

## PERSATUAN GEOLOGI MALAYSIA

# WARTA GEOLOGI

## NEWSLETTER OF THE GEOLOGICAL SOCIETY OF MALAYSIA

JIL 7, NO. 2 (VOL. 7, NO. 2)

MAR — APR 1981

### KANDUNGAN (CONTENTS)

#### CATITAN GEOLOGI (GEOLOGICAL NOTES)

T.T. Khoo: On the suggested effects of potassium metasomatism  
on some rocks in Peninsular Malaysia 35

S. Nishimura & P.H. Stauffer: Fission-track dating of zircons  
from the Serdang volcanic ash, Peninsular Malaysia 39

#### MESYUARAT PERSATUAN (MEETINGS OF THE SOCIETY)

G.H. Moh: Aspects of China's tin deposits 42

R.W. Hutchinson: Massive base metal sulphides deposits as guides  
to tectonic evolution (with some reference to lode tin  
deposits of exhalative origin) 43

GSM Regional Geology Seminar '81 — Geology of the Central Belt,  
Peninsular Malaysia and Thailand — Report & Abstracts of Papers 44

GSM Annual General Meeting 1981 and Annual Dinner 1981 — Report 51

#### BERITA PERSATUAN (NEWS OF THE SOCIETY)

Amended By-Law 1: Dues — Section 2 54

Lake Toba Excursion — new dates 55

Malam Petrologi (Petrology Night) 55

Membership 55

Change of address 56

New Library additions 57

#### BERITA-BERITA LAIN (OTHER NEWS)

5th World Tin Conference 58

International Alluvial Tin Training Course— Report 57

SEATRAD Centre Seminar — Report 59

ASCOPE '81 60

Worldwide survey of Precambrian to Recent glauconitic greensands 62

Part-time geology demonstrators needed 63

Extraction Metallurgy '81 63

UKM 1981 Dissertation titles 66

AGID expands operations 67

Metallogeny of mafic & ultramafic complexes symposium — abstracts 67

Calendar 68



DIKELUARKAN DWIBULANAN  
ISSUED BIMONTHLY

**PERSATUAN GEOLOGI MALAYSIA  
(GEOLOGICAL SOCIETY OF MALAYSIA)**

**Majlis (Council) 1980/81**

**Pegawai-pegawai (Officers)**

- Presiden  
(President)** : Mohd. Ayob, Petronas, P.O. Box 2444,  
Kuala Lumpur
- Naib-Presiden  
(Vice-President)** : Khoo Teng Tiong, Jabatan Geologi,  
Universiti Malaya, Kuala Lumpur
- Setiausaha Kehormat  
(Hon. Secretary)** : Tan Boon Kong, Jabatan Geologi, Universiti  
Kebangsaan Malaysia, Kuala Lumpur
- Penolong Setiausaha  
(Hon. Asst. Secretary)** : Mohd. Ali Hasan, Jabatan Geologi,  
Universiti Malaya, Kuala Lumpur
- Bendahari  
(Treasurer)** : Chin Lik Suan, Datuk Keramat Smelting  
Sdn. Bhd., Jln. Brickfields, Kuala Lumpur
- Pengarang  
(Editor)** : Teh Guan Hoe, Jabatan Geologi, Universiti  
Malaya, Kuala Lumpur
- Immediate Past President** : Tan Bock Kang, Jabatan Geologi,  
Universiti Malaya, Kuala Lumpur
- Councillors (2-year)** : Abdul Aziz Hussin, Jabatan Kejuruteraan  
Petroleum, Universiti Teknologi Malaysia,  
Kuala Lumpur
- Leong Khee Meng, Carigal-BP, P.O. Box  
757, Kuala Lumpur
- Wong Yoke Fah, Valdun Consultants, P.O.  
Box 242, Kuala Lumpur
- Khoo Kay Khean, Jabatan Penyiasatan  
Kajibumi, Bangunan Ukor, Jalan Gurney,  
Kuala Lumpur
- (1-year)** Ismail Mohd. Noor, Jabatan Geologi,  
Universiti Kebangsaan Malaysia, Kuala  
Lumpur
- Gan Ah Sai, Jabatan Penyiasatan Kajibumi,  
Bangunan Ukor, Jalan Gurney, Kuala Lumpur
- Choo Mun Keong, Pernas Charter Management,  
P.O. Box 936, Kuala Lumpur
- Ahmad Said, Petronas, P.O.Box 2444,  
Kuala Lumpur

\*\*\*\*\*

**Address of the Society:** GEOLOGICAL SOCIETY OF MALAYSIA  
c/o Dept. of Geology  
University of Malaya  
Kuala Lumpur 22-11, Malaysia.  
Tel. 03-577036

# CATITAN GEOLOGI (GEOLOGICAL NOTES)

## ON THE SUGGESTED EFFECTS OF POTASSIUM METASOMATISM ON SOME ROCKS IN PENINSULAR MALAYSIA

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

### Introduction

The nature of mineralogical changes resulting from potassium metasomatism will depend on the physical conditions and the composition of the parent rock. Turner and Verhoogen (1960) pointed out that in alkali metasomatism the compositional control will depend on the  $(K_2O + Na_2O)/Al_2O_3$  ratio of the parent rock. However, this point does not seem to have been considered in the suggestions put forward by some authors. The aim of this note is to comment on the suggested effects of potassium metasomatism on some rocks in Peninsular Malaysia.

### Quartzo-feldspathic rocks

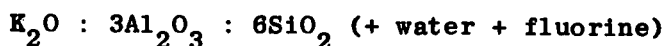
The effects of potassium metasomatism in some rocks of quartzo-feldspathic composition from Peninsular Malaysia have been discussed by several authors such as Hutchison and Leow (1963), Bradford (1972, p. 62) and Hutchison (1973, p. 229 and p. 232). All of them suggested that potassium metasomatism of such rocks resulted in the formation of muscovite.

Hutchison and Leow (1963) described tourmaline greisenization of granite in Langkawi. They observed that adjacent to hydrothermal quartz dykes were 'zones of metasomatic alteration of the granite host' and tourmaline and secondary muscovite developed in these zones. They said, 'tourmalinization precedes the introduction of potassium to form muscovite but both processes are not actually separated by any major time break'.

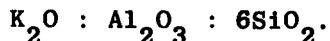
Bradford (1972) suggested that muscovite might have developed in the Jerai quartzite, which is feldspathic, as a result of alkali metasomatism and listed various metasomatic mineral assemblages in the Jerai rocks containing muscovite.

Hutchison (1973) has stated that tourmalinization and greisenization of granites are common in Peninsular Malaysia and that (p. 229) 'there is strong evidence to show that muscovite is secondary and was introduced as a result of alkali metasomatism causing replacement of the feldspar'. He (p. 232) further suggested that Malayan 'granites crystallized under conditions that permitted alkalis to be expelled during the final stages of crystallization' and that 'this deduction is in agreement with the alkali enrichment in hydrothermal dykes and the commonly occurring alkali metasomatic zones associated with these dykes as products of tourmaline greisenization'.

The suggestion that introduction of potassium will cause replacement of feldspar by muscovite is inconceivable. The molecular ratio of muscovite is



but the molecular ratio of potash feldspar is



The alkali/alumina ratio of muscovite is 1:3 but that of potash feldspar is 1:1. Introduction of potassium is more likely to produce potash feldspar rather than replacement of the feldspar by muscovite.

The effects of potassium metasomatism on a quartzo-feldspathic rock like granite or a feldspathic quartzite can be predicted by considering an AKNa diagram. Figure 1 shows an AKNa diagram and minerals of interest which can be plotted on this diagram are muscovite, potash feldspar and albite. The composition of a muscovite-free granite will plot on the line joining potash feldspar and albite and a muscovite-bearing granite will plot in the three-phase field. Introduction of potassium into the muscovite-free granite will shift the composition towards the potash feldspar along the potash feldspar-albite join. The effect of this change is that the albite will be replaced by potash feldspar. At low to moderate temperatures the potash feldspar will be microcline. This type of alkali metasomatism has been classified by Goldschmidt (1922) as 'metasomatic exchange of alkalis', and has been shown by experiments of Orville (1962) to occur readily. Potassium metasomatism of a muscovite-bearing granite would shift the plot in the 3-phase field towards potash feldspar corner and the effect of this will be formation of more potash feldspar at the expense of muscovite and albite. There is no possibility of muscovite forming. In order to form muscovite by addition of potassium the parent rock must obviously need to have a low molecular ratio of  $(\text{K}_2\text{O} + \text{Na}_2\text{O})/\text{Al}_2\text{O}_3$  i.e. the rock must be very aluminous such as kaolinitic sediments and bauxitic rocks whose compositions will plot near the alumina corner of the AKNa diagram. This compositional requirement cannot be met by quartzo-feldspathic rocks like granite or feldspathic quartzite. Muscovite can develop in quartzo-feldspathic rocks if alkalis are removed from the system, not added, so that the alkali/alumina molecular ratio can be made low.

#### Intermediate-basic rocks

In the Benta Complex, Hutchison (1971) described a microcline-plagioclase-hornblende-biotite gneiss which he suggested could be an andesite tuff subsequently metamorphosed and compositionally altered by potassium metasomatism. He wrote (p. 66),

*It is suggested that the microcline microperthite rapakivi porphyroblasts in the foliated gneiss are secondary, and result from potassium metasomatism. The source of the potassium is presumed to be from higher-grade deeper levels which underlay the rocks now exposed. The metasomatism was syn-metamorphic, otherwise one would expect the formation of muscovite to result from K-metasomatism. But muscovite is absent. Hence the metasomatism was under conditions of high temperature which prevented the formation of muscovite.*

Again it is suggested that if the physical conditions are right, muscovite would form in the metamorphosed andesite tuff resulting from potassium metasomatism. In this case maybe muscovite is absent not because the physical conditions were not right but because the composition of the parent rock (both present and suggested former composition) is

unfavourable. Considering the AKF diagram shown in Fig. 2, it is evident that potassium metasomatism of basic to granodioritic rocks cannot give rise to the formation of muscovite. The compositions of average basaltic rocks, tonalites and granodiorites all plot on the KF line of the AKF diagram (Winkler, 1967, p. 56) and addition of potash will only shift the composition towards the K-corner along the KF line. It is not possible for muscovite to form and the conclusion that metasomatism of the rock occurred at high temperatures based on the absence of muscovite cannot be made.

### Conclusions

Rock composition exerts an important control over development of minerals due to metasomatism. Muscovite, for example, cannot develop in quartzo-feldspathic rocks or basic-intermediate rocks due to introduction of potassium because of unfavourable whole rock composition. Several suggestions of muscovite development in such rocks in Peninsular Malaysia are thus invalid.

### References

- Bradford, E.F., 1972. Geology and mineral resources of the Gunong Jerai area, Kedah. Geological Survey of Malaysia, District Memoir 13.
- Goldschmidt, V.M., 1922. On the metasomatic processes in silicate rocks. Econ. Geol., 17, 105-123.
- Hutchison, C.S., 1971. The Benta Migmatite Complex: Petrology of two important localities. Bull. Geol. Soc. Malaysia, 4, 49-70.
- \_\_\_\_\_, 1973. Plutonic activity. In Gobbett, D.J. and Hutchison, C.S. (Editors) "Geology of the Malay Peninsula" Chap. 8, 215-252. Wiley-Interscience, New York.
- \_\_\_\_\_ and Leow, J.H., 1963. Tourmaline greisenization in Langkawi, Northwest Malaya. Econ. Geol., 58, 587-592.
- Orville, P.M., 1962. Alkali metasomatism and feldspars. Norsk Geol. Tidsskr 42, 283-316.
- Turner, F.J., and Verhoogen, J., 1960. Igneous and metamorphic petrology. McGraw-Hill, New York.
- Winkler, H.G.F., 1967. Petrogenesis of metamorphic rocks. Springer-Verlag, New York.

