hotel Merlin, Kuala Lumpur

All correspondence to: The Organizing Chairman
GSM Geotechnical Engineering
Seminar '81
Dept. of Geology
Universiti Malaya
Kuala Lumpur 22-11, Malaysia

GSM REGIONAL GEOLOGY SEMINAR '81

(Theme: Geology of the Central Belt, Peninsular Malaysia)

Call for Papers

Two papers have been promised so far for the RGS '81 whose theme will be "Geology of the Central Belt, Peninsular Malaysia". More papers are being solicited from interested members.

The full day seminar is scheduled to be held in conjunction with the Annual General Meeting of the Society in April 1981

Please submit your tentative titles to:

The Organizing Chairman
GSM Regional Seminar '81
Geology Dept.,
Universiti Malaya
Kuala Lumpur 22-11, Malaysia.

JK

SOCIETY'S ANNUAL DINNER PROPOSED

M.K. Choo proposed rekindling the Society's Annual Dinner, this time to be held in conjunction with the Society's AGM (April 1981).

The Council agreed and M.K. Choo was given the task of organizing the dinner.

UPDATING OF PARTICULARS OF MEMBERS

An exercise is in progress at the moment whereby the Society would like to keep an up-to-date record of all its Members and it is felt that there is an opportunity to do so in conjunction with the opening of applications for Professional Membership. Most of the information supplied by earlier members in their application forms most certainly need to be updated. For example, members who joined in earlier years with a B.Sc. degree may now have higher qualifications, a longer list of publications, more professional experience, etc. Hence it is most desirable to have an updated record.

PROFESSIONAL MEMBERSHIP

Further to the amendments of the Society's Constitution establishing the Professional Membership, all Corporate Members of the Society are hereby informed that they can now apply for Professional Membership. Professional Membership forms and a copy of the Code of Ethics for Professional Members have been sent to all members.

All Corporate Members who wish to apply for Professional Membership are requested to:

- a) Fill the application form fully
- b) Check eligibility by referring to Article III, Section 5 of the Constitution which is also reproduced in the application form
- c) Accompany a 50 ringgit non-refundable processing fee with the completed application form
- d) Send the completed application form to:

The Hon. Secretary
Persatuan Geologi Malaysia
d/a Jabatan Geologi
Universiti Malaya, Kuala Lumpur 22-11.

Results of new oceanographic and space techniques and discussion of deep lithospheric and asthenospheric processes responsible for the dynamics of the area will be emphasized.

Registration of Participants

The subscription fee is \$50 for each participants and \$30 for each associate.

Abstracts should be posted to the Athens office of the Symposium for consideration not later than February 15th 1981.

You are kindly requested to address all correspondence concerning the symposium to

Prof. S.S. Augustithis
International Shmposium on the Hellenic Arc and Trench
National Technical University
Dept. of Mineralogy-Petrography-Geology
P.O. Box 1006, Athens, Greece.

Papers

Please submit the summaries typed in triplicate in English or French. The acceptance of oral papers will be announced to those concerned within 20 days of their receipt.

The summaries will be reproduced photographically and printed by the offset method without any correction or change to the text and will be distributed to the participants on their arrival.

For this reason the text should be of an informative nature, clear and well written, and containing the writer's basic conclusions. The text should be typed in single-space, on one side of white paper, using a typewriter with ELITE lettering and a brand new black ribbon. The paper should be 21 X 30 cm and the text should be included within an area of 10.4 X 20 cm, having equal margins on both sides.

The length of the summary should not exceed two typed pages, including eventual figures.

The proceedings of the Symposium will be published in a special issue of Tectonophysics.

Accepted papers must be presented in English or French. Each speaker will have twenty minutes in which to present his paper. The preferred visual aid will be slides of 2.4 X 3.6 cm in a 5 X 5 cm frame.

GROUNDWATER '81

An international conference and exhibition on soil investigation and groundwater for developing nations

The National Water Well Association of Australia is to hold an international conference and exhibition at the Hilton Hotel, Kuala Lumpur, Malaysia in June 1981 which will be broadly based on subsurface technology highlighting:

- * the latest developments in geotechnology covering groundwater and soils investigations;
- * the latest developments and innovations in training and education in these fields; and

Copies of the original certificates, degrees and others must be certified to be true copies preferably by the colleges or universities awarding them. However, they can also be certified by Corporate Members of the Society, Senior Government Officers, Justices of Peace and others in positions of responsibility. Please do not hesitate to write to the Hon. Secretary for clarifications should there be difficulties in filling the form, etc.

GSM INSTRUCTORS TO BOLIVIA TIN TRAINING COURSE

All the three instructors nominated by the Council will be leaving for Bolivia in early November.

