

PERSATUAN GEOLOGI MALAYSIA

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CATITAN GEOLOGI (GEOLOGICAL NOTES)

On the supposed existence of Late Cretaceous granite in Pulau Tioman, Pahang.
T.T. KHOO, Jabatan Geologi, Universiti Malaya, Kuala Lumpur.

Recent publications have mentioned that Cretaceous granites occur in Pulau Tioman. Hutchison (1977 & 1978) has mentioned that the Karimata islands contain Late Cretaceous granite of age similar to Mount Ophir, Gunung Pulai and Pulau Tioman and that this is the youngest plutonic episode in Peninsular Malaysia. Ishihara, Sawata and others (1979) said that 'Cretaceous plutons, such as Mount Ophir, Gunung Pulai and Pulau Tioman are composed of magnetite-series granitoids'. It is not clear from the papers mentioned regarding the source of the information. The most important work to date on the geology of the island by Bean (1977) put the ages of the granitic rocks to be pre-Cretaceous. However, to the best of my knowledge, the only rock from Tioman dated radiometrically is a so-called biotite-hornblende granite (UM 6732) from locality $2^{\circ} 50'N$ and $104^{\circ} 10'E$ (Fig. 1) which gave a K-Ar biotite age of 74 ± 2 Ma (Late Cretaceous). This information is from Bignell (1972, p. 308). However, on p. 200, Bignell in the same work said that 'the age of the Tioman granite is not known'. There is no evidence to confirm the existence of Late Cretaceous granites in Tioman.

To enable proper appreciation of the K-Ar age (and to prevent ludicrous statements regarding the age) of the Tioman granite it is felt that the nature of the dated specimen UM 6732 and the occurrence of such rocks in the island must be given. The specimen is in the Departmental Collection of the Dept. of Geology, University of Malaya.

The author has examined this specimen petrographically. The so-called biotite-hornblende granite (UM 6732) is not granitic but dioritic (Table 1). The rock is composed predominantly of plagioclase (oligoclase) and a significant amount of both clino- and orthopyroxene. The pyroxenes are usually rim-replaced by hornblende. The dated rock is a quartz diorite.

The major plutonic body in the island is a granite (adamellitic) which contains biotite and sometimes hornblende as well (Bean, 1977). This body forms the western half of the island and the greater part of the southern portion. Plots of the modal quartz-plagioclase-alkali feldspar of the granite (data from Bean, 1977) and UM 6732 are shown in Fig. 2. It is clear that the latter which is quartz dioritic is compositionally different from the granites which make up most of the island. The Tioman granites themselves have not been dated, but only a minor rock type.

Specimen UM 6732 is distinctly gneissic. Alignment of plagioclase and ferromagnesian minerals gives rise to the gneissic foliation. The fabric appears to be due to earlier shearing and deformation followed by later annealing. The pre-annealing history is evidenced by features such as bent feldspar, bent biotite, plagioclase made up of dislocated domains (Fig. 3a & b), etc. The history of UM 6732 is complex, and this will complicate any interpretation of the K-Ar age.

Rocks of mineralogical composition similar to UM 6732 can be found in two areas in Tioman. One, the area mapped as diorite in Bean's (1977)

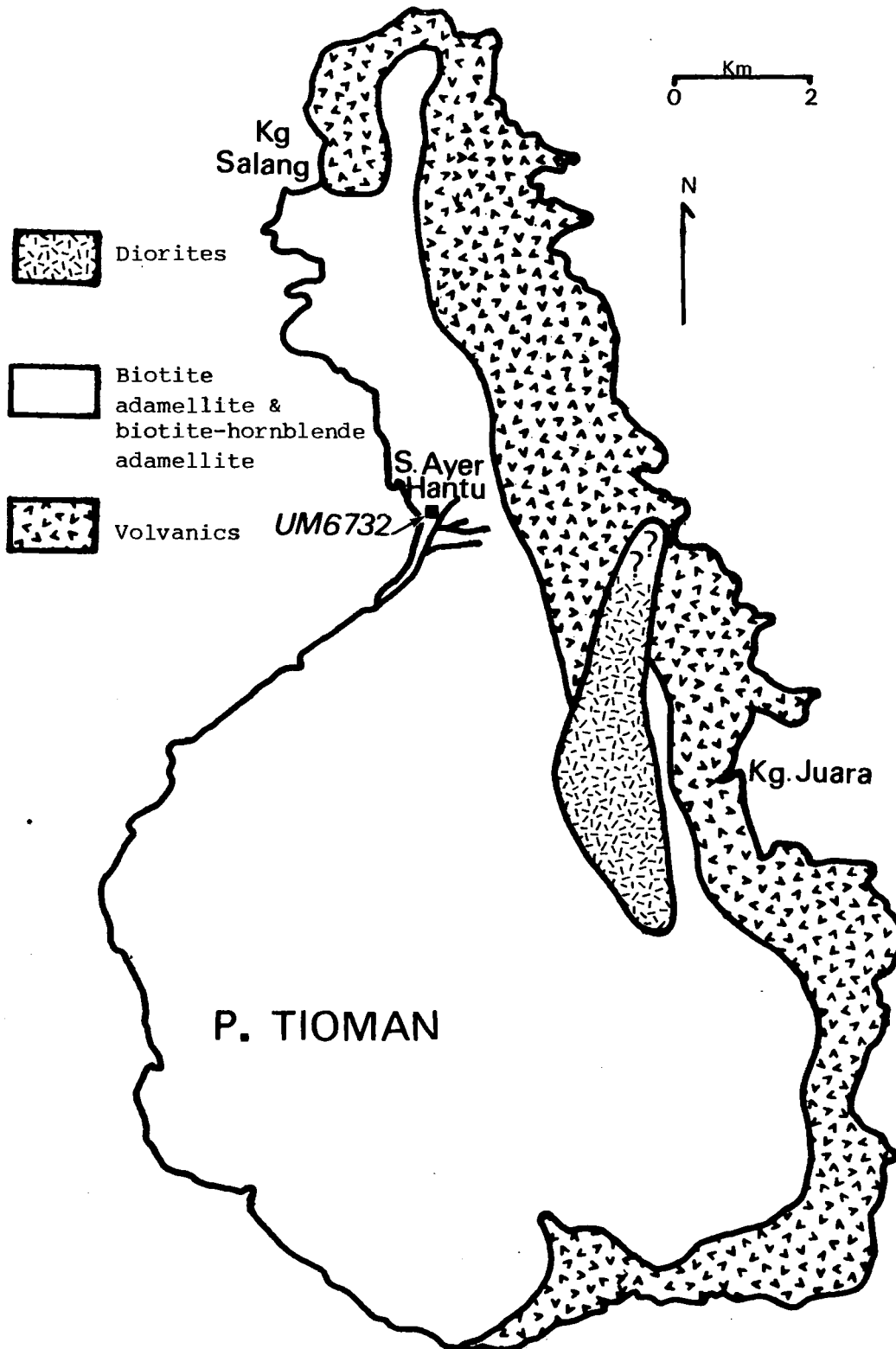


Fig. 1. Pulau Tioman. Geology from geological map accompanying Bean (1977).

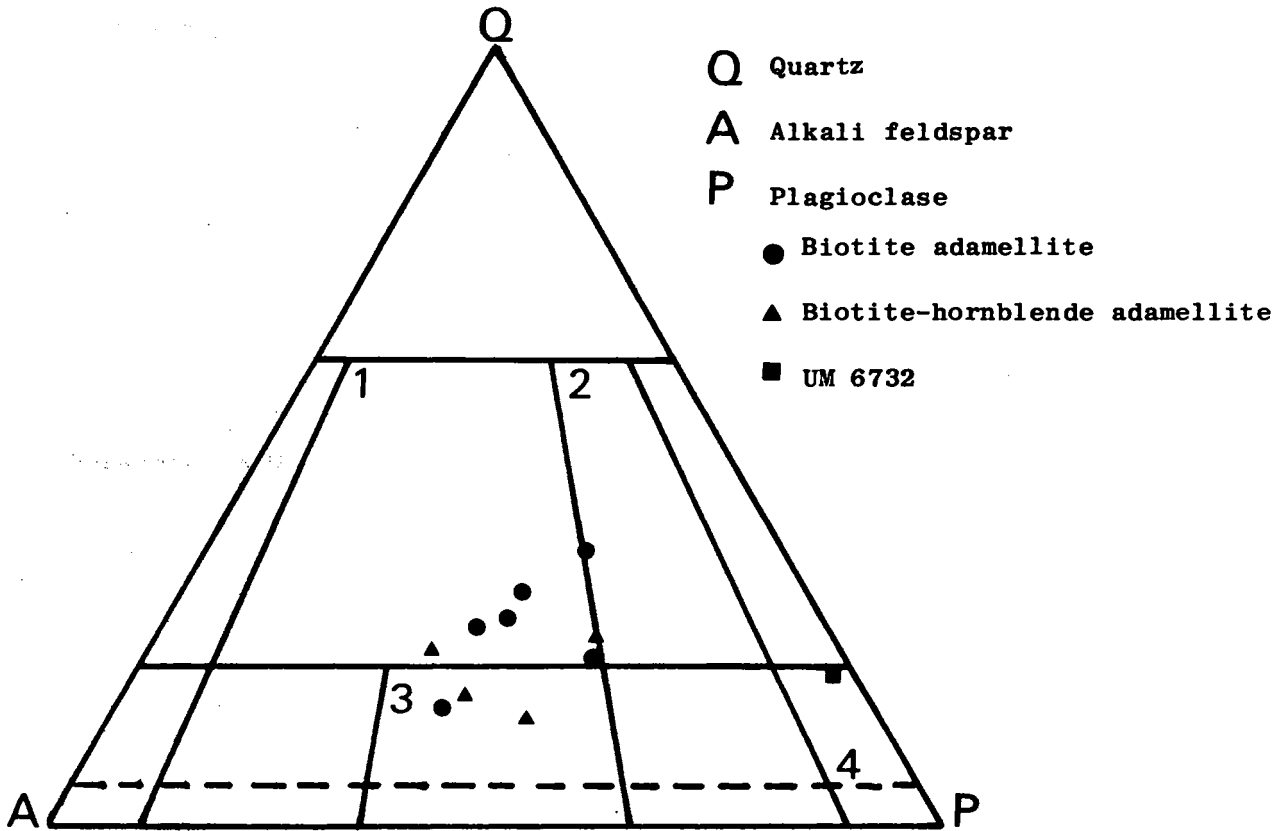


Fig. 2. Plots of modal quartz, plagioclase and alkali feldspar of granites (data from Bean, 1977) and UM 6732. Boundaries are according to Streikeisen's classification (1 = granite, 2 = granodiorite, 3 = quartz monzonite, 4 = quartz diorite).