\*\*\*\*\*

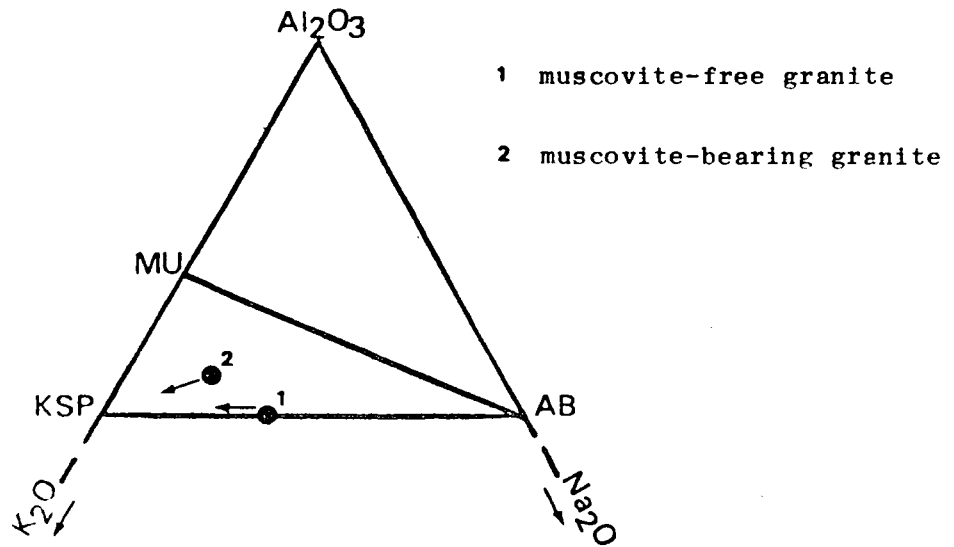


Fig. 1. Schematic AKNa diagram showing muscovite (MU), potash feldspar (KSP) and albite (AB).

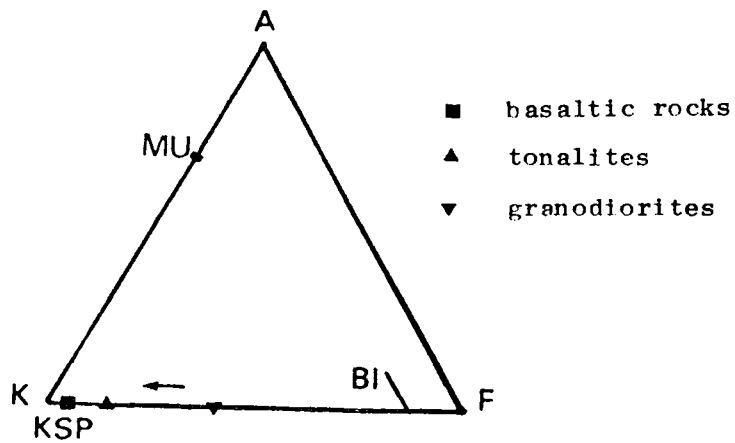


Fig. 2. Schematic AKF diagram showing compositional plots of average basaltic rocks, tonalites and granodiorites (after Winkler, 1967). MU = muscovite, KSP = potash feldspar, BI = biotite.

## FISSION-TRACK OF ZIRCONS FROM THE SERDANG VOLCANIC ASH, PENINSULAR MALAYSIA

SUSUMU NISHIMURA, Dept. of Geology, Kyoto University, Japan, and  
PETER H. STAUFFER, Dept. of Geology, University of Malaya, Malaysia.

A layer of volcanic ash was found a few years ago exposed in a clay pit at Serdang, near Kuala Lumpur, Peninsular Malaysia (Stauffer and Batchelor, 1978). This ash layer, which occurs interstratified with fine-grained alluvial to possibly lacustrine sediments, is 85-90 cm thick, with a relatively coarser middle portion 50 cm thick and containing numerous crystals and crystal fragments of quartz, feldspar, biotite and zircon.

A concentrate of zircon grains was separated from this crystal-rich middle zone in the ash layer and sent to Kyoto for dating by the fission-track method. A number of grains were etched and counted, and the results are presented in Table 1.

In addition to those shown in the table, some other zircon grains yielded older fission-track ages. These are interpreted as representing reworked zircons, and they have therefore been omitted. Visual examination of the sample indeed revealed a minority of grains which are rounded, in contrast to the dominant sharp-edged euhedral crystals. The grains shown in Table 1 form a reasonably tight group representing the youngest age cluster, and these are therefore interpreted as magmatic crystals giving a maximum age for the eruption and for the Serdang ash, both of which are assumed to be nearly contemporaneous with the formation of the zircon crystals. While it is also possible that these zircons were derived from a rock remelted later (i.e. that the eruption age could be much less than 30,000 years), this possibility is considered remote, in view of the associated radiocarbon ages in sediments underlying the ash (see below) and the similarity of sediment overlying the ash at Serdang to that beneath it (Stauffer and Batchelor, 1978).

The average of the individual grain ages in Table 1 is  $0.028 \pm 0.004$  Ma. The age calculated from all the counted tracks taken in aggregate, which is considered a more reliable estimate for the true age, is  $0.03 \pm 0.0045$  Ma. The age of the ash is therefore inferred to be about 30,000 years.

This fission-track age for the ash at Serdang is in very good agreement with fission-track ages (also from zircons) of about 31,000 years, about 30,000 years, and about 30,000 years for similar ash occurrences at Kota Tampan, Perak, and at Ampang, Kuala Lumpur, and for the youngest ash layer at Toba caldera, northern Sumatra (Stauffer, *et al.*, 1980). It therefore supports the inference that the various Quaternary ash occurrences in the southern Malay Peninsula represent a single catastrophic eruption of the Toba volcano. It also further bolsters the credibility of the six radiocarbon dates indicating that the sediments beneath the ash at Serdang and Ampang include strata between 30,000 and 40,000 years old (Stauffer, *et al.*, 1980). This newly

determined age does not support the contrary inference of Ninkovich, et al., (1978) that the Malayan ash is considerably older and correlates with an eruption of Toba volcano 75,000 years ago.

#### Acknowledgment

Mr. S. Sandrasagram separated the zircons from the specimen of ash.

#### References

- Ninkovich, D., Shakleton, N.J., Abdel-Monem, A.A., Obradovich, J.D., and Izett, G., 1978. K-Ar age of the late Pleistocene eruption of Toba, north Sumatra. Nature, 276, 574-577.
- Stauffer, P.H., and Batchelor, B.C., 1978. Quaternary volcanic ash and associated sediments at Serdang, Selangor. Warta Geologi, 4, 7-11.
- \_\_\_\_\_, Nishimura, S., and Batchelor, B.C., 1980. Volcanic ash in Malaya from a catastrophic eruption of Toba, Sumatra, 30,000 years ago. In Nishimura, S. (ed), Physical geology of Indonesian island arcs (Kyoto: Kyoto University), 156-164.

\*\*\*\*\*



Table 1. Fission-track ages for zircon grains from Serdang volcanic ash.

Grain No.	Spontaneous fission tracks		Induced fission tracks		Fission-track age: T (Ma)
	Number: $N_s$	Density: $\rho_s$ (cm <sup>-2</sup> )	Number: $N_i$	Density: $\rho_i$ (cm <sup>-2</sup> )	
1	9	7.9 x 10 <sup>4</sup>	9203	8.08 x 10 <sup>7</sup>	0.030
2	5	4.0	4603	4.04	0.030
3	6	3.7	6013	4.00	0.028
4	10	8.7	9288	8.08	0.033
5	4	3.3	4903	4.05	0.024
6	7	9.0	6470	8.32	0.033
7	8	6.6	9807	8.09	0.025
8	4	3.0	3332	3.87	0.023
9	5	4.4	4644	4.04	0.032
10	11	7.3	12026	7.98	0.028
11	4	4.5	3236	4.16	0.032
Totals: 74			73525	Mean of fission-track ages of grains:	
Fission-track age calculated from total numbers of counted tracks: 0.03 ± 0.0045 (1σ)				0.028 ± 0.004 (1σ)	
Analyst: S. Nishimura					

## MESYUARAT PERSATUAN (MEETINGS OF THE SOCIETY)

On 17th April, 1981, despite the short notice, about 30 members were present at the Department of Geology, University of Malaya to listen to Prof. Dr. G.H. Moh of Universität Heidelberg, W. Germany who spoke on "Aspects of China's tin deposits" and Prof. R.W. Hutchinson of University of Western Ontario, Canada, who talked on "Massive base metal sulphide deposits as guides to tectonic evolution (with some reference to lode tin deposits of exhalative origin)".

Dr. G.H. Teh, who chaired the meeting, thanked the two speakers for finding time from their tight schedule to present their talks to our members enroute home after attending the SEATRAD Centre Seminar in Bandung.

The lively discussion which followed at the end of the two stimulating talks covered questions on a wide spectrum of mineral deposit types, and the members present left contented, ready for their dinners, after a most appetising evening.

G.H. MOH: Aspects of China's tin deposits.

From the mineralogical point of view, cassiterite-sulfide ore deposits are of increasing interest, particularly when microscoping these complex ores regarding their textures, intergrowths, exsolution, mutual reactions, etc. Ore deposits of this type are known from all parts of the world, namely, Bolivia, Japan, New England (Australia) and elsewhere. Prof. Moh had the possibility to visit a couple of Chinese ore deposits which fit excellently into this type of deposits. Two such deposits formed the main part of his talk. The brief outline on them is with respect to his knowledge of these occurrences and on-going microscopical investigations. Firstly, the Dachang ore fields in the Guangxi-province, South China, are restricted to middle Devonian rocks: reef-bearing limestones and shale; and to the lower parts of the upper Devonian series: siliceous rocks and lenticular limestone; with the mineralization related to the magmatic activity of some acidic rocks (e. g. as stocks, dykes) which occur beneath. The various ore lenses and mines are situated within three parallel ore belts with distinctly different types of mineralization. Altogether, there are 5 different types of mineralization: placer, cassiterite-sulfide ore, polymetallic mineralization, and two different skarn types; all of them can be divided into various sub-types. Regarding the ore minerals, besides cassiterite, wolframite and scheelite, a number of common ore minerals found which is of special interest comprises a series of complex sulfosalts which include stannite, franckeite, jamesonite, diaphorite, bournonite, geokronite, and others.

A second area of interest is the Dongpo ore field, Shizu, Hunan-province, South China. This W-Sn-Mo-Bi deposit is restricted to slightly metamorphosed Devonian limestones, and the mineralization is caused in two stages by two distinctly different Mesozoic granites and in a 3rd stage by a granitic porphyry. The W-Bi-Mo mineralization is thought to be commonly between the first and second granite generation; Sn and Be

is or is mainly associated with the second granite generation; whereas most sulfides and again a Sn mineralization are related to the granitic porphyry. The simplified sequence of mineralization is as follows: on top occurs a tin-containing marble with ore veins; below are skarns with varying tin contents; next are the skarns and greisens showing features of metamorphism, and beneath is the fine grained granite showing quartz veins with cassiterite and pyrite.

This rather complex deposit is characterized by various stages of mineralization, fine-grained intergrowths, replacement-textures and so on and a total of more than 100 minerals have been found so far. With respect to liberation and separation problems, because of the extremely fine-grained cassiterite-silicate-sulfide associations, tin has not yet been extracted from the ores, thus, only tungsten, bismuth, and molybdenum is economically mined and recovered.

The studies of the mines, ores and rocks in China, which have been arranged by the Chinese Academy of Geological Sciences, Beijing, is greatly acknowledged by the speaker.