They comprise:

- 1) M.K. Choo - Pernas Charter Management
- 2) Eric Toh - Conzinc Riotinto (M)
- 3) E.B. Yeap - Universiti Malaya.

YOUNG GEOSCIENTIST AWARD 1979

Four nominations for the Award were received by the closing date. However, with regard to the Rules of the Award, only two of the nominations were found to be valid. The Nominations Board, headed by T.T. Khoo, is still working out details and considering the candidates for the Award.

BERITA-BERITA LAIN (OTHER NEWS)

INTERNATIONAL SYMPOSIUM ON THE HELLENIC ARC AND TRENCH (H.E.A.T.)
National Technical University, Department of Mineralogy-Petrography-
Geology, 42, October 28th Street, Athens T.T. 147, Greece

April 8 - 10, 1981, Athens, Greece

Organization and Aim of the Symposium

The symposium is organized by the National Technical University of Athens and research teams working on the Hellenic Arc and Trench.

The symposium is being held under the auspices of the Ministry of Culture and Science of Greece and is also sponsored by the Geophysical Committee of Greece. It is co-sponsored by the International Union of Geological Sciences.

The symposium will be concerned with the formation and evolution of the Hellenic Arc and Trench from land and sea based studies and their relation to the tectonics of the adjacent areas. Comparisons with similar geotectonic structures in the world, especially the Tyrrhenian Sea and Pannonian Basin, will be made.

The H.E.A.T. symposium is a contribution to the new Lithosphere programme and elements of it will be presented at the meeting.

- * the requirements of developing nations in these areas including their needs for equipment, technology and other aspects of such projects.

It is proposed that the topics will be covered by introductory key addresses followed by bilateral exchange in fully recorded workshop sessions.

Papers contributing to this conference are sought in two areas:

- (i) from water authorities (Government Departments) of developing nations summarising their essential need for technology, equipment and training in the subject fields; and
- (ii) from experts with experience and ideas pertinent to the major subject topics of the conference.

The major subject topics are:

- Groundwater:
 - * Drilling
 - * Well and equipment design
 - * Corrosion mitigation and well development
 - * Groundwater management
- Soils Investigation:
 - * In hole evaluations
 - * Coring and sampling
 - * Hydraulic testing
 - * Safety factors and margins in investigation programmes
- Training and Education:
 - * Aims
 - * Needs
 - * Techniques

Synopses of papers (300 words) in English should be sent to:

The Technical Editor
Groundwater 81
P.O. Box 142, Chatswood,
New South Wales 2067
Australia.

Synopses must be received no later than October 31, 1980. Selection of papers will be advised by December 31, 1980. Completed papers will be required by February 28, 1981. Formats, styles and length of papers will be advised to authors at the time of acceptance of the papers.

All papers selected will be published as preprints for delegates attending the conference and the papers as delivered and discussions arising will be available in a separate published form after the conference. Copyright shall be given to the National Water Well Association of Australia.

Selected authors will be expected to deliver their papers to the conference personally as registered delegates or by nominee registered delegates.

For further information, write to: The Technical Editor, Groundwater 81, P.O. Box 142, Chatswood, New South Wales, 2067, Australia.

MINERAL PROSPECTING TAKES TO THE AIR

Sioux Falls, S.D. - Columbia University scientists, prospecting forests from the air, have discovered a way to find valuable mineral

deposits by measuring subtle spectral differences in light reflected from tree tops.

Minerals in soil beneath the trees, the scientists reported this week, retard chlorophyll production, causing subtle but now detectable changes in the special pattern of light reflected by trees' leaves. The scientists have developed an instrument that, when carried in a light aircraft over forest canopies, can pinpoint mineral deposits by detecting the telltale spectral changes.

"The prospects for further development of this new mineral exploration technique look very hopeful", says Williams Collins, adjunct professor and research associate in the Aldridge Laboratory of Applied Geophysics of the Henry Krumb School of Mines at the University's School of Engineering and Applied Science. "We have shown that the method can detect deposits containing nickel, copper and zinc. Other important minerals commonly occur in combination with these ores, and the technique promises to open vast forested areas of the world for exploration of untapped hidden resources."

Dr. Collins and Sheng-Huei Chang, a Columbia research associate, presented details of their research here at the Sixth Annual Pecora Symposium and Exposition. Their research was supported by the National Science Foundation and the National Aeronautics and Space Administration and was conducted with members of the U.S. Geological Survey.