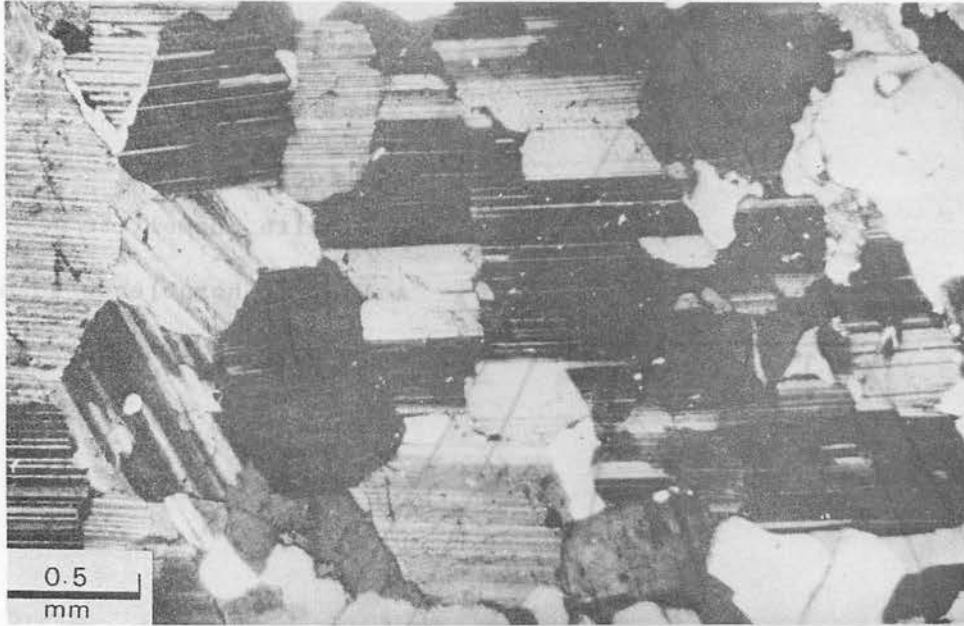


Fig. 3a. Plagioclase grain made up of annealed dislocated domains.



Fig. 3b. Annealed dislocated plagioclase.

Table 1. Modal analysis of specimen UM 6732

<u>Mineral</u>	<u>Percentage</u>
Quartz	15.9
Alkali feldspar	2.3
Plagioclase	63.6
Biotite	10.6
Hornblende	2.0
Pyroxene	3.3
Fe-Ti oxides	1.9
Apatite	0.4
Sphene	trace
Total	<u><u>100.0</u></u>

map (Fig. 1) has rocks ranging from gabbro to quartz diorite and quartz monzonite. The other, the area between Sungai Ayer Hantu and Kampong Salang, has quartz diorites. In these two areas gneissic varieties are rare. The origin of these rocks is uncertain. It is possible that contamination of granitic magma with adjacent calcic volcanics which occur in Tioman, could give rise to these intermediate rocks. Eastern Belt granites with a tonalitic marginal facies resulting from assimilation of calcareous country rocks are not uncommon (MacDonald, 1967). A good example is at Pulau Pinang in the Redang group of islands off Trengganu. Other possibilities for the origin of the quartz diorites such as assimilation of gabbro by granitic magma or differentiation of basic magma cannot be ruled out.

Based on the above information, I feel that the Tioman granites are probably older than Cretaceous. They are cut by dolerite sheets with chilled margins. Similar dolerite dykes in Pahang and Trengganu have been dated to be Jurassic-Cretaceous (Bignell and Snelling, 1977). The granites intrude volcanics of probable Permian age and also thermally metamorphosed the dioritic rocks as evidenced by clouding of plagioclases in the diorites. A Triassic age for the granites is preferred by the author.

Acknowledgement

The author would like to thank Mr. Lee Meng Chong, who shares the author's interest in the geology of sparsely or unpopulated islands off Peninsular Malaysia, for field help.

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Ordovician conodonts from the Kaki Bukit area, Perlis, West Malaysia.

I. METCALFE, Dept. of Geology, University of Malaya, Kuala Lumpur.

Introduction

Ordovician conodonts in Malaysia have been reported from the Langkawi Islands (Igo and Koike, 1967, 1968) and from Perlis (Müller *in* Jones, *et al.* 1966; Igo and Koike, 1973). Igo and Koike (1967, 1968) described conodonts from the Setul Limestone of Langkawi and recognised four conodont 'zonules' for the Ordovician and Early Silurian. Müller (*in* Jones, *et al.* 1966) and Igo and Koike (1973) reported Ordovician conodonts from the Thye San Tin Mine 20 km north of Kangar, Perlis. This was to date the only record of Ordovician conodonts in Malaysia outside the Langkawi Islands. In this paper, Ordovician conodonts are recorded from the Setul Limestone at three further localities in Perlis (Fig. 1).

The Setul Limestone of Perlis

Little detailed stratigraphical work has been carried out in Perlis but the Setul Limestone is widespread in the area (Jones, *in* press). The limestone of the area is dark grey and fossiliferous but recrystallisation has rendered much of the fossil material unidentifiable. Exposures occur in tin mines and as isolated limestone hills. The Setul Limestone Formation ranges from Lower Ordovician to Lower Devonian in age and is approximately 1500 m thick (Jones, *in* press). Jones (*in* press) recognises three units in the Setul Limestone of the Langkawi Islands; a basal limestone 100 m thick of Lower Ordovician age which constitutes Unit 1; the 'Lower Setul Limestone' of Middle to Upper Ordovician age approximately 1000 m thick forming Unit 2; and the Lower Detrital Member, 'Upper Setul Limestone' and Upper Detrital Member which together form Unit 3 of Silurian to Lower Devonian age.

In Perlis, Ordovician and Silurian fossils are known from the Setul Limestone. Kobayashi (1959) recorded *Ormoceras langkawiense* Kobayashi, *Actinoceras perlisense* Kobayashi, *Actinoceras* sp., *Stereoplasmodoceras* sp. and *Malayspira rugosa* Kobayashi from Bukit Lagi near Kangar and believed the fauna to be of the same age as that of the 'Gastropod Limestone' of Langkawi (= 'Lower Setul Limestone' of Jones, *in* press). This would make the fauna Middle or Upper Ordovician. Kobayashi (1959) also records an Ordovician macrofauna from the Thye San Mine 20 km north of Kangar. Two species are recorded, *Armenoceras chediforme* Kobayashi and *Lytospira rectangularis* Kobayashi. The age of this fauna was said to be probably Lower Ordovician but not older than Toufangian (= early Arenigian). Müller (*in* Jones, *et al.* 1966) and Igo and Koike (1973) recorded conodonts from the Thye San Mine. They recorded *Scolopodus bassleri* (Furnish) *Scolopodus staufferi* (Furnish), *Drepanodus* sp., *Panderodus acostatus* (Branson & Branson), *Panderodus* sp. and *Oistodus* sp. Igo and Koike correlated the fauna with those from the lower part of the Setul Limestone of Langkawi (Lower Ordovician). Igo and Koike (1973) also reported Silurian conodonts from the Setul Limestone of Gua Getri, 17 km north of Kangar. The fauna included *Acodus mutatus* (Branson & Mehl), *Spathognathodus pennatus* Walliser, *Panderodus unicostatus* (Branson & Mehl), *Trichonodella symmetrica* (Branson & Mehl) and *Trichonodella* sp. and was taken to indicate a late Llandovery age, correlating with faunas from the limestones immediately overlying the Lower Detrital Member in Langkawi.

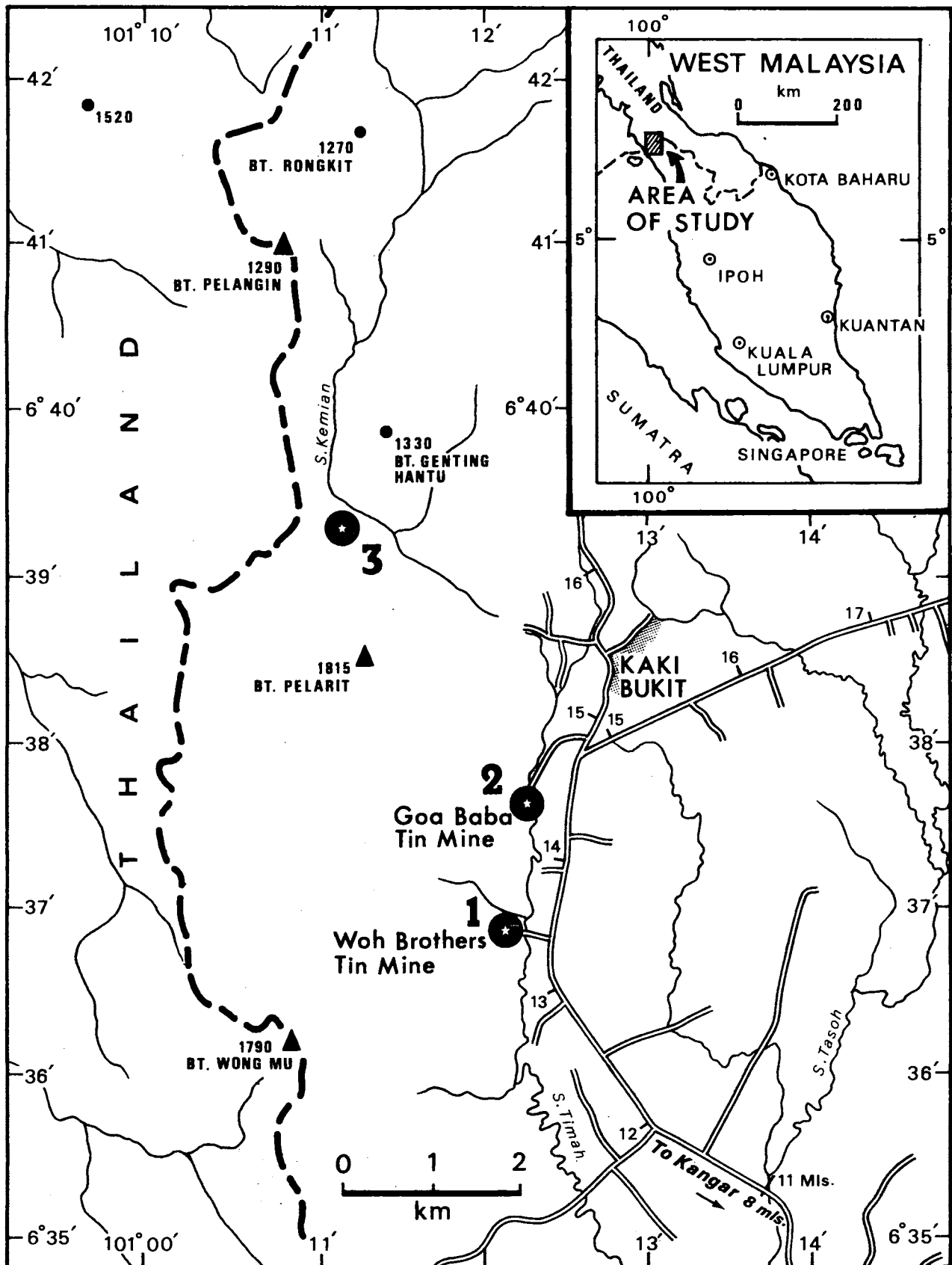


Fig. 1. Sketch map of the Kaki Bukit area showing Ordovician conodont localities 1, 2, and 3.