\*\*\*\*\*

R.W. HUTCHINSON: Massive base metal sulphides deposits as guides to tectonic evolution (with some reference to lode tin deposits of exhalative origin)

In introducing his talk, Dr. Hutchinson indicated that the major family of massive base metal sulphide deposits includes one main group hosted in volcanic and another in sedimentary rocks. Each group includes differing varieties distinguishable by their broad geological characteristics. These varieties occur in rocks of the entire geological column from Archean to Recent and they span a complete spectrum from ensimatic to ensialic geological environments and their time distribution suggests an evolutionary sequence in their development. In addition, the massive sulphides have significant metallogenic and genetic links to other important families of ore deposits, notably to porphyry copper deposits and to Mississippi Valley type lead-zinc ores. Since broad crustal tectonic processes controlled the space and time distribution of all these deposits, they may serve as guides to tectonic evolution and paleo-tectonic processes.

Dr. Hutchinson then went on to show the geological environment, tectonics, age and examples of the 6 main types of massive sulphide deposits. This was punctuated by examples of tin deposits with evidences of exhalative origin.

He then showed that the environments of formation of the six types can be related to various configurations and evolutionary developments along both accreting and consuming plate boundaries in Phanerozoic orogenic belts. The spatial dispositions of these base metal deposit types across consuming boundaries provides an additional indication of the dip of paleo-subduction zones. The space-time distribution of certain types suggests an evolutionary change in the nature of consuming boundaries, from primitive Japanese type, through West Pacific type to mature Andean type, during Phanerozoic time.

The geological settings and the space-time distributions of the deposits also suggest that plate tectonic mechanisms were not important



R. W. HUTCHINSON

NEEDED URGENTLY

GEOLOGICAL NOTES

FOR

WARTA GEOLOGI

in Precambrian time and that Archean greenstone belt tectonism was dominated by subsidence or vertical subduction. Proterozoic tectonism, in turn was dominated by continental crustal rifting. Lateral separation on the continental rifts may have formed the deep ocean basins and eventually initiated late Precambrian-Phanerozoic plate tectonic processes. Various plate configurations, with their own evolutionary developments along plate boundaries, led to repetition in the same sequence, but in a smaller span of both time and space, of all the earlier environments and resulting mineral deposit types.

G.H. TEH

\*\*\*\*\*

## REGIONAL GEOLOGY SEMINAR '81 - REPORT

The Regional Geology Seminar with its theme on The Geology of the Central Belt, Peninsular Malaysia and Thailand, turned out to be a great success. It was held on 10th April 1981 at the Hotel Merlin, Kuala Lumpur.

Eleven papers (see abstracts of papers), covering economic geology, petrology, geophysics, geochemistry, radiometric age dating and regional geology, were presented to approximately 120 participants from Thailand, Singapore, Indonesia and Malaysia. The Seminar was also widely covered by the local press.

Dr. Mohammad Ayob, President of the Geological Society of Malaysia, declared open the Seminar.

The Organizing Committee would like to records its thanks to Conzinc Riotinto (M) Sdn. Bhd., Pernas Charter Mangement Sdn. Bhd., Thart Lee Mines Sdn. Bhd. and Robertson Research International Limited (U.K.) for their financial support for this meeting and to the Council Members and individuals for their help during the Seminar.

---

### PROGRAMME - Friday, 10th April 1981

- 8.30 - 8.50 a.m. : Late registration
- 8.50 - 9.00 a.m. : Addresses by Organizing Chairman & President

### Session I - Session Chairman: Mr. S.K. Chung, Director-General, Geological Survey Malaysia

- 9.00 - 9.30 a.m. : The margins of the Central Belt, Peninsular Malaysia - B.K. Tan (Universiti Malaya)
- 9.30 - 10.00 a.m. : Background and progress of the geochemical exploration programme Central Belt Project - Fateh Chand (Geological Survey Malaysia)
- 10.00 - 10.30 a.m. : Interpretation of the regional gravity data across south - central Peninsular Malaysia - Loke Meng Heng, Lee Chong Yan & G.A. van Klinken (Universiti Sains Malaysia)
- 10.30 - 11.00 a.m. : Tea

Session II - Session Chairman: Mr. Eric Toh, Conzinc Riotinto (M) Sdn. Bhd.

- 11.00 - 11.30 a.m. : Metamorphic episodes of the western foothills of Gunung Ledang (Mt. Ophir) Johore-Malacca - T.T. Khoo (Universiti Malaya)
- 11.30 - 11.55 a.m. : K-Ar and Rb-Sr mica mineral ages from the Gunung Ledang granite - Yap Fook Loi (Geological Survey Malaysia)
- 11.55 - 12.20 p.m. : Osmiridium - a discovery in Cheroh, Pahang, Peninsular Malaysia - Shu Yeoh Khoo (Geological Survey Malaysia)
- 12.20 - 12.40 p.m. : Manson's lode - a stratabound, submarine exhalative base metal - silver deposit - Dr. (Miss) Gan Lay Chin (Institute of Mineralogy and Petrology, Mining University, Loeben, Austria)
- 12.40 - 2.30 p.m. : Lunch in Lotus Room II, Hotel Merlin for all registered participants.

Session III - Session Chairman: Mr. Yin Ee Heng, Asst. Director-General, Geological Survey Malaysia

- 2.30 - 3.00 p.m. : Airborne geophysical survey Central Belt Project of Peninsular Malaysia - A.S. Gan (Geological Survey Malaysia)
- 3.00 - 3.30 p.m. : Preliminary geological studies of the Chini-6 area, Pahang Tenggara - Low Keng Lok (Universiti Malaya)
- 3.30 - 4.00 p.m. : Association of barite and sulphides in East and Central Belts of Peninsular Malaysia - Aw Peck Chin (Geological Survey Malaysia)
- 4.00 - 4.30 p.m. : Geology of Yala, Narathivat and Pattani areas, southern Peninsular Thailand - Sahat Muenlek & Assanee Meesook (DMR, Thailand)
- 4.30 - 5.00 p.m. : Tea
- 5.00 - 6.00 p.m. : Annual General Meeting
- 8.00 - 10.00 p.m. : Annual Dinner

---

K.K. Khoo

## REGIONAL GEOLOGY SEMINAR '81 - ABSTRACTS OF PAPERS

### THE MARGINS OF THE CENTRAL BELT, PENINSULAR MALAYSIA

B.K. TAN, Dept. of Geology, University of Malaya

The concept of a three fold division of the Malay Peninsula into the Eastern, Central and Western Belts is based primarily on the different styles of mineralization: the Central Belt being a gold and base metal belt while the other two belts are predominantly enriched in tin. Other differences between these three zones in their sedimentary, igneous, structural and metamorphic histories have also been noted. Although maps have been drawn showing the locations of these different belts, the basis for this subdivision has not been clearly defined and the nature and origin of these three belts are open to speculations.

This paper will attempt to evaluate some of the basis for this three fold division. Particular attention will be given to the

geological features found near to the proposed margins of these three zones as theories on the tectonic development of the Central Belt are based largely on the interpretation of the geology along these margins. The features discussed include the numerous small bodies of serpentinite, major faults, mineralization and igneous activity adjacent to the belt margins.

The evidence for the serpentinite bodies being part of a ophiolite sequence representing slabs of ancient oceanic lithosphere is found to be unconvincing and an alternative mechanism involving major geofracture zones along the margins is offered. These deep fractures besides providing avenues for the upward migration of the ultramafics may also have provided access for the migrating ore bearing fluids giving rise to the present high base metal concentration along the eastern margin of the Central Belt. The emplacement of the serpentinite close to the geofractures are relatively early events compared to the main granite intrusion in the Triassic and some of the large granite bodies cuts the earlier major fault zones.

\*\*\*\*\*

## BACKGROUND AND PROGRESS OF THE GEOCHEMICAL EXPLORATION PROGRAMME CENTRAL BELT PROJECT

FATEH CHAND, Geological Survey of Malaysia, P.O. Box 1015, Ipoh, Perak.

The Central Belt Project area is situated in north-central Peninsular Malaysia covering some 31,000 square kilometres.

The aim of the project is to access the mineral potential of this region, particularly for base metals, precious metals, uranium and iron, with the hope of diversifying the country's largely tin-dependent mining industry.

The project which was initiated with grant and technical aid from the Canadian International Development Agency (CIDA), now forms an important aspect of the department's mineral exploration programme.

Canadian participation in the geochemical surveys was phased out by 1979. The surveys at the reconnaissance and detailed levels, are now being continued by the Geological Survey Staff. In addition the department launched an airborne magnetometric and spectrometric survey covering the Central Belt area.

\*\*\*\*\*

## INTERPRETATION OF REGIONAL GRAVITY DATA ACROSS SOUTH-CENTRAL PENINSULAR MALAYSIA

LOKE MENG HENG, LEE CHONG YAN & G.A. VAN KLINKEN, Pusat Pengajian Sains Fizik, Universiti Sains Malaysia, Minden, Pulau Pinang

Five major gravity traverses were made across Peninsular Malaysia, namely (i) from Klang to Karak; (ii) Maran to Raub via Jerantut; (iii) Sepang to Kuala Rompin via the Bahau-Keratong highway; (iv) Gemas to Masjid Tanah in Melaka and (v) Muar to Labis. Together with the gravity traverse made by P.J.C. Ryall from Kuala Selangor to Kuantan in 1976, a gravity contour map was drawn. In this gravity contour map, the major

features in P.J.C. Ryall's profile appear to be regional rather than localized in nature. The gravity minimum over the Main Range roughly follows the outcrop of the granite. The gravity maximum over the central Mesozoic basin appears to extend at least to Jerantut in the north but appears to close off somewhere east of Bahau in the south. The gravity minimum over the Main Range is probably due to thickening of the earth's crust under the Main Range, but is enhanced by the flanking higher density Palaeozoic meta-sedimentary rocks. The maximum over the central Mesozoic basin appears to be mainly caused by a crustal anomaly, either a thinning of the crust or an increase in density. The crustal origin of this gravity anomaly is supported by available aeromagnetic data over the same area.

\*\*\*\*\*

## METAMORPHIC EPISODES OF THE WESTERN FOOTHILLS OF GUNUNG LEDANG (MT. OPHIR), JOHORE-MALACCA

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

The western foothills of Gunung Ledang are underlain by two stratified units - a predominantly pelitic unit and calcareous unit. The calcareous unit is represented by metamorphosed tuffaceous rocks, calc-silicate hornfelses and minor marble, amphibolite and pelitic hornfels layers. The former unit is made up of spotted and non-spotted pelitic hornfelses with minor interbeds of metamorphosed tuffaceous rocks, and calc-silicate hornfelses. These rocks are intruded by the Belading granite on the west and the late Cretaceous Ledang granite on the east.

The granitic intrusions have thermally metamorphosed the rocks, probably throughout the whole area. Thermal metamorphism of the pelitic rocks gives rise to the development of biotite, andalusite, cordierite and sillimanite. The calcareous unit developed wollastonite, diopside, plagioclase, forsterite, phlogopite and prehnite. In more basic varieties, hornblende is common, usually with some biotite. The Belading granite has a well-developed thermal aureole and in the area the Ledang granite appears to have a well-developed thermal aureole as well. The two aureoles appear to coalesce at the southern part of the area.

Superimposed on the thermal metamorphism of the calcareous unit which occurs adjacent to both granites are metasomatic aureoles. Late metasomatic minerals such as lime garnet, scapolite and vesuvianite are well-developed in the calc-silicate rocks and in the marble chondrodite developed.

There is also evidence of an early pre-granite episode of regional metamorphism. Relict cleavages are sometimes present in the calc-silicate rocks and in rocks which have not developed thermal or metasomatic minerals schistose fabric can be seen. Also rock fragments in metatuffs are often ellipsoidal or elongated and show preferred orientation. The lack of relict minerals gives an impression that the early regional metamorphism is of a low grade.