The ability of ore metals to affect plant growth has been known since ancient times, but scientists had been unable to put that knowledge to practical use in prospecting. The problem, now solved by the Columbia researchers, was to identify certain physical properties of the affected plants and to filter out interferences so that the specific spectral signal of the metal-influenced leaves could be identified. Dr. Collins likened the problem, under airborne measurement conditions, to detecting a faint A-sharp sound over the roar of a subway train.

Differences in the densities of forest canopies, in sun angle, in ground slope and in the light-reflecting characteristics of various plant species, like the roar of a subway train, drown out the subtle spectral signals that indicate buried mineral deposits. Cameras and other photo-sensitive sensors, including the orbiting LANDSAT satellite, are unable to distinguish the spectral variations.

The instrument used by the Columbia scientists is a 500-channel geophysical/spectroradiometer designed by Dr. Collins and Hong-Yee Chiu at the Aldridge Laboratory. It is many times more sensitive to spectral differences than the unaided human eye or conventional instrument systems used in remote-sensing.

Data collected by the scientists during field surveys are stored in digital form on computer-compatible magnetic tape aboard their aircraft. The data is later analyzed using a computer that filters out most of the interference, thus allowing sensitive detection of the mineral-related signals.

To confirm the technique's accuracy, Drs. Collins and Chang have so far detected known or suspected deposits of ore metals in several test sites, including Cotter Basin, Mont., and the Spirit Lake area in Washington. The metal-influenced spectral effects observed in field surveys have been reproduced and verified under controlled conditions in laboratory studies.

TRAVEL GRANT FOR GEOSCIENTISTS

The Regional Office for Science and Technology for Southeast Asia is pleased to recall that, within the framework of the "Regional Network for Geosciences in Southeast Asia", and with the financial assistance of the "Association of Geoscientists for International Development" (AGID), Unesco is prepared to make one travel grant to a geoscientist to carry out a study or exchange visit, for a period of one to three months to an institution or project in the field of the earth sciences in Australia, Indonesia, Republic of Korea, the Philippines, Thailand, Hong Kong, Malaysia or Singapore.

The travel grant, consisting of an air ticket and a lump sum living allowance, is limited to a monetary value not exceeding US\$1800. The actual grant will be made on the basis of the cost of the air ticket and the planned length of the visit.

The grant will be made to a person working in the field of the earth sciences who is from a developing country in Southeast Asia which is a member of the Regional Network for Geosciences in Southeast Asia.

The candidate for the grant must have worked out his own detailed programme for the study visit. The visit must be completed before 31 March 1981. At the conclusion of the visit the candidate shall submit a detailed report to Unesco.

Candidates wishing to apply for this travel grant should submit to the Director of Unesco, ROSTSEA, the following documents:

- a) summary of education accomplishments and work experience;
- b) detailed statement of the purpose and programme of the proposed study visits;
- c) evidence that the host institutions or projects agrees to the proposed programme.

Unesco will accept applications on a first come first served basis.

Unesco will consult representatives of the Regional Network for Geosciences in Southeast Asia and the Association of Geoscientists for International Development before awarding the travel grant.

The candidate will be accepted in his or her private capacity and shall not be considered as an agent or member of Unesco during the period of the exchange visit.

The accepted candidate for the travel grant shall be responsible for the purchase of any insurance that he or she considers necessary in respect of accidents or sickness, for the duration of the exchange visit programme. Unesco will not assume any responsibility for compensation in the event of sickness, accident, death, or disability of the grantee nor will it arrange for the insurance of grantee or reimburse premiums on such insurance.

Further information available from:

Dr. V. Prakash
 Director, ROSTSEA
 Jl. Thamrin 14
 Tromolpos 273. JKT
 Jakarta, Indonesia.

INDONESIAN PETROLEUM ASSOCIATION - TENTH ANNUAL CONVENTION
 Jakarta, 26th-27th May 1981.

The Indonesian Petroleum Association will hold its Tenth Annual Convention on May 25 to 27, 1981.

Authors of outstanding papers who represent the exploration pulse of the extensive geographic area in Southeast Asia are encouraged to contribute. Although the Convention has no theme, extra consideration will be given to papers that will deal with, but not exclusively, to the following:

- * Exploration and Production
- * Petro-Chemical
- * LNG and Gas
- * Marketing and Transportation.

Quality papers from other parts of the world will also be considered.

Please send early replies to the following address:

Thomas A. Miller
 Chairman Lecture Committee
 10th Annual IPA Convention
 P.O. Box 63/JKT
 Jakarta, Indonesia.