Conodont faunas and age

Conodonts were recovered from the three localities as follows (see Fig. 1):-

Locality 1. Woh Brothers Tin Mine (472322)*

Sample 623, 1.0 kg.

<i>Acanthodus</i> sp	2
<i>Acodus</i> sp	1
<i>Acontiodus</i> sp. A. Igo & Koike	2
<i>Loxodus bransoni</i> Furnish	4
<i>Paltodus</i> sp. (drepanodiform element)	4
<i>Scolopodus giganteus</i> Sweet & Bergstrom	2
<i>Scolopodus staufferi</i> (Furnish)	2
<i>Scolopodus</i> sp.	5
Gen. indet.	21
Total	43

Locality 2. Goa Baba Tin Mine (473337)*

Sample 624, 1.5 kg.

<i>Acodus?</i> sp.	1
<i>Drepanodus?</i> sp.	1
<i>Scolopodus giganteus</i> Sweet & Bergstrom	1
<i>Scolopodus insculptus</i> (Branson & Mehl)	1
<i>Scolopodus staufferi</i> (Furnish)	2
Gen. indet.	7
Total	13

Locality 3. Limestones exposed south-southwest of Bukit Genting Hantu (453369)*

Sample 625, 1.5 kg.

<i>Acodus</i> sp. (oistodiform element)	1
<i>Acontiodus</i> sp. A. Igo & Koike	2
<i>Falodus?</i> sp.	1
<i>Serratognathus bilobatus</i> Lee	3
Gen. indet.	5
Total	12

The conodont faunas indicate that all three samples are of Ordovician age. The presence of *Loxodus bransoni* Furnish and *Acontiodus* sp. A. Igo and Koike in sample 623 suggests a Lower Ordovician age for the limestones at locality 1. *L. bransoni* is characteristic of the Lower Ordovician in North America and *Acontiodus* sp. A. is known only from the basal part of the Setul Limestone of Langkawi (Lower Ordovician). A correlation between the limestones at locality 1 and the basal part of the Setul Limestone is thus suggested. The fauna of sample 625 also contains *Acontiodus* sp. A. suggesting a Lower Ordovician age for the limestones at locality 3. Limestones exposed at the Goa Baba Mine (sample 624), however, yield *Scolopodus giganteus* and *Scolopodus staufferi* which are characteristic of the Lower to Middle Ordovician *S. staufferi* - *S. giganteus* Zonule (Igo & Koike, 1967). The fauna also contains *Scolopodus insculptus* which ranges from Middle to Upper Ordovician (Sweet, *et al.* 1971). A Middle Ordovician age is thus indicated for the limestones at locality 2.

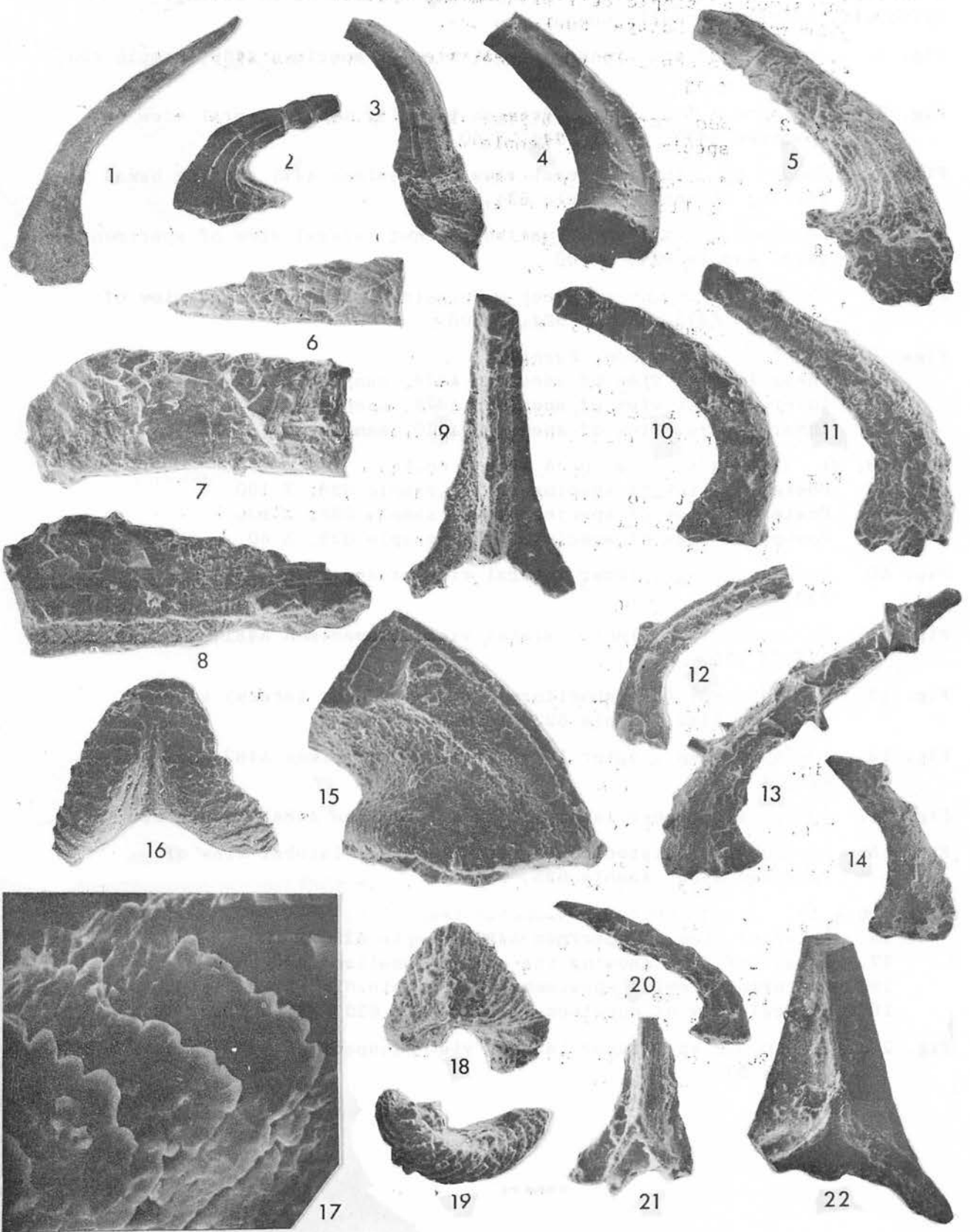
* Grid references given refer to sheet 145, Padang Besar, 1972.

Acknowledgements

The receipt of a University of Malaya Research Grant No. F142/77 is gratefully acknowledged. I would like to thank Brian C. Batchelor for collecting the limestone samples, Mr. S. Srinivass for drafting Fig. 1 and Mr. Jaafar bin Abdullah for photographic work.

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Explanation of Plate

All figures are scanning electron micrographs. Specimens are deposited as single cell slide mounts in the Department of Geology, University of Malaya, Kuala Lumpur.

- Fig. 1. *Drepanodus?* sp., inner lateral view of specimen A469, sample 624, X 25.
- Fig. 2. *Scolopodus insculptus* (Branson & Mehl), inner lateral view of specimen A470, sample 624, X 50.
- Fig. 3. *Acodus* sp., inner lateral view of specimen A471 showing basal filling attached, sample 624, X 50.
- Fig. 4. *Scolopodus staufferi* (Furnish), inner lateral view of specimen A472, sample 624, X 100.
- Fig. 5. *Scolopodus giganteus* Sweet & Bergstrom, inner lateral view of specimen A473, sample 624, X 100.
- Figs. 6 - 8. *Loxodus bransoni* Furnish.
6. Inner lateral view of specimen A474, sample 623, X 50.
7. Inner lateral view of specimen A475, sample 623, X 25.
8. Inner lateral view of specimen A476, sample 623, X 25.
- Figs. 9, 21, 22. *Acontiodus* sp. A. Igo & Koike.
9. Posterior view of specimen A477, sample 623, X 100.
21. Posterior view of specimen A478, sample 625, X 100.
22. Posterior view of specimen A479, sample 625, X 50.
- Fig. 10. *Acanthodus* sp., inner lateral view of specimen A480, sample 623, X 50.
- Fig. 11. *Scolopodus* sp., inner lateral view of specimen A481, sample 623, X 100.
- Fig. 12. *Paltodus* sp. (drepanodiform element), inner lateral view of specimen A482, sample 623, X 50.
- Fig. 13. *Scolopodus* sp., outer lateral view of specimen A483, sample 623, X 100.
- Fig. 14. *Acodus* sp., inner lateral view of specimen A484, sample 623, X 50.
- Fig. 15. *Acodus* sp., (oistodiform element), inner lateral view of specimen A485, sample 625, X 100.
- Figs. 16 - 19. *Serratognathus bilobatus* Lee
16. Anterior view of specimen A486, sample 625, X 100.
17. Detail of A486 showing the coarse lamellae structure.
18. Posterior view of specimen A487, sample 625, X 100.
19. Lateral view of specimen A488, sample 625, X 100.
- Fig. 20. *Scolopodus* sp., inner lateral view of specimen A489, sample 623, X 50.

A comparison of the supposed graptolites of the Tarutao Formation, Ko Tarutao, with *Dictyodora* trace fossils found in the Machinchang Formation, Pulau Jemurok, Langkawi.

C.P. LEE, Dept. of Geology, University of Malaya, Kuala Lumpur.

During the recent GSM fieldtrip to Tarutao Island, south Thailand, from 31st March to 2nd April, 1980, by a team of geologists from the Geological Societies of Thailand and Malaysia, one of the items of great interest was seeing the occurrence of possible graptolite fossils reported by Bunopas (1974 and 1980) in the fine micaceous sandstone strata at Ao Talo Lingai (Fig. 1). The report is of special interest on two accounts. Firstly, the "graptolites", which were described as having four stipes, were preserved abundantly, as *moulds* in *sandstones*. They are, however, normally found as carbonaceous impressions in argillaceous rocks. Secondly, the "graptolites" are not the dendroid type whose occurrence is known to stretch into the Cambrian but rather are supposed to be those belonging to the order *Graptoloidea* which is supposed to be found initially in the Ordovician. The Tarutao Formation is generally accepted as Upper Cambrian from the brachiopod and trilobite fauna found in the same strata (Kobayashi, 1957).