The age of the rocks is uncertain. They may be equivalent to the Middle to Upper Triassic Gemas Beds occurring just north of the area. If this is true, the regional metamorphism cannot be earlier than Triassic.

\*\*\*\*\*



## K-AR AND Rb-Sr MICA MINERAL AGES FROM THE GUNUNG LEDANG GRANITE

YAP FOOK LOI, Geological Survey of Malaysia, P.O. Box 1015, Ipoh.

The Gunung Ledang granite is a small pluton satellitic to the Main Range granite batholith of Peninsular Malaysia. Previous reconnaissance age dating work indicates this epizonal post-orogenic granite was probably emplaced in the Late Cretaceous. In the present work 5 biotites and 3 muscovites give a mean K-Ar age of  $68.2 \pm 1.7$  m.y. Rb-Sr mineral ages give a mean of  $69.4 \pm 2.8$  m.y. A five point whole-rock mineral isochron gives an age of  $68.9 \pm 1.3$  m.y. with initial  $^{87}\text{Sr}/^{86}\text{Sr}$  ratio of  $0.7083 \pm 0.0012$ . The good concordance of the K-Ar and Rb-Sr ages places the emplacement age of the Gunung Ledang granite at 69 m.y.

\*\*\*\*\*

## OSMIRIDIUM - A DISCOVERY IN CHEROH, PAHANG, PENINSULAR MALAYSIA

SHU YEOH KHOON, Geological Survey of Malaysia, P.O. Box 1015, Ipoh

Significant traces of osmiridium, a platinum - group metal, were found in the tin placer deposit along the Sungai Semantan near Cheroh, 10 miles north of Raub, Pahang, Peninsular Malaysia. The likely origin of this metal is a large serpentinite body situated 4 miles to the west which is drained by some tributaries of the Sungai Semantan. The presence of osmiridium further supports the view that the serpentinite bodies of the Foothills Group of rocks represent an ophiolite belt of Lower Palaeozoic age.

\*\*\*\*\*

## MANSON LODGE - A STRATABOUND SUBMARINE EXHALATIVE BASE METAL - SILVER DEPOSIT

GAN LAY CHIN, Institute of Mineralogy and Petrology, Mining University, Loeben, Austria

Manson Lode occurs in a complex Permian lithology of limestones, phyllites, rhyolites and tuffs, which form part of the Palaeozoic volcano-sedimentary series of the Central Belt of Peninsular Malaysia. Metamorphism was low-grade and resulted in the development of a distinct planar fabric. Ore-microscopic investigations revealed the presence of complex sulphide association, with pyrite, sphalerite, galena, arsenopyrite, chalcopyrite and pyrrhotite as major constituents. Fahlores and Bi-bearing minerals are trace minerals which are of economic importance.

Extensive electron microprobe analyses have reveal an extreme spread of silver contents in fahlores and the iron contents in sphalerite. All these compositional variations occur within the area of one polished section and are not linked in any way to the geometry of the orebody. These inhomogeneities suggest rapidly varying metal supply in the submarine environment and also reflect the lack of later re-equilibration.

\*\*\*\*\*

## AIRBORNE GEOPHYSICAL SURVEY CENTRAL BELT PROJECT OF PENINSULAR MALAYSIA

A.S. GAN, Geological Survey of Malaysia, Kuala Lumpur

An area of 31,000 square kilometres was surveyed using a Bell 212 helicopter equipped with a digitally recording standard sensitivity magnetometer and a differential four channel gamma-ray spectrometer. North 30° East flight lines with spacing of 600 metres and North 120° East tie lines with spacing of 6.0 kilometres were used. Total lines flown is 58,000 line kilometres. Magnetometer sensor height is a nominal 125 metres. Navigation is visual using 1:25,000 topographical maps and doppler navigational aid.

The specific objectives of the survey are :

- a) To recognise and delineate magnetic anomalies caused by granitic intrusives which may have mean dimensions as small as 500 metres.
- b) To delineate basement structure that may assist in the recognition of features favourable for base metal mineralisation.
- c) To map the natural gamma-ray activity of the surface rocks and soils for recognising radioactive mineral deposits of possible economic significance and mapping lithological boundaries, possibly delineating granitic intrusives.

To achieve these objectives, a small terrain clearance and close flight lines interval are necessary. In the present area, some locations with appreciable topographic relief as well as dense forest cover data acquisition can only be accomplished by using a rotary-wing aircraft.

\*\*\*\*\*

## PRELIMINARY GEOLOGICAL STUDIES OF THE CHINI-6 AREA, PAHANG TENGGARA

LOW KENG LOK, Jabatan Geologi, Universiti Malaya, Kuala Lumpur

Surface mapping of the Chini-6 area in Pahang Tenggara showed that the area is underlain by three main rock types - sedimentary rocks (sandstone, siltstone and mudstone interbeds), metaquartzites and volcanics (crystal and crystal-lithic tuffs). Core samples obtained from twelve diamond-drill holes in the area covered by volcanics, revealed that a shallow granitic body had intruded and thermally metamorphosed a pile of volcanics with lenses of thin beds of garnet-skarns. Base metals (Fe-Pb-Zn-Cu) mineralisation is associated with the skarn rocks while some of the granitic rocks are molybdenum-bearing.

\*\*\*\*\*

## ASSOCIATION OF BARITE AND SULPHIDES IN EAST AND CENTRAL BELTS OF PENINSULAR MALAYSIA - SIGNIFICANCE AND PROSPECTS

AW PECK CHIN, Geological Survey of Malaysia, P.O. Box 1015, Ipoh, Perak

Barite occurrences in the East and Central Belts are commonly associated with lead and zinc sulphides. The barite occurs in various rock types ranging from marine meta-sedimentary and meta-volcanics to continental clastic rocks which are of Carboniferous to Jurassic-

Cretaceous ages. Some of the barite occurrences are associated with intrusive rocks, whilst for the rest the association is less certain or unknown.

Barite has been found in situ with iron, lead, copper and zinc sulphides. It has also been found to be associated with stream sediments and soil anomalies of lead and zinc. Where base-metal sulphides are not discernible in the barite samples, residual soils over the barite are highly anomalous of the base-metals.

The economic potential of the barite occurrence is reviewed. Two of the barite occurrences have been mined sporadically on a small scale. A few are not likely to be of any economic importance. Two or three other occurrences are likely to contain barite and/or sulphides deposits. Follow-up investigations are warranted in a number of localities where barite boulders or barite heavy minerals are present in the stream sediments.

\*\*\*\*\*

## GEOLOGY OF SOUTHERN SONGKHLA, YALA, NARATHIWAS AND PATTANI AREAS, SOUTHERN PENINSULAR THAILAND

SAHAT MUENLEK & ASSANEE MEESOOK, Geological Survey, Dept. of Mineral Resources, Thailand

The area is covered by sedimentary rocks of Middle Paleozoic to Quaternary age. The western part of the Middle Paleozoic rocks can be classified into two formations, the Lower part and the Upper part. The Lower part is characterized by low grade regional metamorphic rocks consisting of phyllite, mica schist, quartzite and recrystallized limestone/marble. The Upper part of the Middle to Devonian is the series of alternating sandstone, shale with tentaculites siliceous shale, chert and limestone lenses. The Silurian-Devonian rocks at the eastern part are mainly phyllite and meta-tuff/volcanic?. Carboniferous marine clastic sediments of shallow water environment unconformably overlying the Silurian-Devonian rocks are conformably overlain by Permian massive limestone. Middle to Upper marine Triassic rocks consists of conglomerate at the base, conglomeratic sandstone, sandstone, siltstone, shale with *Daonella* and limestone. Fluvial Tertiary rocks are predominantly conglomerate. Gravel beds, beach sand, swamps are alluvial deposits and probably Pleistocene.

Igneous rocks, predominantly granite, are elongated in shape and trending north-south. They may be classified into three phases by their textural differences, gneissic granite, coarse-grained porphyritic biotite granite and fine-grained tourmaline-muscovite granite. Isotopic dating is available for the granite rocks at Pin Yo mine (Yala province) and Songkhla province yielding Rb/Sr whole rock ages of  $229 \pm 7$  m.y. and  $171 \pm 5$  m.y. respectively. Diorite and andesitic dikes intruded and extruded along the NS and NW fracture zones as well as serpentinized - periodotite.

The rocks in the mapped area have been affected by many orogenic and epeirogenic movements and igneous activities. Structurally they trend in a north-south direction. The Middle Paleozoic rocks had suffered at least two successive deformation phases during the Early Carboniferous orogeny. The regional metamorphism probably developed

contemporaneous with the first deformation phase which produced isoclinal folds with schistosity/slaty axial plane cleavage. The second phase developed tight folds with crenulation/fracture axial plane cleavage. Late Triassic orogenic movements had affected the Upper Paleozoic and the Middle to Upper Triassic rocks producing tight folds with slaty axial plane cleavage. Four sets of directions of faults and fractures, NW, NE, NS and EW are recognised. Strike-slip conjugated faults of NW and NE direction are sinistral (left-lateral) and dextral (right-lateral) respectively.

Cassiterite-wolframite mineralisation which occurred in quartz veins system is confined to tourmaline-muscovite granite. Lead-zinc is associated with lode tin deposits. Chromite is related to serpentinite-peridotite. Gold deposit which occurs in quartz veins may be related to diorite.

\*\*\*\*\*

## AGM & ANNUAL DINNER REPORT

### ANNUAL GENERAL MEETING

The AGM was held at 5.00 p.m., Friday, 10th April 1981, at Hotel Merlin, Kuala Lumpur following the Regional Geology Seminar. It was attended by about 40 members. Reports by the various office bearers were read and confirmed without much query.

The main issue raised was the increase in the membership rates with effect from 1st January 1982, and after some deliberations, the new increases were agreed on and accepted. The new rates (as of 1 January 1982) are:

	<u>Old</u>	<u>New</u>
Entrance fee	M\$5	M\$10
Student Members	\$8	\$10
Associate Members	\$15	\$25
Full Members	\$15	\$15
Institutional Members	\$30	\$50.

\*\*\*\*\*

### ANNUAL DINNER

The annual dinner was held at Peijing Restaurant, Wisma Central, Kuala Lumpur, following the Annual General Meeting.

It was attended by about 50 people which included some specially invited guests.

The President gave a short address, with a touch of a little spicy joke about the barber, etc.

After the sumptuous dinner and wine, the members left merrily, with some carting away the bouquet that have been used for the occasion, to bring home for their wives, so they say.

Tan Boon Kong

\*\*\*\*\*

Captions to photographs

1. GSM President, Mohd. Ayob, with his opening address.
2. T.T. Khoo "Say cheese ..... that's a metamorphic episode !"
3. F.L. Yap on the mineral ages from G. Ledang.
4. K.H. Loke interpreting the gravity data across south-central Peninsular Malaysia.
5. S. Chandra Kumar (and not Kathigesu!) demonstrating a question from the floor.
6. K.L. Low, full concentration (and from the heart too) on his presentation of the Chini-6 area.
7. L.C. Gan and her findings on the Manson Lode; ponders "who's that handsome Session Chairman?"
8. Session Chairman, Eric Toh, considering "Wouldn't a tie be more appropriate? Imagine no drinks for the Session Chairman!"
9. L.H. Chu ably presenting F. Chand's paper.
10. S. Muenlek during question time. Sigh "That's the fourth question from him. Why won't he leave me alone?"
11. A.S. Gan and his paper on geophysical survey.
12. Happiness is ..... Y.K. Shu and his osmiridium smile.
13. Tea time ..... and about time!
14. Now on with the AGM; while the Treasurer desperately tries a last minute balance of the accounts.
15. A section of the participants at the Annual Dinner. 'Is there really a floor-show after this?"
16. "No more mood for food. Now to focus my appetite on the floorshow!"