UNIVERSITI MALAYA PROJECT REPORTS 1979/80

1. Geology of the Yan-Ayer Puteh area, Kedah by Chow Kok Tho.
2. The geology and biostratigraphy of the Kanthan area, Perak by Ramly Khairuddin.
3. Mineralogy and chemistry of 'amang' in Kuala Lumpur area by Jamlus Md. Yasin.
4. Petrography of the Kodiang limestone, Northeastern Kedah by Abdul Latif Hj. Ashaari.
5. Geology of Parit Sulong, Sri Medan and northeast Batu Pahat, Johore by Jawati Abu Naim.
6. Geology of the Kluang Kahang area, Johore, West Malaysia by Ismail Iman.
7. Some aspects of mineralogy and chemistry of amang minerals from the tin mines of Ipoh region by Lau Ching Tiung.
8. Geology of Templer Park area, Selangor by Jalaludin Ismail.
9. Geology and geophysical surveys over a base metals prospects, Chini Six area, Pekan, Pahang by Hee Kong Hin.
10. Geology of Kenny Hill Formation, Selangor, Peninsular Malaysia by Rosly Mohd. Nor.
11. Geology of the Kepong and surrounding area with emphasis on primary tin mineralisation by Wong Keen Ming.
12. Geology of bedrock and Late Cainozoic stanniferous alluvium (with associated artifacts) of Dengkil area, Selangor by Ong Whee Sen.
13. Geology and geochemical studies of the Chini Six area, Pekan, Pahang by Goh Juan Hui.
14. Conodont biostratigraphy of the Kodiang limestone, Kodiang, Kedah, West Malaysia by Yii Siew Sang.
15. Geology, mineralisation and geochemical studies of Ulu Yam - Serendah area by Chan Kek Yau.
16. The geology of Sungai Kusial - Machang area, Kelantan by Mohd. Azmer Ashari.

17. Detailed geological study and ground magnetic study of the Kedah Peak (Rest House) area, Kedah by Lim Beng Kung.
18. General geology of the Jurong Formation, Singapore by Husein Aman.
19. Geology of the Santubong Peninsula, West Sarawak by Awang Kasumajaya.
20. Stratigraphic and petrographic studies of Bau Limestone, West Sarawak, Malaysia by Boniface Bait.
21. The geology of the Marup area, Second Division, West Sarawak, with emphasis on some aspects of the geochemistry and mineralization of Marup gold by Mohd. Zailon Ramli.
22. Geology of Tanjung Kidurong area, Bintulu, Sarawak, East Malaysia by Stanley Ajang Bato.
23. Petrology and petrochemistry of the volcanic rocks of the eastern region of North Tawau area, Tawau, Sabah by Gasah Lingkai.
24. The geology of lower Umas Umas and Merotai Besar Valley, Tawau, Sabah by Gordon (Joseph) Tan.
25. Petrology and geochemistry of the ophiolite suite, lower Bole area, Lahat Datu, Eastern Sabah by Alexander Yan Tze Wah.
26. Geology of the upper Bole River, Segama Valley, Sabah, East Malaysia by Lai Hoi Kean.
27. Petrology of the ophiolitic rocks of Sungai Kawag area, Sabah by Goh Kiat Tze, Kenny.
28. Petrology and geochemistry of the volcanic suite of North Tawau area, Semporna Peninsula, Eastern Sabah, Malaysia by Liew Kim Kiat.

CALENDAR

A bracketed date, e.g. (Mar-Apr 1979), denotes entry in that issue carried additional information.

1980

- Nov 23 - 28 : Mining of Copper Porphyries, Santiago, Chile. (L.B. O'Higgins, 1170 9^o piso, Casilla 14668, Correo 21, Santiago, Chile). (May-Jun 1980).
- Dec 1 - 5 : Symposium on Problems and Practice of Dam Engineering, Bangkok, Thailand. Prof. A.S. Balasubramaniam, Division of Geotechnical & Transportation Engineering, Asian Institute of Technology, P.O. Box 2754, Bangkok, Thailand. (May-Jun 1980).

1981

- Mar - Apr : SEATRAD Seminar on "Complex Tin Ores and Related Problems", Ipoh, Malaysia. The Director, SEATRAD Centre, 14 Tiger Lane, Ipoh, Perak, Malaysia. (May-Jun 1980).
- Mar 29 - Apr 4 : International Conference on Arid Soils - Properties, Genesis and Management, Jerusalem, Israel. International Conference on Arid Soils, P.O. Box 3054, 122 Hayarkon St., Tel Aviv, Israel. (May-Jun 1979).
- May : International Symposium on "Concept and Method in Paleontology" Barcelona. Dr. Jordi Martinell, Department de Paleontologia, Facultar de Geologia,