Examination of the supposed four-stipe-like graptolite moulds in the ripple-marked sandstone surface in the field proved not convincing enough. Most of them were curved shallow depressions (Fig. 2) and some of them seemed to have tiny serrated edges (Fig. 4). These could perhaps be trace-fossils of some kind because the shape, size and occurrence of these markings resemble very much the trace-fossil, *Dictyodora*, which occur in similar sandstone strata of the Machinchang Formation at Pulau Jemurok (Fig. 1). (The Machinchang Formation is the southerly continuation of the Tarutao Formation, 6 km across the Selat Chinchin).

Dictyodora is essentially a ribbon-like burrow made in the sediment by an animal that seems to have possessed a siphon while it was feeding through the sediment (Seilacher, 1967). Hence, on the bedding surface it looks like a child's scribble (Fig. 5) while in three dimension it is actually a wavy strip reaching at an angle or vertically downwards from the bedding surface into the sediment (Fig. 6). The earlier forms of *Dictyodora* were typically scribble like and less organized due to the inefficient manner of sediment exploitation by the less highly evolved organisms. The later forms began to develop meanders and spirals for more efficient sediment exploitation.

A float specimen of *Dictyodora* collected by the author at Pulau Jemurok recently strongly resembles the graptolite fossils of Ao Talo Lingai. Closer examination of the float specimen from Pulau Jemurok also revealed that the edges of parts of the *Dictyodora* have minute serrations (Fig. 4) similar to that of the "graptolite" moulds of Ao Talo Lingai. The author is convinced that the so called "graptolites" of Tarutao are in fact the same trace fossil, *Dictyodora*, found on Pulau Jemurok. It is also interesting to note (and very helpful for correlation) that the markings on Tarutao and the *Dictyodora* on Pulau Jemurok are associated with bands of fragmentary trilobites and brachiopod fossils in the same type of sandstones which show similar sedimentary structures and characteristics.

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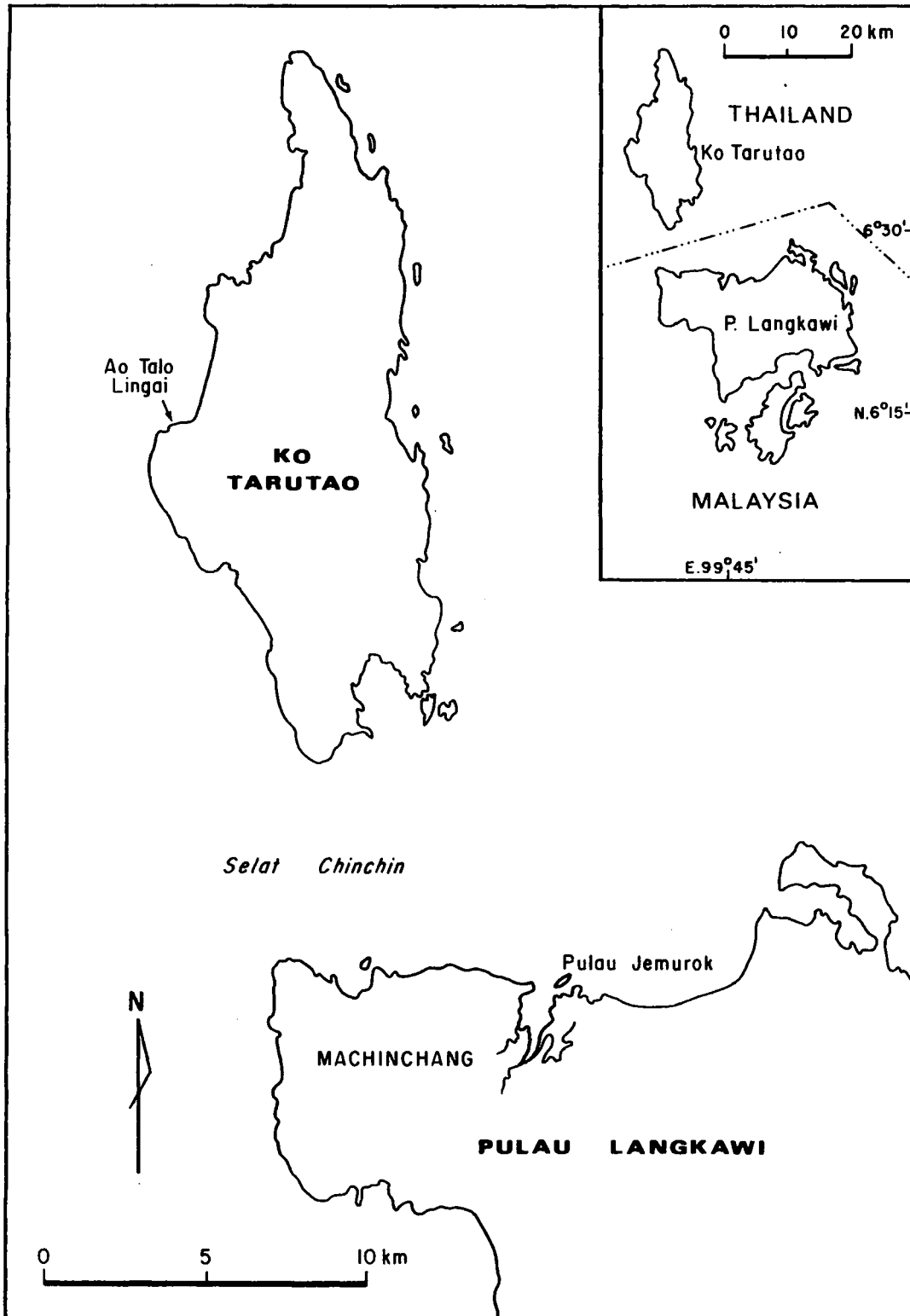


Fig. 1. Location map of Ko Tarutau (Tarutau Island)

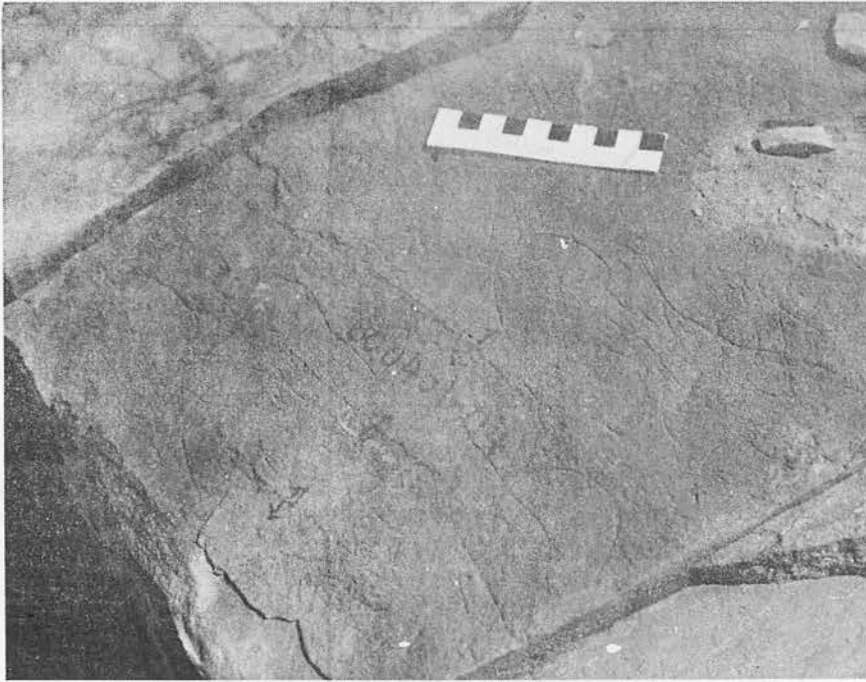


Fig. 2. Curved "graptolite" moulds on ripple-marked bedding surface at Ao Talo Lingai, Ko Tarutao.

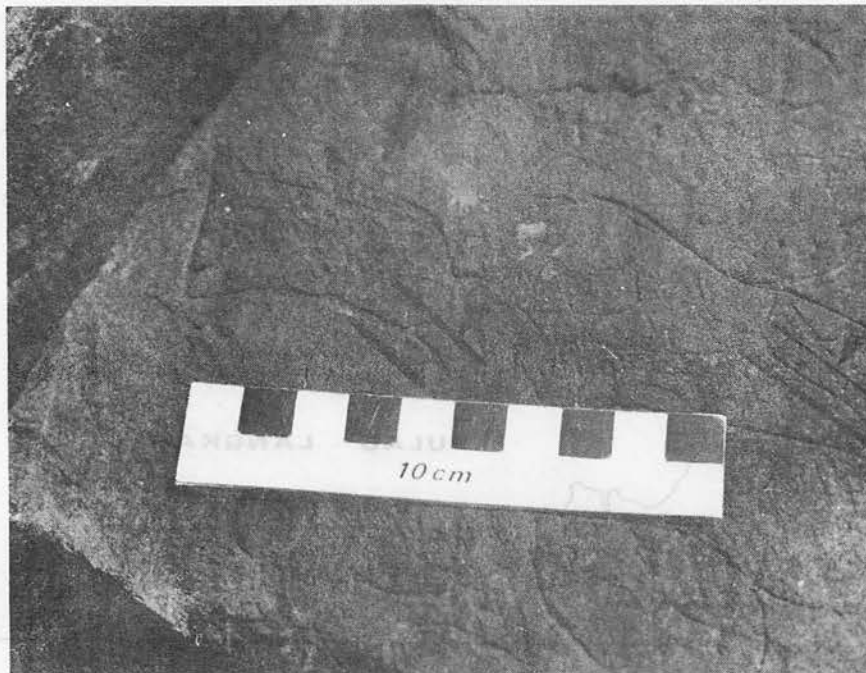


Fig. 3. Closer view of "graptolite" moulds at Ao Talo Lingai. Note tiny serrations indicated in marked area.