\*\*\*\*\*

BERITA PERSATUAN  
(NEWS OF THE SOCIETY)

AMENDED BY-LAW 1: DUES - SECTION 2

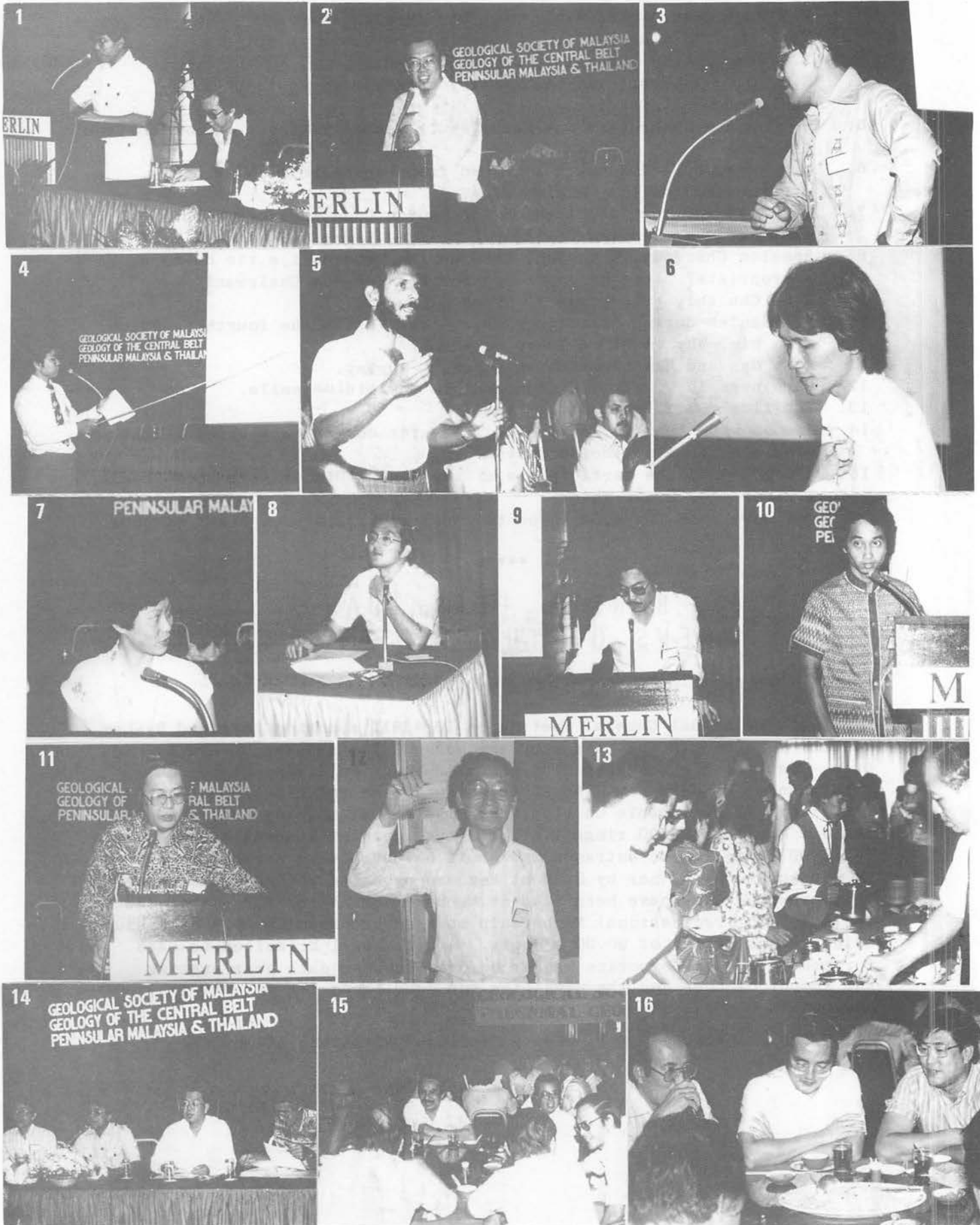
At the Annual General Meeting on 10.4.81, a motion to amend By-Law 1: Dues - Section 2 was passed by the House. The amended By-Law 1: Dues - Section 2 shall read "The Annual dues of Full, Associate and Professional Members shall be 25.00 ringgit. An entrance fee of 10.00 ringgit shall be payable on election. The annual dues of Institutional Members shall be 50.00 ringgit. The annual dues of Student Members shall be 10.00 ringgit. No entrance fee shall be payable by persons elected as Student Members, nor by Student Members promoted to Corporate membership provided they have been Student Members for at least 2 years. Each applicant for Professional Membership must be accompanied by a non-refundable processing fee of 50.00 ringgit. A bill shall be mailed to each Corporate and Non-Corporate Member before December each year stating the amount of dues and the penalties and conditions for default in payment".

The amended By-Law 1: Dues - Section 2 will take effect from 1.1.1982.

L.S. Chin

\*\*\*\*\*

# GSM REGIONAL GEOLOGY SEMINAR '81 & AGM



## LAKE TOBA EXCURSION - POSTPONED TO 7TH JULY - 12TH JULY 1981

In spite of several previous attempts, we have not been able to secure an Indonesian guide for the Lake Toba Excursion planned for early 1981. As such, we have now postponed the Excursion to 7th July - 12th July 1981, and we hope that with the help of the Ikatan Ahli Geologi Indonesia (Indonesian Association of Geologists) we will be successful in getting an Indonesian guide.

Members will kept informed when plans are finalised. Incidentally, response from members has been very encouraging so far and if you have not given it much thought previously, perhaps it is time to make plans to attend the Excursion.

Tan Boon Kong

\*\*\*\*\*

## MALAM PETROLOGI - AN EVENING OF TECHNICAL TALKS ON PETROLOGY

Three speakers will talk on various aspects of petrology on Tuesday, 30th June 1981, as follows:

- a) Dr. Hamzah Mohd (UKM): Isochemical nature of regional metamorphism: Evidence from quantitative chemical studies of pelitic/psammitic rocks from Scotland.
- b) Dr. Yeap Cheng Hock (PCM): Chemical comparison of Peninsular Malaysian granites.
- c) Mr. Chandra Kumar (UM): Petrology of some basic intrusive rocks of the Malay Peninsula and their relation to similar rocks of other areas.

The talk will start at 7.30 p.m. at the Dept. of Geology, University of Malaya; each talk lasting about  $\frac{3}{4}$  hour. Refreshments will be served at the end of the talks.

\*\*\*\*\*

## MEMBERSHIP

The following people have joined the Society:

Full Membership

- Zelina bt. Zaiton Ibrahim, Jabatan Pengajian Alam Sekitar, UPM, Serdang.  
 Hartmut Schmidt, UKM/Sabah campus, Beg. Berkunci no. 62, Pejabat Pos Besar, Kota Kinabalu, Sabah.  
 Teoh Seng Kok, Mine Office, Klian Intan, P.O. Box WD 1, Upper Perak.  
 Budwick A. Marchette, Schlumberger, Wisma Bunga Raya, K.L.  
 Idris Jaafar, Petronas, P.O. Box 2444, K.L.  
 Donald R. Raney, Union Oil of California, Box 7600, Los Angeles, Ca. USA 90051.  
 Vincent Paul St. Joh, Carigali-BP, Kuala Lumpur.  
 Nor Hisham Hazizi, PCM, P.O. Box 936, K.L.  
 Yap Teong Seng, 20, SS2/68, P.J.  
 Angelo Crostella, Hudbay Oil, Arthaloka Bldg., 4th Floor, Jl. Jend. Sudirman No. 2, Jakarta, Indonesia.  
 Henri Fontaine, 128 rue du Bac, 75341 Paris Cedex 07, France.

Yongyut Trangcotshcasan, Mineral Resources Region 1, Songkla, Thailand.  
 Mahan Singh, Binnie & Rakan, 12th Floor, Hongkong Bank Bldg., Jalan  
 Leboh Pasar, K.L.  
 Leong Hin See, c/- Jurong Engineering, 25 Tanjong Kling Road, Jurong  
 Town, Singapore 2262.

Associate Membership

Wong Ne Fong, 179-E, Jalan Ipoh, K.L.  
 Wong Piang Yow, 179-E, Jalan Ipoh, K.L.  
 Guo ang Yang, 14, 20/16A, P.J.  
 Liew Yee Yow, 14, 20/16A, P.J.  
 Azizan bt. Baharuddin, The Dean's Office, Fac. of Science, University of  
 Malaya, K.L.

Institutional Membership

National University of Singapore, Library (Serials Dept.), National  
 University of Singapore, Kent Ridge, Singapore.  
 Mobil Oil Indonesia, Newton P.O. Box 25, Singapore.

\*\*\*\*\*

CHANGE OF ADDRESS

The following have informed the Society of their new addresses:

1. Richard S.S. Koe, c/o Esso Australia Ltd. (Exploration), 127 Kent Street, Sydney, NSW. 2000, Australia.
2. Mangatas Situmorang, c/o Quaternary Geology and Seismotectonic Section, Geological Research and Development Centre, Ministry of Mines and Energy, Jalan Diponegoro 57 Bandung, Indonesia.
3. Adi Suprpto, Huffco Indonesia, Geological Department, Bras Basah, P.O. Box 92, Singapore 9118.
4. Dale F. Wetherbee, Exploration Manager, Oceanic Exploration Co., 1050 17th St. Suite 1900, Denver, Co. 80265, USA.
5. Zainol Hj. Husin, Bt. 8, Kg. Pergam, Tebengau, Alor Setar, Kedah.
6. Stewart Lai, Aviation Industrial & Marines (M) Sdn. Bhd., 212 Jalan Bandar, Kuala Lumpur.
7. G. Balakrishnan, Geosains Sdn. Bhd., c/o Civil Target, P.O. Box 315, Kota Kinabalu, Sabah.
8. J.H. Armitage, c/o Esso Exploration Inc., St. Clements House, Church Street, Walton-on-Thames, Surrey, England KT12 2Q1.
9. Zulkifli Mohd. Yusoff, Sya. Permodalan & Perusahaan Pahang Bhd., 2A, Tingkat 1, Bgn. LKNP, Jalan Besar, Kuantan, Pahang.
10. Wan Ismail Wan Yusoff, Jabatan Eksplorasi, Petronas, P.O. Box 2444, K.L.
11. N.S. Haile, Coppice Chase, Pwlycrochan Avenue, Colwyn Bay LL29 7BW, North Wales, U.K.
12. B. John Chronic, Jr., 502 S Post Oak Ln 209, Houston, Tx. 77056, USA.