- Univ. Barcelona, Gran Via de las Corts Catalanes, 585, Barcelona-7, Spain (May-Jun 1980).
- May 13 - 15 : Industrial Minerals (Forum), Albuquerque, New Mexico, USA. (G.S. Austin, New Mexico Bureau of Mines & Mineral Resources, Campus Station, Socorro, N.M. 87801, USA. Tel. 505-835-5125).
- May 18 - 22 : Fourth International Coral Reef Symposium, Manila, Philippines. Marine Sciences Center, Univ. of Philippines, P.O. Box 1, Diliman, Quezon City, Philippines. (May-Jun 1980).
- Jun 24 - 26 : ICAM 81 - International conference on Applied Mineralogy in the mineral industry, Johannesburg, South Africa. Pre- and post-conference field excursions. (L.F. Haughton, ICAM 81, Nat. Inst. for Metallurgy, Private Bag X3105, Randburg, 2125 South Africa). (Jan-Feb 1980).
- Aug : United Nations Conference on New and Renewable Sources of Energy, Nairobi, Kenya. Information Officer, UN Conference on New & Renewable Sources of Energy, DESI/DPI - Room 1072-C, United Nations, New York, NY 10017, USA. (Jul-Aug 1980).
- Aug 7 - 16 : 4th International Conference on basement tectonics. (Conference with field excursions), Oslo, Norway. Major theme: origin, propagation and significance of basement fractures. (I.B. Ramberg, Dept. of Geology, University of Oslo, Box 1047, Blindern, Oslo, 3, Norway).
- Aug 9 - 14 : Second international symposium of the Cambrian system, Golden, Colorado, USA. Sponsored by the Cambrian Subcommittee of the IUGS Commission on Stratigraphy and the U.S. Geological Survey. (The Cambrian Symposium, Paleontology and Stratigraphy Branch, U.S. Geological Survey, Box 25046, Mail Stop 919, Denver Federal Center, Co. 80225, USA).
- Aug 16 - 25 : XIth Congress and General Assembly - International Union of Crystallography, Carleton University, Ottawa, Canada, Mr. K. Charbonneau, XIIth I.U. Cr. Congress, National Research Council of Canada, Ottawa, Ontario, Canada K1A 0R6. (Jul-Aug 1980).
- Sep 1 - 6 : Second International Conference, Graptolite working group for the International Palaeontological Association, (Conference and field excursions), Cambridge, U.K. (P.R. Crowther, Dept. of Geology, University of Cambridge, Sedgewick Museum, Downing Street, Cambridge CB2 3EQ, U.K.).
- Sep 7 - 12 : 7th International Clay Conference, Bologna and Pavia, Italy. Conference with pre- and post-meeting field trips. (F. Veniale Istituto di Mineralogia e Petrografia, Università di Pavia, Via Bassi 4, 27100 Pavia, Italy).

- Oct 7 - 9 : ASEAN Council on Petroleum (Meeting), Manila, Philippines. (ASCOPE '81 Organizing Secretariat), Philippine National Oil Co., 7901 Makati Ave., Makati, Metro Manila, Philippines, Telex: 63667 PNOC PM).
- Nov 18 - 23 : GEOSEA IV - Geology, Mineral and Energy Resources of Southeast Asia; Philippine International Convention Center, Manila, Philippines. The Secretary, Geological Society of the Philippines, Bureau of Mines Bldg., Pedro Gil St., Malate, Manila, Philippines. (Jul-Aug 1980).
- Nov 23 - 26 : Asian Mining 81, Singapore. The Secretary, IMM, 44 Portland Place, London W1N 4BR, England. (May-Jun 1980).

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- May 12 - 14 : 9th International Geochemical Exploration Symposium, Saskatoon, Canada. (L.A. Clark, Saskatchewan Mining Development Corp., 122 3rd Ave. North, Saskatoon, Sask., Canada S7K 2HG).
- Aug. 20 - 23 : IV International Symposium on the Ordovician System, Oslo, Norway. One pre-meeting excursion in Norway and three post-meeting excursions in Sweden. (D.L. Bruton, Paleontologisk Museum, Sars gate 1, Oslo, 5, Norway).
- Aug 22 - 28 : Circum-Pacific Energy and Mineral Resources Conference, Honolulu, Hawaii, USA. (M.T. Halbouty, 5100 Westheimer Road, Houston, Texas 77056, USA).

PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)

Tujuan Persatuan Geologi Malaysia adalah untuk memajukan sains bumi, terutama sekali di Malaysia dan negara negara jiran. Barang siapa yang ingin menjadi ahli Persatuan adalah dipersilakan mendapatkan 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 the neighbouring countries. Anyone interested in becoming a member of the Society should obtain the necessary forms from the Hon. Secretary.