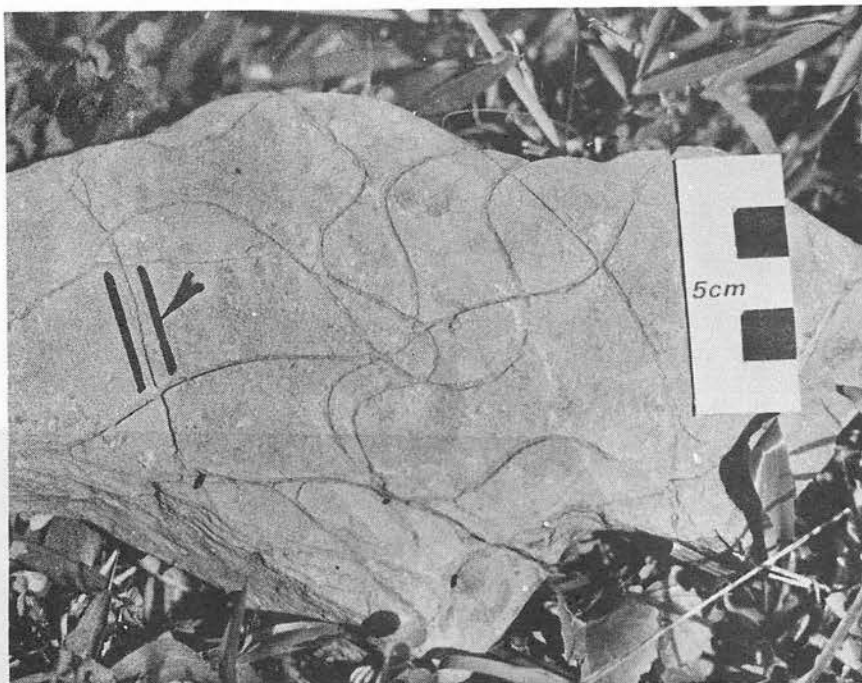


Fig. 4. Float specimen from Pulau Jemurok with curved *Dictyodora* trace-fossils. Note tiny serrations indicated in marked area.

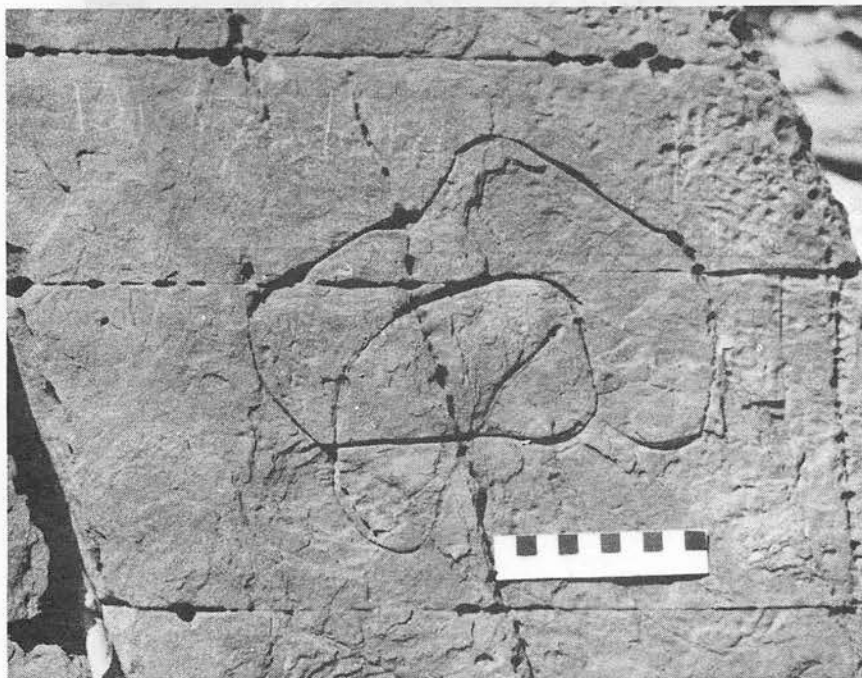


Fig. 5. Isolated scribe-like *Dictyodora* trace-fossil on surface of bedding plane at Pulau Jemurok.

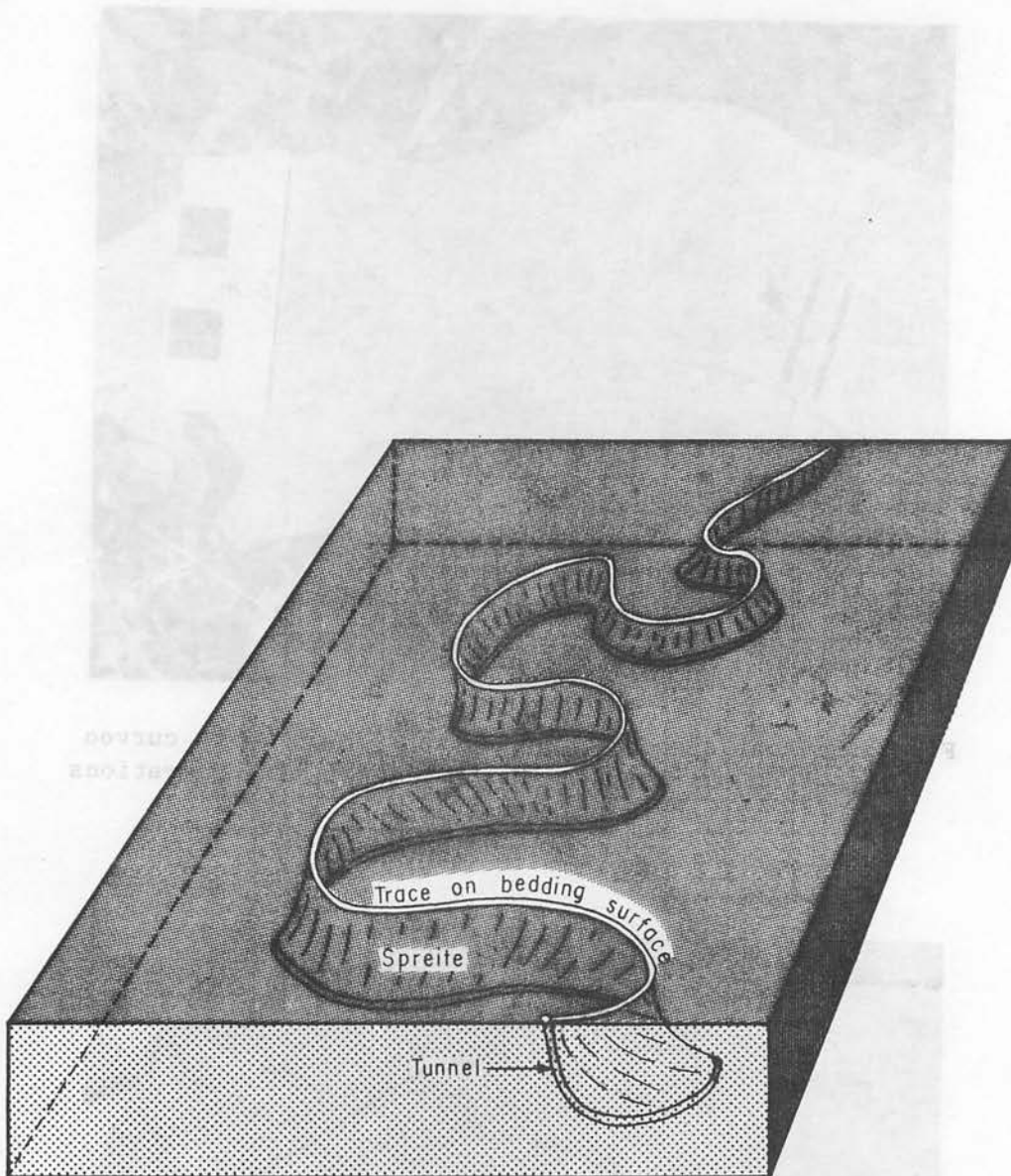


Fig. 6. Sketch of *Dictyodora* burrow in 3-Dimension

Fig. 5. Isolated scribble-like *Dictyodora* trace-fossil on surface of bedding plane at Polan Jesenice.

BERITA PERSATUAN (NEWS OF THE SOCIETY)

Resignation of Hon. Treasurer and Hon. Secretary

The Hon. Treasurer, Mr. Gan Ah Sai, tendered in his resignation owing to the increased frequency of being away from Kuala Lumpur. He will, however, remain a Councillor.

The Hon. Secretary, Mr. Wong Yoke Fah, wrote in from Swaziland to tender in his resignation due to the fact that he will be staying longer overseas than expected.

The Council at a meeting on 13 June 1980 regretfully accepted both the resignations.

Appointment of new Hon. Treasurer and Hon. Secretary

At the Council Meeting on 13 June 1980, Mr. Chin Lik Suan was appointed the new Hon. Treasurer and Mr. Tan Boon Kong, the new Hon. Secretary. Both of them were Councillors in the 1980/81 Council prior to their appointments.

Appointment of Nominations Committee

At a Council Meeting on 25 April 1980, Mr. Leong Khee Meng (Cari-gali - BP) was appointed Chairman of the Nominations Committee. He will be assisted by Mr. Aw Peck Chin (Geological Survey of Malaysia) and Mr. J.K. Raj (Dept. of Geology, University of Malaya).

Co-option of new Councillors

The appointment of Mr. L.S. Chin and Mr. Tan Boon Kong as Hon. Treasurer and Hon. Secretary respectively, created 2 vacancies for 1-year Councillors. Another vacancy for 1-year Councillor arose earlier when Dr. Mohd. Ayob assumed office as President.

The following have been co-opted to serve as the remaining 1-year Councillors in the 1980/81 Council:

- Mr. Choo Mun Keong (Pernas Charter Management)
- Mr. Ahmad Said (Petronas)
- Mr. Gan Ah Sai (Geological Survey Malaysia).

Appointment of Chairman of Budget Subcommittees

The following were appointed Chairman of the various subcommittees to plan and budget for the Council's 1980/81 activities:

- i) Publications - G.H. Teh
- ii) Technical talks - M. Ayob
- iii) Field trips - H.D. Tjia and Tan Boon Kong
- iv) Seminars - T.T. Khoo.

Appointment of GSM Representatives

The Council has appointed the following members to represent GSM at the various bodies and organisations listed:

- i) SIRIM (Standards and Industrial Research Institute of Malaysia) Clay - J.K. Raj.
- ii) SIRIM Engineering Standards - Tan Boon Kong.
- iii) Mineral Engineers' Act - B.K. Tan.
- iv) COSTAM (Confederation of Scientific and Technological Associations of Malaysia) - B.K. Tan and Mohd. Ayob.
- v) MSA (Malaysian Scientific Association) - B.K. Tan.

GSM Seminar Programme for 1980/81

The Seminar subcommittee under the chairmanship of Dr. T.T. Khoo has proposed the following seminars for 1980/81.

1. Economic Geology Seminar (EGS)

Theme	:	Industrial Minerals
Date	:	October 1980
Duration	:	1-day Seminar and 1-day Field Excursion
Venue	:	Hotel Merlin
Organising Chairman	:	T.T. Khoo.

2. Geotechnical Engineering Seminar II (GES)

Theme	:	No theme
Date	:	February 1981
Duration	:	1 day
Venue	:	Hotel Merlin, Kuala Lumpur
Organising Chairman	:	Tan Boon Kong.

3. Petroleum Geology Seminar IV (PGS)

Theme	:	No theme
Date	:	December 1980
Duration	:	2 days
Venue	:	Hotel Merlin or better, Kuala Lumpur
Organising Chairman	:	Leong Khee Meng.