\*\*\*\*\*



## NEW LIBRARY ADDITIONS

The following publications were added to the Library:

1. Geosurvey Newsletters, vol. 12, nos. 12-14, and vol. 13, nos. 1-8, 1980.
2. National Library Singapore, adult reference collections, accession list, Nov-Dec, 1980 & Jan-April 1981.
3. Memoirs of the Ehime University, vol. IX (1), 1980.
4. Unesco, An international symposium on metallogeny of Mafic, ultra-mafic complexes: The eastern Mediterranean-Western Asia area and its comparison with similar metallogenic environments in the world. Abstracts, 1980.
5. Jour. of Geological Society, vol. 137, nos. 4-6, 1980 & vol. 138, no. 1, 1981.
6. Committee for co-ordination of Joint Prospecting for Mineral resources in South Pacific Offshore area (CCOP/SOPAC), Proceedings of the eighth session.
7. South Pacific marine geological notes, vol. 1 (10) and vol. 2 (1), 1980.
8. Geological Survey of India, News, vol. 11, nos. 3, 4, 6-9, 1980.
9. Seatrads Centre, Acquisition list (Oct-Dec) 1980.
10. Jour. Stratigraphy, vol. 4, nos. 2-3, 1980.
11. Acta Palaeontologica Sinica, vol. 19, nos. 4 & 5, 1980.
12. American Museum, Novitates, nos. 2694 and 2699, 1980.
13. A guide to the Sydney Basin, 1980.
14. Sydney 1:500,000. Metallogenic map. Mine data sheet, 1980.
15. Records of the Geological Survey of New South Wales, v. 19, pt. 1, 1980.
16. Resource sensing from space, 1977.
17. AAPG Explorer, May 1980.
18. AGID News, nos. 24, 1980 & no. 27, 1981.
19. American Museum of Natural History, vol. 165, no. 2, 1980.
20. Geological correlation, no. 8, 1980.
21. ESCAP/Regional Mineral Resources Dev. Centre Newsletter, vol. 1, no. 2, 1980 and vol. 1, no. 3, 1981.
22. University of Kansas, Palaeontological contributions, Papers 101-103, 1980.
23. Commonwealth Geological Liaison Office, special liaison report 3/1 and 4/1, 1980.
24. Commonwealth Geological Liaison office, nos. 9-12, 1980 and no. 1, 1981 (Newsletter).
25. Beautiful British Columbia, 1980.
26. IMM Bulletin nos. 890-893, 1981.
27. IMM Transactions/Section A, vol. 89, Oct, 1980 and vol. 90, Jan & April 1981.
28. Oklahoma Geological Survey, Bulletin 129, 1980.
29. Annual report, Institute of Geoscience, University of Tsukuba, no. 6, 1980.
30. Geological report of the Hiroshima University, no. 23, 1980.
31. Seatrads Bulletin, vol. 1, no. 4, 1980 and vol. 2, no. 1, 1981.
32. Bulletin of the National Science Museum, series C, v. 6, no. 4, 1980.
33. Secondary geochemical dispersion and bedrock reflection in the tropical rain forest terrain by Gunter Matheis. Erzmetall. 33, no. 3, 1980.
34. On the Carboniferous trilobite provinces by T. Kobayashi & T. Hamada. Proceedings of the Japan Academy, v. 55, ser. B, no. 4, 1979.
35. Outline of the Carboniferous trilobites in Japan by T. Kobayashi & T. Hamada. Proceedings of the Japan Academy, v. 55, ser. 5, no. 3, 1979.

## BERITA-BERITA LAIN (OTHER NEWS)

### 5TH INTERNATIONAL TIN CONFERENCE, KUALA LUMPUR, 19TH - 23RD OCT. 1981.

The Ministry of Primary Industries together with the International Tin Council will be holding the 5th International Tin Conference from 19th to 23rd Oct. 1981. This conference is in the form of a technical conference where various important aspects in connection with the world tin resources, exploration, mining and smelting, market and uses of tin will be discussed through various working papers to be presented.

At the same time, an exhibition of new discoveries in the recovery methods, uses of tin and other matters pertaining to the tin industry will be held. Interested parties are invited to take part in this exhibition.

Further information on the conference and exhibition are obtainable from:

Ketua Setiausaha  
Kementerian Perusahaan Utama  
Tingkat 8-10, Wisma Keramat  
Jalan Gurney  
Kuala Lumpur 15-01.

\*\*\*\*\*

### INTERNATIONAL ALLUVIAL TIN TRAINING COURSE - REPORT

The Association of Geoscientists for International Development (AGID), the Geological Society of Malaysia (GSM) and the Geological Society of Bolivia successfully carried out an International Alluvial Tin Training Course in Bolivia from the 3rd to the 28th of November 1980. This was organised in the spirit of international cooperation and development.

The idea behind the organisation of this course was inspired no doubt by the success of the International Training Course on Tin Deposits held in Malaysia and Thailand in March 1974. The main aim of the Training Course held in Bolivia was to introduce the Malaysian expertise on prospecting, evaluation and the mining of the placer or alluvial tin deposits to the Bolivians and other participants of the course. The Bolivians had for the past been concentrating on mining of hardrock tin deposits and there is now an increasing awareness of the placer tin potential.

The three Malaysian instructors nominated by the GSM to run the course were Mr. Choo Mun Keong, of Pernas Charter Management Sdn. Bhd., Mr. Eric Toh, of Conzinc Riotinto Malaysia Sdn. Bhd., and Dr. Yeap Ee Beng of the Department of Geology, University of Malaya.

The course was conducted in English with simultaneous translation into Spanish. The venue of the course was the Conference Hall of Geobol, La Paz. The participants included qualified mining engineers, geologists and metallurgists who are working largely with the Bolivian Government Agencies or with private mining companies in Bolivia or other countries. There were altogether 33 participants consisting of 1 Venezuelan, 4 Brazilians and 28 Bolivians.

The course given consisted of lectures, practicals and field trips to study some of the Bolivian placer deposits. Topics covered by the lectures and practicals were quite comprehensive — ranging from principles of placer formation and concentration to prospecting and evaluation to mining practices and beneficiation to financial analysis and discounted cash flow. Field visits to several Bolivian placer deposits which are either of the eluvial or glacial-fluvial types were carried out. Several placer deposits visited during the fieldwork include the following:

- (i) Estalsa Mine, District of Oruro
  - a) Bouldery ground with average grade of about 1 lb Sn per cu yd of the glacial-fluvial type worked by a 13 $\frac{3}{4}$  cu ft bucket spud dredge.
  - b) Glacial outwash deposits on slope directly below Avicaya Mine - worked by slack line scrappers and treated in two washing plants using trommels and jigs. Unliberated ores of plus 2 inch over size from trommels are hand-picked from moving belts which carry the rest of the oversize to a dump.
- (ii) Huanuni Mine, District of Oruro
  - a) The Playa Verde glacial-fluvial, which had been in part dredged from 1936 to 1954, is located directly downstream of the Huanuni Mine, presently the richest hard rock mine in Bolivia. The Playa Verde deposit still contains a proven reserve of 23 million cu yd with a grade of 0.21 lb of Sn per cu yd.
  - b) Eluvial deposit on the slopes of Huanuni Mine - with an inferred reserve of  $\frac{1}{2}$  million cu yd of 1 lb of Sn per cu yd.
- (iii) Llallagua Mine, District of Oruro
  - a) The El Centenario alluvial fan deposit located about 2 $\frac{1}{2}$  miles east of Llallagua Mine. It is reputed to contain a reserve of 270 million cu yd with an average content of 0.27 lb Sn per cu yd.
  - b) Al Carmen and Cancaniri moraine deposits located about 2 miles N and NE of the Llallagua Mine. They are inferred to contain about 11 million cu yd of 1 lb Sn per cu yd.

It is interesting to note that in view of the very coarse and bouldery nature of the Bolivian placer deposits, the most effective and proven drilling tool is the churn drill.

During the last week of the training course, the participants were divided into 3 groups to carry out a feasibility study on the El Centenario placer deposit. The findings of each individual group was then presented for discussion during the afternoon of the last day of the training course. The closing ceremony with the presentation of the certificates to the participants and instructors was held later that evening.

E.B. Yeap

\*\*\*\*\*

## SEATRAD CENTRE SEMINAR, PANDUNG - REPORT

The two-day SEATRAD Centre Seminar on "Complex tin ores and related problems" was held on the 9th and 10th April 1981 in Bandung in cooperation with PT Tambang Timah. The seminar was organised in order to encourage a greater exchange of information and highlight some of the problems facing the tin industry and to try and solve some of the more pressing problems.

A total of 16 papers were presented. SEATRAD Centre will be publishing the seminar proceedings in the near future.

- Paper no. 1. Mineralogic investigation of complex tin ores, a contribution to separation problems by Günter Moh, Federal Republic of Germany.
- Paper no. 2. The tin-bearing minerals of Southeast Asia by K.F.G. Hosking, United Kingdom. Paper read by D. Santokh Singh.
- Paper no. 3. The occurrence of complex tin-iron ore in Belitung, Indonesia by Sutedjo Sujitno, Adipurnama Ronojudo and Muljadi, Indonesia.
- Paper no. 4. Exploration and mineralogical data on several Australian Tin Deposits by L.A. Newham.
- Paper no. 5. Lode tin deposits of exhalative origin by R.W. Hutchinson, Canada.
- Paper no. 6. Some problems of Belitung complex tin-iron ore and their treatment possibility by Alwi Ibrahim, Djamhur Sule, Moh. Iskandar and Warjono Soemodinoto, Indonesia.
- Paper no. 7. Benefication of a complex tin ore at Renison by I.R. White, Australia.
- Paper no. 8. Mineralogy applied to the benefication of the Pinyok ore, Thailand by C. Soux, SEATRAD Centre.
- Paper no. 9. A study of the gravity benefication of a complex tin ore of Pinyok Mine by Kit Watanavorakitkul, SEATRAD Centre.
- Paper no. 10. Case study of a typical complex tin processing technique with particular reference to the physical properties by Ruangsak Vajarapong and Somwang Vitaya - Panyanon, Thailand.
- Paper no. 11. Mineability and benefication of tin-ores in Malaysia by Abdullah Hasbi h. Hj. Hasan, Moh. Zaki b. Hj. Taib and H. Hussin, Malaysia.
- Paper no. 12. Recovery of tin and lead-zinc from complex tin-lead-zinc-iron sulphide ores by Soonthorn Fuang Thong and Thammasak Pongprasart, Thailand.
- Paper no. 13. Geomicrobiological leaching of complex tin ores by Teh Guan Hoe, Malaysia.
- Paper no. 14. Belitung customer treatment plant by M. Simatupang, Ismu Imama Mohamad and Harsono, Indonesia.
- Paper no. 15. Development of the matte fuming process for tin recovery from sulphide materials by K.A. Foo, Australia.
- Paper no. 16. Recovery of tin by using fuming process by W. Soriano, Bolivia.

Field trips included a visit to the Kawah Kamojang Geothermal Project and a trip to Bangka Island to visit a hydraulic mine, Bangka II offshore dredge, Pemali open-pit mine, Peltim tin smelter and Mentok treatment plant.

G.H. Teh

\*\*\*\*\*

## ASCOPE '81 MANILA

The ASEAN Council on Petroleum (ASCOPE), the organization of national oil companies of the five ASEAN countries, Indonesia, Malaysia, the Philippines, Singapore and Thailand, is holding its second Conference and Exhibition in Manila this year.

The first was held in Jakarta in 1977 with Indonesia's Pertamina as host. The Philippines, through the Philippine National Oil Company (PNOC), is hosting the project this time. The Conference and Exhibition will be on October 7-11, 1981 at the Philippine International Convention Center in Manila.

#### The Conference Theme: Future Energy for ASEAN

Five national policy papers will be presented in plenary sessions on opening day by the ASCOPE Council members which may be the occasion for a review of specific energy policy issues or an announcement of major policy changes. Aside from these policy papers, there will be five ASCOPE regional papers covering short and medium range outlooks in the supply/demand for petroleum, in hydrocarbon potential and energy financing requirements as these apply to the ASEAN region.

Important speakers in energy have been invited to address the delegates in plenary sessions. Among them are:

Dr. Ali A. Attiga, secretary-general of OAPEC, on "A Policy Paper on Petroleum".

Minister Marc Lalonde, Ministry of Energy, Canada, on "Canadian-ASEAN Cooperation in the Field of Energy."

Mr. Fred Hartley, Chairman and president of Union Oil, on "The Future of Geothermal Energy as a Renewable Energy Resource."

Mr. Harald Norvik, Secretary of State, Norwegian Ministry of Petroleum and Energy on "Norway's Experience in Oil Exploration".

While maintaining the primacy of oil and gas, the conference program will cover alternative sources of energy like geothermal, coal, nuclear and non-conventional sources. Matters critically related to the development and utilization of these different energy sources - financing, environmental implications, and new technologies - will be discussed in the technical sessions.

A sampling of these topics in the technical sessions is as follows:

#### Oil and Gas

"The Supply/Demand Outlook for Petroleum in the Context of the Total Energy Situation in the ASEAN Region" by the ASCOPE Economic Committee.

"Hydrocarbon Outlook for the ASEAN Region" by the ASCOPE Technical Committee.

"Geothermal, Geophysical, and Geochemical Investigations in the Visayan Basin, Philippines: A Technical Cooperation Project as an Incentive for Commercial Oil Exploration" by Dr. H. Porth, et al., BED German Advisory Group.

#### Coal/Nuclear/Hydro

"International Coal Trading and Marketing Trends" by Mr. G.S. Pecchioli, Managing Director, Shell Coal International.

"Site Selection Criteria for Nuclear Waste Disposal" by Dr. Dick Winar of Dames and Moore.

#### Energy Planning/Economics/Financing

"Energy Financing Requirements of the ASEAN Region" by the ASCOPE Economic Committee.

"Petroleum Resource Development Policies: Implications of the Southeast Asian Contractual Framework" by Dr. Corazon Siddayao, East-West Center.

"Innovations in Energy Financing" by Mr. P.J. Keenan of Chase Manhattan N.A.

Non-Conventional Energy/Conservation/Ecology

"Environment Dimensions of Energy Policies in the Asian and Pacific Region and the United States" by Dr. Toufiq A. Siddiqi, East-West Center.

"Planning and Management of Energy/Environment Systems" by Professor Wesley K. Foell of Wisconsin University.

Geothermal

"Geothermal Reservoirs Assessment" by Dr. Subir K. Sanyal of Stanford University.

"Problems and Constraints of Geothermal Development in the Philippines" by Dr. Arturo P. Alcaraz of PNOC.

"Environmental Aspects of Geothermal Development" by KRTA of New Zealand.

"Design and Performance of the Tiwi Gathering Systems" by R.N. Upadhyay, et al., Union Oil, California.

Some 50 papers will be read during the conference. All in all, each paper should add to a well-rounded, up-to-date information on energy particularly in the ASEAN region.

Further information on ASCOPE '81 obtainable from:

The Chairman  
 ASCOPE '81 Organising Board  
 P.O. Box 1031, MCC,  
 Makati, Metro Manila, Philippines.

\*\*\*\*\*

WORLDWIDE SURVEY OF PRECAMBRIAN TO RECENT GLAUCONITIC GREENSANDS

A worldwide survey of Precambrian to Recent glauconitic greensands (sediments containing about 10 percent or more glauconite) is being conducted by Nenad Spoljaric, Delaware Geological Survey, University of Delaware, Newark, Delaware, 19711, USA. The purpose of this survey is to produce a set of maps showing geographic, stratigraphic, and lithologic distribution and characteristics of these sediments.

The origin of highly concentrated glauconite (often exceeding 80 percent) in thick sequences (hundreds of meters) of greensands is unknown. The abundance of these deposits in restricted stratigraphic intervals (Cretaceous, for example) throughout the world suggests that major global events may have been responsible for their sedimentation. The maps generated by the survey would provide the essential means of testing this and other hypotheses. It is important to realize that unless the origin of glauconitic greensands is explained, our knowledge of geologic history of regions containing these deposits will not be complete.

Maps, reprints of articles, references, and other data which can be utilized in the survey to achieve the stated objective are solicited. Proper acknowledgment would be given to every scientist, organization, institute, society, and others who assisted in this survey.

\*\*\*\*\*

## PART-TIME GEOLOGY DEMONSTRATORS NEEDED

The Geology Department, University of Malaya will be able to employ a limited number of part-time demonstrators for the 1981/82 session beginning in the first week of July 1981. Minimum qualification: B.Sc. in Geology.

Anyone interested should contact:

Mohamad Ali Hasan  
Co-ordinator  
c/o Dept. of Geology  
University of Malaya  
Kuala Lumpur.

\*\*\*\*\*

## EXTRACTION METALLURGY '81

Theme: Technology's response to the challenge of high costs.  
An international symposium organized by the Institution of Mining and Metallurgy in collaboration with GDMB, Benelux Metallurgie and Societe Francaise de Metallurgie.

### Date and venue

21 - 23 September 1981, in the Shergold Building, Imperial College of Science and Technology, Prince Consort Road, London SW7. Conference office.

### Papers

Papers will be presented in sessions to show developments in the technology of extracting various ferrous and non-ferrous metals to reduce production costs by:

- \* Lower investment and operating costs for plant and equipment
- \* Energy cost savings
- \* Improved control and modelling for design
- \* Treating new feedstocks
- \* Environmental protection
- \* New Process routes.

The following papers are expected to be presented:

- \* Fume and dust arrestment in precious metal smelting at Brimsdown: F. Arnold, G.G. Fisher and R.J. Tait (Johnson Matthey, U.K.).
- \* Development and general correlations for making rapid forecasts of the efficiency of dump and in-situ leaching processes: J.C. Box and A.P. Prosser (University of N.S.W., Australia).
- \* Continuing evolution of an integrated concentrating/smelting/refining philosophy at the Renison, Ltd., tin mine: J.E. Butler (Consolidated Gold Fields Australia, Australia).
- \* Use of statistical response surface methodology to find operating conditions for leaching: P.G. Christie and W.J. Welch (Warren Spring Laboratory and Imperial College, U.K.).
- \* Separation of the platinum group metals using selective solvent extraction techniques: M.J. Cleare (Johnson Matthey, U.K.).
- \* Anode depolarisers in electrowinning cells: A.V. Cook, J.P. Chilton and D.J. Fray (University of Cambridge, U.K.).

- \* Bath stirring and fuel injection into the BOS process: M.W. Davies and A.S. Normanton (British Steel Corporation, U.K.).
- \* Extraction of the uranium contained in phosphoric acid by octylpyrophosphoric acid by J.M. Demarthe and S. Solar (Minemet Recherche, France).
- \* Developments in the recovery of tin by fuming from sulphide-rich ores and low-grade concentrates: W.T. Denholme (CSIRO, Australia).
- \* Electrowinning of copper and of cobalt using fluidized bed cathodes: M. Dubrovsky, D. Ziegler, I.F. Masterson and J.W. Evans (University of California, USA).
- \* Direct use of coal for production of molten iron: S. Eketorp, O. Wijk and S. Fukagawa (Royal Institute of Technology, Sweden).
- \* The Dextec copper process: P.K. Everett (Dextec, Australia).
- \* Antimony behaviour in lead recovery from lead battery scrap: A. Paulin and A. Fajmut (University of E. Kardelj and Lead Mines and Smelter, Yugoslavia).
- \* Use of electrolytes in the analysis of molten metals: D.J. Fray (University of Cambridge, U.K.).
- \* Electrolytic lead production from spent lead batteries: M.V. Ginatta (Progetti Elettrochimici, Italy).
- \* Oxygen mass transfer in Pachuca tanks: C.J. Hallet, A.J. Monhemius and D.G.C. Robertson (Imperial College, U.K.).
- \* Cost minimization in the extraction of copper from an oxide ore: W.T. Hicban and P.M.J. Gray (Benguet Consolidated, Philippines).
- \* Oxygen for energy saving: H. Hilbrans and P. Paschen (K.H.D. Humboldt, West Germany).
- \* Hall-Heroult process developments: N. Jarrett (ALCOA, U.S.A.).
- \* Electrolytic treatment of diluted metal containing solutions under environmental aspects: R. Kammel and H.W. Liebar (Technische Universität and Technische Fachhochschule, West Germany).
- \* High rate thickening: the route to lower costs and improved performance: W.T.H. Keleghan (Esmil, U.K.).
- \* Vacuum-refining of steel recovered from municipal refuse: J. Kruger and P. Fischer (RWTH and Lurgi, West Germany).
- \* Computer control in copper converting at Ronnskar works, Boliden Metall AB: A. Holmstrom and G. Lindkvist (Boliden, Sweden).
- \* Developments in the pyrometallurgical treatment of slags: a review of current technology and physical chemistry: P.J. Mackey and J.M. Floyd (Noranda, Canada, and CSIRO, Australia).
- \* Present state of development of the OSL lead process: H. Maczek, W. Blum and P. Fischer ("Berzelius" Preussag and Lurgi, West Germany).
- \* Hydrometallurgical process for the extraction of copper: J.H. McNamara (Cyprus Metallurgical Process, U.S.A.).
- \* Development of metallurgical refractories: A. Majdic (Forschungsinstitut der Feuerfest-Industrie, West Germany).
- \* The H+ process for alumina from shales: J. Michelet (Aluminium Pechiney, France).
- \* Smelting in the 80s: K.B. Murden (Outokumpu, Finland).
- \* New hydrometallurgical processing of nickel and cobalt mixed sulphide in Japan: S. Nishimura (Kansai University, Japan).
- \* New two stage hydrometallurgical route for the quantitative recovery of metallic copper from sulphate leach liquors: D.M. Nobbs and P.B. Linkson (University of Sydney, Australia).
- \* Use of electrostatic precipitators in the copper smelting industry: S. Oglesby and J. Burkle (Southern Research Institute and US Environmental Protection Agency, U.S.A.).
- \* Production of blister copper from dead roasted copper sulphide



- concentrates: W.R. Opie, (AMAX, U.S.A.).
- \* Improved metal recovery with the low-contaminant Jarosite process: R. V. Pammenter and C.J. Haigh (E.Z. Industries, Australia).
  - \* Application of the VAW tube digester for metallurgical pressure-leaching processes: H.B. Pietsch and F. Kaempf (Lurgi and Vereinigte Aluminium-Werke, West Germany).
  - \* Some developments in gold and silver metallurgy: G.M. Potter (Consultant, U.S.A.).
  - \* Utilization of zirconium wastes for the aluminium industry: M. Potzschke, H.P. Sattler and P. Wincierz (Metallgesellschaft, West Germany).
  - \* Extraction of gold from finely disseminated gold ores using acidic thiourea solution: R.A. Pyper and J.L. Hendrix (Carlin Mining and Mackay School of Mines, U.S.A.).
  - \* Applications of chloride metallurgy to base metal sulphide and uranium ores at CANMET: M.C. Campbell and G.M. Ritcey (CANMET, Canada).
  - \* Production of sponge iron using low-grade coals: P. Rangel and W. Schnabel (Atos Finos Pirantini, Brazil and Lurgi, West Germany).
  - \* Energy conservation in metal working using microprocessor automatic control: J.L. Robertson (NEF, U.K.).
  - \* Beneficiation of chromite and other ores by selective chlorination: M. Robinson, H.B. Wilson, A.D. Crosby and K.J. Talati (Laporte Industries, U.K.).
  - \* Process and environmental design criteria for a U.S. secondary lead smelter: J.M. Rossini (Gould, U.S.A.).
  - \* Recovery of vanadium and nickel from oil sands coke ash: L.G. Schneider and Z.M. George (Alberta Research Council, Canada).
  - \* Design developments and operation of waste heat recovery system from NORANDA Process: S.N. Sharma and R.J. Anderson (Kennecott, U.S.A.).
  - \* Recovery of hydrochloric acid from ferrous chloride liquor in a coal-fired fluidized bed: H.N. Sinha and J.R. Tuffley (CSIRO and Australian Mineral Development Laboratories, Australia).
  - \* Interruptable continuous techniques: D.A. Temple and J.S. Jacobi (Imperial Smelting Processes and Consultant, U.K.).
  - \* Extraction of metals in the new sustained shockwave plasma (SSP) reactor: J.K. Tylko, J.J. Moore and K.J. Reid (University of Minnesota, U.S.A.).
  - \* Coal gasification for reduction processes: K.H. van Heek and J. Lehmann (Bergbau-Forschung, West Germany).
  - \* Developments in smelting nickel concentrate as practised by Western Mining Corporation: C.J.D. Williams (Western Mining, Australia).
  - \* Electrolysis of oxide melts: R. Winand (Universite Libre de Bruxelles, Belgium).