4. Regional Geology Seminar II (RGS)

Theme	:	Geology of the Central Belt, Peninsular Malaysia
Date	:	April 1981
Duration	:	1 day
Venue	:	Jabatan Geologi, University of Malaya
Organising Chairman	:	Khoo Kay Khean.

In addition, the following seminars are proposed for 1981/82 and are included here for consideration as organising must begin early for these.

1. National Non-Fuel Mineral Policy Seminar

Date	:	20-21 November 1981
Duration	:	2 days
Venue	:	A leading hotel in Kuala Lumpur
Organising Chairman	:	Y.F. Wong.

2. Thai-Malay Border Area Correlation Seminar

Date : December 1981 or March-April 1982
 Venue : Penang
 Duration : 2-day Seminar; 7-day Field Trip
 Organising Chairman : B.K. Tan.

GSM Field Trips for 1980/81

The Field Trip subcommittee headed by H.D. Tjia and Tan Boon Kong, has proposed the following field trips for 1980/81:

- 1) Pulau Langkawi (7 days)
- 2) Engineering Geology Field Trip (Malaysia & Singapore - 7 days)
- 3) East Sumatra (Lake Toba - 5 days).

Forthcoming GSM Bulletins

Bulletin 12

This Bulletin is in its final stages of preparation and should be available in August - September 1980. Papers appearing include:

- A.J. BOL & B. Van HOORN: Structural styles in Western Sabah Offshore.
 M. EPTING: Sedimentology of Miocene Carbonate Buildups, Central Luconia, Offshore Sarawak.
 TAN BOON KONG & CHAN SIN FATT: Preliminary studies on the correlation of index properties and engineering properties of Malaysian rocks.
 L.S. YAP & B.K. TAN: Deformation of the Upper Paleozoic rocks at Tanjung Gelang, Pahang.
 W. PONGSAPICH, S. VEDCHAKANCHANA & P. PONGPRAYOONG: Petrology of the Pranburi-Hua Hin Metamorphic Complex and Geochemistry of Gneisses in it.
 N.S. HAILE & H.P. KHOO: Palaeomagnetic measurements on Upper Jurassic to Lower Cretaceous sedimentary rocks from Peninsular Malaysia.
 K.R. CHAKRABORTY: On the evolution of the nepheline to hypersthene normative alkali basaltic rocks of Kuantan, Pahang, Peninsular Malaysia.

Bulletin 13

Bulletin 13 is scheduled to be out by the end of 1980.

The volume will include papers from GSM Petroleum Seminar III, NW Peninsular Malaysia Geology Seminar and Geology of the ASEAN region.

Bulletin 14

Plans are on the way too to publish a monograph on "Trace fossils from Tertiary deposits of Labuan Island, Sabah, Malaysia".

We hope to bring out this Bulletin in the first quarter of 1981.

Editorial Advisory Board

The following will be invited to sit on the board:

Nopadon Muangnoicharoen (Thailand)
 M.M. Purbo-Hadiwidjoyo (Indonesia)
 C.K. Burton (Philippines)
 R.D. Stewart (Singapore)
 K.F.G. Hosking (England)
 H.D. Tjia (Malaysia)
 P.H. Stauffer (Malaysia)
 T.T. Khoo (Malaysia)
 P.C. Aw (Malaysia)
 C.H. Yeap (Malaysia)
 B.K. Tan (Malaysia).

The purpose of the Board is to solicit papers, recommend appropriate reviewers besides assisting and advising the Editor on editorial matters in promoting the Society's publications.

Review of Bulletin 11 by AGID News

The following is a reproduction of the review of GSM's Bulletin 11 by AGID News (Newsletter of the Association of Geoscientists for International Development).

GEOLOGY OF TIN DEPOSITS. Bull. Geol. Soc. Malaysia, No. 11. Editor: C.H. Yeap, Dec. 1979, 386 p. Price: US\$25.00 (2.00 postage surface mail).

The volume is a collection of 18 papers of 31 authors presented at the International Symposium on *Geology of Tin Deposits*, held at Kuala Lumpur in March 1978, sponsored by AGID and the Geological Society of Malaysia. The papers have an excellent coverage of the subject matter, dealing with: distribution patterns, source, plate tectonics, petrology, geochemistry, controls of mineralization, exploration, granites and pegmatites, reviews of tin fields, with papers focussing Australia, Bolivia, Brazil, England, Malaysia, Nigeria, South Africa, and Thailand. Three general papers cover 100 pages. They are: Tin Distribution Patterns; Tin - A mantle or crustal source?; Rift-, Subduction- and Collision - related Tin Belts. Profusely illustrated both with figures, tables and some plates, the volume is well printed and presented. The papers represent reviews, synthesis and research. This leaves an impression that the volume is like a *textbook* on Geology of Tin Deposits, at a very accessible price to a great number of interested workers. It is a must for teachers in mineral deposits, and professionals who deal with tin. Contact: Geol. Soc. of Malaysia, Dept. of Geology, University of Malaya, Kuala Lumpur 22-11, Malaysia.

(A.B.R.)

(AGID News, No. 23, April 1979)

GSM and COSTAM

The Geological Society of Malaysia is one of 18 founder associations of COSTAM (Confederation of Scientific & Technological Associations in Malaysia).

The Inaugural Meeting of COSTAM was held on 26 June 1980. Dr. T.T. Khoo and Mr. Tan Boon Kong represented the GSM at this meeting. Dr. Khoo was elected a member of the Exco.

The Inauguration Dinner of the Confederation was held on the same evening at the Regent Hotel. Ten GSM Council members were invited to attend the function.

GSM Economic Geology Seminar - Industrial Minerals

An Economic Geology Seminar with the theme "Industrial Minerals" will be held

on Friday, 10 October 1980
at Hotel Merlin, Kuala Lumpur.

The Seminar will be followed by a field excursion to places of interest in north Kuala Lumpur, such as quarries and industrial minerals users.

Relevant papers are welcome. To date the following papers are promised:

- 1) P.C. Aw (Geological Survey): Present exploitation and future prospects of industrial minerals in Peninsular Malaysia.
- 2) E.U. Kidav (APMC): Cement industry in Malaysia.
- 3) B.M. Sedalia (Kraftangan Malaysia): Minerals in Malaysia for the ceramic industry.

Other papers, such as those on amang processing, standards and the kaolin industry are possibilities.

Those wishing to participate are advised to reply to a circular to be sent to all members and those interested soon.

Members of the Organizing Committee are T.T. Khoo (Chairman), P.C. Aw, E.B. Yeap, K.K. Khoo and Ambrose Ng.

TTK

Letters to the Editor

"Gloomy picture" coloured "rosy"

A member, who wrote in from Australia, noted the 'gloomy picture' painted by En. Eric Toh on employment opportunities for geologists in the mining industry in Malaysia at the moment (WARTA GEOLOGI, Jan-Feb 1980).

What he would like to impart to the geological fraternity in Malaysia is that the current state of affairs in Australia is just the reverse. According to him, currently there is on the average at least 3 job offers made to every graduating geologist and there is simply a drastic shortage of geologists in the exploration industry.

He feels that "any enterprising geologist, who could find himself in Australia with a work visa, would have little difficulty in obtaining employment in the exploration industry".

Apologies for omission

The Editor (1978/79) has requested that this note be included in the WARTA.

"The Editor (1978/79) regrets that the list of Councillors in Warta Geologi, Vol. 4, nos. 5 & 6 and Vol. 5, Nos. 1 & 2 did not include Mr. Ambrose Ng Aik Peng who served on the

Council from 27th Oct 1978 to 20 April 1979 and offer his apologies for this omission".

Yours sincerely

C.H. Yeap (signed)

Address: c/o Dept. of Geology
University of Malaya
Kuala Lumpur.

11 Jun 1980

Comment on paper from GSM Geotechnical Engineering Seminar 1979

In the paper titled "Engineering Properties and Bearing Capacity of Malaysian Rocks" by S.F. Chan, an assumption on a limestone formation was made that when 15 feet of continuous rock was met, this rock would be more than adequate to set the foundation on. My comment on this assumption is that there seems to be a lack of appreciation for lateral continuity that is needed when working with this rock type.

Most engineers are aware of the irregularity of cavities in limestone. Some long pinnacle structures can be almost unsupported laterally. Therefore, during drilling careful assessment must be made of the rock as to its mode of occurrence as well as to its lateral continuity. If there is found to be great variation in depths to the assumed rockhead, especially with close proximity, then more information may be required before a final recommendation can be given.

One example given was disturbing. There were four holes all within five feet of each other yet all had different depths to the assumed rockhead with a maximum difference of 20 feet. After this difference was noted, each subsequent hole was still stopped at the predetermined 15 foot mark. I would suggest that at least all subsequent holes should have been taken down to as far as the deepest hole. In addition, further drilling may have been required after careful assessment of the geological structures and of the proposed structure to be founded.

Therefore, my point in short is that fixed criteria for field testing procedures are convenient but must be continually assessed with the field data while testing. At times such criteria must be altered in light of variations on the basic assumption with which these criteria are made.

Peter James Walls
34 Miles Rd
Toronto, Ontario M8V 1V3
Canada
28 June 1980

Editor's Note

We are overwhelmed by the quick and encouraging response to the plea for articles towards our WARTA GEOLOGI and BULLETINS. This has resulted in the possibility of churning out 2 (or 3) Bulletins by the 1980/81 Council.

Also some members have written in to express their views or give comments on material published in the Newsletter. This has encouraged us to include in this issue of the WARTA GEOLOGI a section on "Letters to the Editor".

So keep your manuscripts and letters coming in and we on our part will try our best to put them out in print as fast as possible.

We are thankful to all contributors and we appreciate too the prompt action taken by our reviewers on these manuscripts.

GHT

New Library Additions

The following publications were added to the Society's collection:

1. Geosurvey Newsletter, vol. 12, nos. 2-3, 1980.
2. Geology and Palaeontology of Southeast Asia edited by T. Kobayashi, et. al., vol. 21, 1980.
3. Alfred Wegener, 1880-1930. Leben und Werk.
4. Berliner Geowissenschaftliche Abhandlungen, Band, 12 & 13, 15 & 16, 18 & 19.
5. Structure and geotectonic evolution of the Hellenides by V. Jacobshagen. Proceedings, vol. III, 1355-1367, 1977.
6. Some effects of the constant-sum problem in geochemistry by W. Skala. Chemical geology, 27, 1-9, 1979.
7. The morphology of the Aegean Sea: a discussion of morphometrical data by H. Ibbeken & Ruprecht Schleyer. Z. Geomorph. N.F. 23, 4, 396-414, 1979.
8. Lithospheric split in the descending plate: observations from the Northern Apennines by K.J. Reutter, et al. Tectonophysics, 64, T1-T9, 1980.
9. Commonwealth Geol. Liaison Office, Newsletter 3 & 4, 1980.
10. IMM Bulletin no. 882 and 883, 1980.
11. IMM/Transactions, Sect. C, vol. 89, 1980.
12. The University of Kansas, Paleontological contributions, Paper 98, 1980.
13. Geothermal resources of Northern Thailand: San Kampaeng, Fang and Mae Chan geothermal systems, 1980.
14. The classification and the significance of geochemical patterns for basaltic rocks in the Chanthaburi and Trat area by Y. Panjasawatwong, 1979.
15. The standard oxidation ratio for late Cenozoic basaltic rocks of Thailand by Y. Panjasawatwong, 1979.
16. R.R.I. News, Jan. 1980.
17. Science Reports of the Inst. of Geoscience, University of Tsukuba, Vol. 1, 1980.
18. Int. Subcommittee on stratigraphic classification of IUGS Commission on stratigraphy. Circular no. 60, 1980.
19. Scripta geologica, no. 53, 1979.
20. IMM/Transactions, Sect. A, v. 89, 1980.
21. National Library Singapore, adult reference collections accessions list, May 1980.
22. Mineralogia Polonica, vol. 9, no. 2, 1978.
23. AGID: membership directory, 1979.
24. Bulletin of the National Science Museum, vol. 6, no. 1, 1980.
25. National Library Singapore, Teen talk, 1980.
26. Acta Palaeontologica Sinica, v. 19, no. 3, 1980.
27. A report of scientific expedition in the Mount Jolmo Lungma region, 1975.
28. IMM/Transactions B, Feb. & May, 1980.

29. South Pacific Marine geological notes, vol. 1, no.1 (1975) - no. 9 (1979).
30. Committee for Co-ordination of Joint Prospecting for Mineral Resources in South Pacific Offshore areas (CCOP/SOPAC): (1) Proceedings of the First and second session, Third to seventh session; (2) Technical Bulletin no. 2 (1976) and (3) Technical Bulletin no. 1 (1975).

Membership

The following people have joined the Society:

Full Membership

Raja Kumar, Malaysia Peter R. Thomas, Singapore
 Gordon A. Allen, Australia
 G. Balakrishnan, Malaysia.
 Abdul Rashid bin Abdul Mohid, Malaysia

Institutional membership

Sabah State Library, Sabah.
 British Museum (Natural History), Palaeontology Library, England.

Change of address

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

1. F.T. Barr, Houston Oil & Minerals Corporation, 1100 Louisiana, Houston, Texas 77002, USA.
2. Liaw Kim Kiat, SESCO Hq., Batang Ai Section, Kuching, Sarawak.
3. Foong Yin Kwan, 45, Raphael Drive, Wheelers Hill, Vic. 3150, Australia.
4. Mohd. Norani bin Abd. Rahman, P.O. Box 857, Kuala Lumpur.
5. Richard Cayzer, 19 Hanbury St., West Chermside, Brisbane 4032, Australia.
6. B. Biswas, Esso Resources Canada Ltd., 500 Sixth Avenue S.W., Calgary T2P 0S1, Canada.
7. T.E. Yancey, Dept. of Geology, Texas A & M University, College Station, Texas 77843, USA.
8. Ong Tiam Hoe, The Straits Trading Co. Ltd., 1-3, Jalan Sultan Yussuf, Ipoh, Perak.
9. Lee Chiong Ting, Gopeng Consolidated Ltd., Gopeng, Perak.
10. J.G. Best, 36/98 Ourimbah Road, Mosman, NSW 2088, Australia.
11. Lee Ming Lian, P.O. Box 150, North Ryde, NSW 2113, Australia.

BERITA-BERITA LAIN (OTHER NEWS)

SEAPEX-AAPG Stratigraphic Interpretation of Seismic Data School in Singapore

The course is tentatively scheduled for late 1981 at a leading hotel in Singapore.

Summary of the programme is as follows:

"Improvements in seismic data quality and resolution resulting from digital recording processes have led to significant advances in interpreting seismic data. Predictions of geologic age, depositional environment, rock type, structural history, and hydrocarbon occurrence are now more accurate than

ever before. The course begins with a comprehensive discussion of composition of reflections, synthetics, and the relationship of seismic reflections to physical stratigraphy and geologic time. Lectures and exercises are presented on developing a stratigraphic framework, interpreting depositional environment, and identifying sandstone, shale, carbonate and evaporite-prone areas from reflection patterns. Applications of seismic parameters to velocity, amplitude, frequency phase, polarity of predicting lithology, hydrocarbons, and bed spacing will be integrated into the reflection pattern framework for more precise lithology and fluid interpretations. Seismic modeling will provide a valuable test of the stratigraphic/lithologic interpretation. A discussion of seismic expression of different types of stratigraphic traps and clues for their recognition are also included."

The course is estimated to cost US\$700 - 800 per student.

Those interested should write directly to the following address before the end of August 1980:

Mr. J.F.W. Savage
SEAPEX Education Chairman
c/o British Petroleum Development Ltd.
Tanglin P.O. Box 288,
Singapore 9124.

Geological Survey Malaysia Report 1977

This latest published report of the Geological Survey of Malaysia is now available. Its contents, among other things, include the following progress reports:

PROGRESS REPORTS: PENINSULAR MALAYSIA

- The geology of the Gemas-Jementah area, Sheet 114
- The geology of the Gunung Tahan area, Sheet 58
- The geology of the Sungai Tekai area
- The geology and mineral resources of the Segamat area, Sheet 115, Johore
- The geology of the Tanjung Malim area, Sheet 76
- The geology of the Keluang area, Sheet 124
- The geology of the Rompin-Gemas area, Sheet 105, Negeri Sembilan
- A systematic investigation of the Quaternary deposits in the coastal plain of Taiping, Perak
- A systematic description and presentation of Quaternary geological data
- Banka hand drilling - volume measurement and samples treatment
- Coding forms for computer processing of geochemical data
- Geochemical survey of the Central Belt of Peninsular Malaysia
- Kaolin investigation in Sungai Long, Cheras, Selangor
- Limestone quarries in the Kinta District
- Brief report on the detrital heavy minerals of other surfaces sea bottom and shallow sub-surface sea bottom samples from the Straits of Malacca

PROGRESS REPORTS: SARAWAK AND SABAH

- Review of the geology of the Lupar valley, west Sarawak
- Geochemical prospecting, Hose Mountains, Sarawak
- Hydrogeological survey, Belawai area, Sarawak
- The geology of the Wullersdorf area, eastern Sabah.

The Report, priced at M\$20.00, is obtainable at:

Geological Survey of Malaysia
Tiger Lane
Ipoh, Perak, Malaysia.

Price trends for selected metals and minerals

In previous issues of the Natural Resources and Energy Newsletter (Vol. 1, no. 5, April 1977; vol. 2, nos. 1 and 5 August 1977 and April 1978, respectively; and vol. 3, December 1978), developments in prices of mineral commodities were summarized. Table 1 shows the update of this information for aluminium, copper, lead, zinc, tin, iron ore, manganese ore, tungsten, nickel and phosphate rock.

As could be expected, recent developments have not been uniform. While prices for some commodities have increased substantially, those of others have remained at their previous level or even declined. Aluminium and tin have continued to experience steady increases, especially during the first nine months of 1979. Both metals have also shown uninterrupted rises during most of the 1970s. Prices of copper and, particularly, lead rose in 1979 from much lower levels in 1978. Lead prices are at an all-time high and the supply situation is described as tight. In the case of copper, the previous high of about \$1.50 per pound has not been reached, though at times daily quotations were above \$1 per pound. Nickel has recovered from a low-price period of almost two years and is quoted around \$3 per pound. For all these metals, stocks at commodity exchanges (copper, lead and tin), in the hands of producers (aluminium, nickel and other metals) and under the management of commodity agreements (tin) are low or very low. For virtually all other metals and minerals mentioned in the table, prices have remained low or even decreased in recent years. In the case of zinc, iron ore and some other commodities, prices are reported to be below production costs of a number of producers.

BKT

(From: Natural Resources & Energy Newsletter, vol. 4, no. 3, Dec. 1979).

Mining of Copper Porphyries Conference

In celebration of its 50th anniversary, the Instituto de Ingenieros de Minas de Chile is organizing a conference on the mining of copper porphyries at which invited speakers from a number of countries will discuss the themes 'Geology and evaluation of copper porphyry deposits' and 'Energy efficiency of mining and extractive metallurgical copper processes'. The conference will be held in Santiago from 23 to 28 November, 1980, and it is intended that pre- and post-conference technical visits shall be held. Further information and summaries of intended presentations should be sent to:

Libertador Bernardo O'Higgins
1170 9^o piso, Casilla 14668
Correo 21, Santiago,
Chile.

TABLE 1

Price trends for selected metals and minerals from 1970 to 1979

Year/ Month	Aluminium ^{a/}	Copper		Lead		Zinc		Tin	Iron ore ^{g/}	Manganese ^{h/}	Tungsten ^{i/}	Nickel ^{j/}	Phosphate ^{k/}
	(cents/lb)	(cents/lb)		(cents/lb)		(cents/lb)		(cents/lb)	(\$/metric ton)	ore (\$/metric ton)	(\$/short ton unit WO ₃)	(\$/lb)	rock (\$/metric ton)
		LME ^{b/}	NY ^{c/}	LME ^{d/}	NY ^{c/}	LME ^{d/}	NY ^{e/}	LME ^{f/}					
1970	27.9	64.2	57.7	13.8	15.7	13.4	15.3	166.7	11.9	64.1	70.4	1.28	11.8
1971	28.4	49.1	51.4	11.5	13.9	14.0	16.1	158.9	11.5	61.5	49.6	1.33	11.8
1972	26.8	48.6	50.6	13.7	15.4	17.1	17.7	170.8	11.2	76.3	35.4	1.40	11.8
1973	27.2	80.8	58.9	19.5	16.3	38.3	20.8	218.3	15.5	115.9	40.3	1.53	13.8
1974	34.7	93.4	76.7	26.9	22.5	56.3	36.0	371.5	17.2	139.1	80.1	1.74	52.5
1975	39.4	56.0	63.5	18.9	21.5	33.8	38.9	311.6	21.4	142.1	83.3	2.03	68.0
1976	40.4	63.6	68.8	20.3	23.1	32.3	37.5	344.0	20.2	140.0	104.2	2.20	48.5
1977	49.4	59.3	65.8	28.0	30.7	26.7	34.4	489.6	18.9	147.5	170.7	2.30	39.5
1978	60.1	61.9	65.5	30.0	33.7	26.9	31.0	609.0	19.7	141.1	143.8	2.08	35.4
1979 ^{1/}	68.8	87.9	89.3	54.0	50.9	34.0	37.7	685.5	23.7	135.0	139.2	2.63	36.4
1978 Aug.	59.9	64.7	66.2	29.0	32.2	28.1	31.2	590.3	18.4	135.0	137.1	2.08	35.0
Sept.	62.7	65.4	66.6	31.4	34.1	28.8	32.4	629.7	19.1	135.0	142.8	2.03	35.0
Oct.	64.6	68.3	69.5	37.7	36.6	32.3	32.8	690.0	19.8	135.0	144.8	2.03	35.0
Nov.	63.2	66.7	70.2	36.5	38.0	31.2	34.4	683.1	20.3	135.0	145.3	2.03	35.0
Dec.	63.9	69.5	70.9	39.0	38.0	31.2	34.5	642.9	20.1	135.0	140.4	2.03	35.0
1979 Jan.	64.4	75.3	75.6	45.0	40.8	32.7	34.6	628.5	22.3	135.0	130.0	2.03	36.4
Feb.	64.6	88.2	88.7	47.9	43.6	36.0	35.6	659.0	23.2	135.0	128.2	2.05	36.4
Mar.	65.6	92.9	95.7	53.4	45.5	36.0	37.1	681.4	23.4	135.0	141.7	2.25	36.4
Apr.	66.7	95.2	97.3	52.6	48.0	35.8	39.0	686.2	22.5	135.0	135.2	2.50	36.4
May	66.3	87.3	90.2	56.2	49.4	35.3	39.4	696.5	23.2	135.0	140.2	2.85	36.4
June	70.0	85.2	87.2	62.7	56.6	34.2	39.4	732.0	24.5	135.0	147.1	3.00	36.4
July	74.8	82.2	85.8	57.7	58.1	32.7	39.4	715.3	24.6	135.0	140.8	3.00	36.4
Aug.	74.1	89.6	90.3	55.0	57.9	30.2	36.9	671.2	24.9	135.0	142.9	3.00	36.4
Sept.	72.8	95.1	92.6	55.9	58.0	32.9	37.5	699.3	25.1	235.0	146.4	3.00	36.4