### Technical visits

#### Tour A

- Thursday, 24 September 1981: Visit to Murex, Ltd., Rainham, Essex.  
Visit to Sheerness Steel Company, Ltd., Sheerness, Kent.
- Friday, 25 September 1981: Visit to Inco Europe, Ltd., London NW10.  
Visit to Warren Spring Laboratory, Stevenage, Hertfordshire.

#### Tour B

- Thursday, 24 September 1981: Visit to Johnson Matthey Research Centre, Sonning Common, Reading.  
Visit to BNF Metals Technology Centre, Wantage.

Friday, 25 September 1981: Visit to Commonwealth Smelting Ltd.

Volume of papers

All papers presented will be published in the volume Extraction metallurgy '81, to be distributed to registrants for £35.00 each in August 1981, and to non-registrants in October 1981.

General

For further information on the symposium and its associated events please contact the Meetings Secretary, Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR. Telephone: 01-580 3802; Telex: 261410.

\*\*\*\*\*

UKM DISSERTATION TITLES 1981

- Jaybee Buayie: Analisis mineral berat dari lombong timah Kuala Lumpur Utara, Selangor.
- Thomas Kuud Nyanat: Kajian mineral berat dari lombong-lombong timah di Kuala Lumpur Selatan, Selangor.
- Mohd. Azmi Ismail: Menentukan kandungan unsur pada profil singkapan batuan terhadap gred luluha di Lebuhraya Kuala Lumpur-Karak.
- Ab. Rashid Bachik: Analisis geokimia sedimen Sungai kawasan Gunung Muntahak.
- Sahibin Ab. Rahim: Geologi struktur kawasan Tanjung Bangka - Air Petri Mersing Johor, Semenanjung Malaysia.
- Abdullah Sani b. Hj. Hashim: Sedimentasi dan sekitaran sedimen Air Keroh, Melaka.
- Ab. Majid Sahat: Geologi kejuruteraan Lebuhraya Kuala Lumpur-Karak.
- Noor Bakri Endut: Perlapisan sedimen klastik (Trias Atas) Bukit Belah Batu Pahat, Johor.
- Mat Isa Jamaluddin: Sedimentasi dan stratigrafi Lapisan Paloh, Kluang, Johor.
- Mohd. Sidi Daud: Analisis geokimia sedimen sungai Kawasan Ulu Langat Seremban-Selangor, N. Sembilan.
- Saffeen Baharuddin: Sifat-sifat geologi kejuruteraan tanah basalt, Kuantan, Pahang.
- Tew Sea Kia: Sifat-sifat geologi kejuruteraan tanah basalt, Segamat, Johor.
- Madzlan Zam: Analisis geokimia sedimen sungai kawasan Gunung Pantii, Kota Tinggi, Johor.
- Fauzi Zainuddin: Analisis mineral berat sedimen Sungai G. Muntahak, Johor.
- Ab. Hassan Mohamad: Analisis mineral berat sedimen Sungai Kawasan Gunung Pantii, Johor.
- Zainol Hj. Husin: Kajian awal mineral berat dalam sedimen sungai kawasan Ulu Langat-Seremban Malaysia Barat.
- Mohd. Zaidi b. Mohd. Hasan: Kajian mineral-mineral berat dari sedimen sungai kawasan Bukit Galla, Seremban, Negeri Sembilan.
- Ismail Che Mat Zain: Hidrogeologi kawasan Kelang Kapar-Meru, Selangor.
- Muhd. Saleh b. Ambok Bolong: Pengaruh hakisan dan luluha terhadap kesetabilan cerun lebuhraya Kuala Lumpur-Seremban.

\*\*\*\*\*

## AGID EXPANDS OPERATIONS

In February, 1981, the Association of Geoscientists for International Development (AGID) opened its new global headquarters at the Asian Institute of Technology (AIT) in Bangkok, Thailand, where its President, Dr. Prinya Nutalaya is based. The former secretariat in Caracas is now operating as a Regional Office for Latin America and the Caribbean under the supervision of Dr. Alirio Bellizzia, and a new Regional Office for Africa has also been established at Ahmadu Bello University in Nigeria where both AGID's Past-President, Prof. Deborah Enilo Ajakaiye, and the Council member Michael E. Woakes are located.

The decision to move the Headquarters to Asia was taken by the Council in Paris, 1980, in recognition of the major accomplishments of the past two years in increasing the membership and organizing activities in Latin America, and in order to build up the Association in Asia and the Pacific, where the cost of operations are also lower than those in Venezuela. AIT, a post-graduate engineering institution for the whole of the Asian region, is providing facilities and services to the new Headquarters, which is housed in the Geotechnical Division. Discussions are now underway to explore possible avenues for cooperation with the Asian Regional Geoscience Network, various IGCP Asian projects, the ESCAP Regional Mineral Resources Development Center and other Asian organizations and individuals.

In the last six months the Caracas Office has organized in cooperation with other Latin American groups five training courses: alluvial gold prospecting (Peru), applied mineral economics (Brazil), alluvial tin deposits (Bolivia, using instructors from Malaysia), groundwater (Ecuador), and well drilling techniques (Bolivia). Planning for further training courses and workshops in the region is now underway.

The Nigerian Office launched its own program in January, 1981, with the publication of the first issue of the bilingual, French-English, West Africa Geoscience Newsletter. Plans are also being formulated for other regional activities, for example in the fields of drilling techniques and small scale mining and mineral industries.

Enquiries regarding publications and memberships in the Association, and comments and proposals concerning activities are welcomed and may be addressed to the Headquarters or to either of the Regional Offices.

Headquarters: AGID, Asian Institute of Technology, Box 2754, Bangkok, Thailand.

Regional Offices: AGID, Apartado 3672, Carmelitas, Caracas 1010A, Venezuela.

AGID, Depts. Physics and Geology, Ahmadu Bello University, Box 393, Zaria, Nigeria.

\*\*\*\*\*

## METALLOGENY OF MAFIC AND ULTRAMAFIC COMPLEXES SYMPOSIUM - ABSTRACTS

Abstracts of the symposium on the Metallogeny of Basic and Ultrabasic rocks, which took place on Oct. 1980 in Athens, are now published.

Copies of the abstracts could be sent free of charge upon request

to all geoscientists working on the subject. Write to:

Prof. S.S. Augustithis  
National Technical University  
Dept. of Mineralogy-Petrography-Geology  
42 October 28th St. P.O. Box 1482  
Athens-Greece.

\*\*\*\*\*

## CALENDAR

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

### 1981

- May : International Symposium on "Concept and Method in Palaeontology" Barcelona. Dr. Jordi Martinelli, Department de Paleontologia, Facultar de Geologia, Univ. Barcelona, Gran Via de las Corts Catalones, 585, Barcelona-7, Spain. (May-Jun 1980).
- May 13 - 13 : 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).
- May 26 - 27 : Indonesian Petroleum Association - Tenth Annual Convention, Jakarta. Thomas A. Miller, Chairman Lecture Committee, 10th Annual IPA Convention, P.O. Box 63/JKT, Jakarta, Indonesia. (Sep-Oct 1980).
- Jun 9 - 11 : Symposium New Mineral Raw Materials, Karlovy Vary, Czechoslovakia. Symposium NEMIRAM 1981, Organizing Committee, 7th International Clay Conference, c/o Istituto Mineralogia Petrografia - Universita via Bassi, 4-27100 Pavia, Italy. (Jan-Feb 1981).
- 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 X31Q5, Randburg, 2125, South Africa). (Jan-Feb 1980).
- June : Groundwater '81. International Conference and exhibition at the Hilton Hotel, Kuala Lumpur. The Technical Editor, Groundwater '81, P.O. Box 143, Chatswood, NSW 2067, Australia. (Sep-Oct 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). (Nov-Dec 1980).
- Aug 16 - 25 : XII th Congress and General Assembly - International Union of Crystallography, Carleton University, Ottawa, Canada, Mr. Charbonneau, XIIth I.U. Cr. Congress, National Research Council of Canada, Ottawa, Ontario, Canada K1A 0R6. (Jul-Aug 1980).
- Aug 28 -  
Sep 9 : Arc volcanism, symposium, Tokyo (Aug. 31/Sept. 5), & field trips (Aug 28-30 to Hokkaido & geothermal fields; Sept. 6-9 to Kyushu, Izu, Oshima & Asama), by Volcanology & Chemistry of the Earth's Interior. Daisuke Shimozuru, Earthquake Research Institute, University of Tokyo, Bunkyo-ku, Tokyo 113, Japan.
- 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 6 - 12 : 7th International Clay Conference, Bologna & Pavia, Italy. Prof. Fernando Veniale, Chairman of Organizing Committee, 7th International Clay Conference, c/o Istituto Mineralogia Petrografia - Universita via Bassi, 4-27100 Pavia, Italy. (Jan-Feb 1981).
- 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 & Jan-Feb 1981).
- Nov 23 - 26 : Asian Mining '81, Singapore. The Secretary, IMM, 44 Portland Place, London W1N 4BR, England. (May-Jun 1980).
- Dec 7 - 11 : Ore deposits, ann. workshop, Toronto. (E.T.C. Spooner, Dept. of Geology, University of Toronto, M5S 1A1).

1982

- 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).
- Aug 22 - 28 : Eleventh International Congress on Sedimentology, Hamilton, Ontario, Canada, IAS Congress 1982, Dept. of Geology, McMaster University, Hamilton, Ontario L8S 4M1, Canada. (Nov-Dec 1980).

\*\*\*\*\*

THE GEOLOGICAL SOCIETY OF MALAYSIA  
**NOW AVAILABLE!**  
BULLETIN OF THE GEOLOGICAL SOCIETY OF MALAYSIA

KDN 0492/80

ISSN 0126-6187

---

---

BULETIN PERSATUAN  
**GEOLOGI MALAYSIA**

---

---

**BULLETIN OF THE GEOLOGICAL SOCIETY OF MALAYSIA**

---

---

**KANDUNGAN  
CONTENTS**

- 1 Stratigraphy and palaeontology of the Carboniferous sediments in the Panching area, Pahang, West Malaysia  
I. Metcalfe, M. Idris and J.T. Tan
- 27 Cenozoic basins of Thailand and their coal deposits: A preliminary report  
Martin Gibling and Benjavun Ratanasthien
- 43 Some qualitative analyses of the ground magnetic survey in the Kedah Peak Rest House Area, Kedah  
B.K. Lim
- 57 Some geochemical studies of the metaquartzites of the Jerai Formation, Kedah  
K.T. Chow
- 63 The gabbroic suite and associated hornfelses of Bukit Kemuning, Trengganu, Peninsular Malaysia  
S. Chandra Kumar
- 87 Short Communications
- 87 Instrumental neutron activation analysis for rare earth elements in dolerite dykes of Kuantan area, Peninsular Malaysia  
G. Sita Ram, K.R. Chakraborty and Sharifah Barlian Aidid
- 93 Some comments on the emplacement level of the Kemahang granite, Kelantan  
T.T. Khoo
- 103 Rare earth element abundance patterns in alkaline basaltic lavas of Kuantan, Peninsular Malaysia  
K.R. Chakraborty, G. Sita Ram and Sharifah Barlian Aidid

Editor  
G.H. TEH

---



**DECEMBER 1980**

**No. 13**

Price: M\$20.00 (US\$10.00)

Cheques, Money Orders or Bank Drafts must accompany all orders. Please add US\$1.30 for bank charges.

Orders should be addressed to: The Hon. Assistant Secretary  
GEOLOGICAL SOCIETY OF MALAYSIA  
c/o Dept. of Geology  
University of Malaya  
Kuala Lumpur 22-11  
MALAYSIA