Sources: Annual averages (1970-1976) for all but nickel are from United Nations Conference on Trade and Development, Monthly Commodity Price Bulletin, Special Supplement 1960-1976, March 1977. Other averages for all but nickel are from United Nations Conference on Trade and Development, Monthly Commodity Price Bulletin, August 1978 and October 1979. Averages for nickel are from Metals Week.

a/ Canadian, delivered United Kingdom. b/ London Metal Exchange, wire bars, cash. c/ New York, domestic producer's price. d/ London Metal Exchange, cash settlement, e/ United States Prime Western, delivered. f/ Spot cash. g/ Canada, Lake Jeannine, concentrates, c. 65 per cent Fe, c.i.f. North Sea ports (from 1978: Mount Wright concentrates, c. 64 per cent Fe, c.i.f. North Sea ports). h/ Mn content, c.i.f. United Kingdom (London). i/ Wolfram, c.i.f. European ports, basis 65 per cent WO₃. j/ Major producer, cathode. k/ Khouribga, 75-77 per cent TPL, f.a.s. Casablanca. l/ First nine months.

Fourth Joint Meeting MMIJ-AIME 1980, Tokyo, Japan**SPECIAL SESSION:**

- A. 1. Minerals industry in international economy
2. Environmental control of closed mines
3. New aspects of mineral resources ventures
- B. Review on mineral resources and industries in People's Republic of China.

SCOPE OF TECHNICAL SESSION

- A. Geology and Exploration
Energy resources, geological, geochemical, and geophysical exploration of mineral deposits, application of geoscience to mineral exploration.
- B. Mining
Newly developed mines, strata control, open-pit mining, underground mining, blasting, environmental control, mine safety.
- C. Mineral Processing
Comminution and sizing, separation, application of mineral processing and coal preparation techniques to other fields, plant practice.
- D. Metallurgy
Copper, lead and zinc, nickel and cobalt, environmental control, energy conservation, miscellaneous subjects
- E. Others
Development of marine resources, environmental control, application of computers, in-place leaching, energy conservation.

KEY SUBJECTS

1. Application of new techniques to exploration
2. Open-pit mining
3. Practices in coal mine safety
4. Mineral processing for integral utilization of resources
5. New techniques in hydrometallurgy and pyrometallurgy
6. Computer application in mining, mineral processing and metallurgy
7. Environmental control
8. Development of geothermal energy
9. Energy conservation.

Further information may be obtained from

The Mining and Metallurgical Institute of Japan
5-4 Ginza 8-chome, Chuo-ku
Tokyo 104, Japan.

Symposium on problems and practice of dam engineering
1st - 5th December 1980, Bangkok, Thailand.

The Division of Geotechnical and Transportation Engineering and the Continuing Education Center of the Asian Institute of Technology take pleasure in announcing a four-day symposium on 'Problems and Practice of Dam Engineering'. The symposium, the first of its kind to be held in South-east Asia will concentrate on geotechnical aspects of all types of dams. Specific themes will include soil and rock improvement, foundations, construction control and instrumentation, failures of dams and also case studies. Two types of papers are to be presented. The first type consist of country reports from invited persons in the region to include India, Indonesia, Japan, Korea, Pakistan, Philippines, Malaysia, Sri Lanka, and Thailand. In addition, leading specialists in dam engineering working in the region and abroad will be invited to give special lectures. These include:

1. Mr. Pierre Londe, President, International Commission on Large Dams
 - (a) Lessons from earth dam failures
 - (b) Foundations and slope treatment
2. Prof. Walter Wittke, President, International Society for Rock Mechanics
 - (a) Foundations of concrete arch dams
3. Mr. James Barry Cooke, USA
 - (a) Rockfill: Placement, properties and performance
 - (b) Concrete face rockfill dam
4. Dr. Hikoji Takahashi, Assistant Director, Kajima Institute of Construction Technology
 - (a) The role of geology in the construction of tunnels, dams and stable slopes
5. Mr. R.L. Kulesza, Betchtel Inc., USA
 - (a) Geotechnical aspects of the Larona hydro-electric project in Sulawesi, Indonesia
6. Dr. P. Sembenelli, Electro-consult, S.p.A., Italy
 - (a) Recent trends in the design of large earth and rockfill dams
7. Mr. A. Catalano and Mr. Paolo Rinaldi, Vianini S.p.A. and Fondisa-Far East Co. Ltd
 - (a) Srinakarind Dam - grouting and slope treatment works
8. Dr. A.D.M. Pennman, Building Research Establishment, U.K.
 - (a) Instrumentation for earth and rockfill dams
9. Prof. Tom Hanna, University of Sheffield, U.K.
 - (a) Use of rock anchors in dam engineering
10. Mr. S. Marchini, Rodio S.p.A., Italy
 - (a) Grouting works in dam engineering.

The symposium will take place at the Asian Institute of Technology, Rangsit Campus, Prathumthani.

The registration fee for the participants is US\$60.00 which include the admission for all technical sessions, coffee and for pre-prints of contributed papers. The registration fee for the accompanying person is US\$20.00.

Following the symposium technical visits will be arranged to various hydro-power projects in Thailand.

All correspondence related to the symposium should be addressed to

Prof. A.S. Balasubramaniam
 Division of Geotechnical & Transportation Engineering
 Asian Institute of Technology
 P.O. Box 2754
 Bangkok, Thailand.

SEATRAD Seminar on "Complex Tin Ores and Related Problems"

The Southeast Asia Tin Research and Development (SEATRAD) Centre will be organising a three-day seminar entitled "Complex Tin Ores and Related Problems" in March/April 1981. The Seminar shall be held in Ipoh, which is in the centre of the tin-producing region of Kinta Valley, Malaysia. The Seminar shall be opened to participants from SEATRAD and non-SEATRAD countries. Papers on geology, exploration, mining, mineral processing and smelting of complex tin ores are welcomed, and prospective authors should write to:

The Director
 SEATRAD Centre
 14 Tiger Lane
 Ipoh, Perak, Malaysia.

International Symposium on "Concept and method in Paleontology"
Barcelona, May 1981.

This International Symposium is organized by the Facultat de Geologia, Universitat de Barcelona (Departament de Paleontologia).

The Symposium will discuss the methodological problems brought about by the development in Paleontology over the last three decades. During the two or three days in Barcelona about 10 invited papers will be presented, plus a number of free contributions which will be concerned with problems in paleobiology and biogeology.

The Symposium includes the following topics:

- a) Scientific method and Paleontology
- b) Form, function and evolution in Paleontology
- c) Environmental Paleontology (Taphonomy, Paleoecology and Paleobiogeography).
- d) Biostratigraphy
- e) Teaching
- f) Divulgarion via publication
- g) Applied Paleontology.

The official languages of the Symposium will be English, Spanish and Catalan.

Those who require further details should contact:

Dr. Jordi Martinell
Secretary of the Symposium "Concept and Method in Paleontology"
Departament de Paleontologia
Facultat de Geologia, Univ. Barcelona
Gran Via de les Corts Catalanes, 585
Barcelona - 7, Spain.

Fourth International Coral Reef Symposium - The Reef and Man
Manila, Philippines, May 18-22, 1981

The International Coral Reef Committee of IABO has requested the Philippines to host the fourth in the series of International Coral Reef Symposia. In line with this, the University of the Philippines, through the Marine Sciences Center, has accepted this invitation, subject to formal approval by the Government of the Philippines.

Among the topics to be covered will be:-
Biology and Geology of coral reefs
Man's relationship to the reef
Coral reef resource management and conservation
Pollution and environmental degradation
Coral reef fisheries
Ancient reefs and oil exploration.

Contributed papers are welcome. An editorial board will determine acceptability for presentation and suitability for publication in the symposium proceedings. Post symposium field trips are also planned.

For further information, write to:
Marine Sciences Center
University of the Philippines
P.O. Box 1,
Diliman, Quezon City
Philippines.

Asia Mining 81: International Conference

23-26 November 1981, Singapore

The Institution of Mining and Metallurgy has been invited to organize an international conference on the occasion of the Asian Mining 81 international exhibition. Aims of the proposed conference include the provision of a forum for the discussion of mining projects and developments in Asia and opportunities for investment in mining within the region.

The Organizing Committee intends to invite a number of authors to present papers, but will welcome additional submissions on technical and operational aspects of mining, treatment and exploration and on broader concerns such as resources, investment and safety.

Abstracts (200-300 words) of papers for consideration should be submitted to the Secretary, The Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, England, before 1 August, 1980. Completed manuscripts of approved papers will be required in March, 1981, and a preprinted volume will be sent to registrants in advance of the conference.

The exhibition, Asian Mining 81, will be held at the World Trade Centre, Singapore, from 23-27 November 1981. Enquiries relating to the exhibition should be addressed to the organizers, ITF Pte. Ltd., Suite 804, 8th Floor, World Trade Centre, 1 Maritime Square, Singapore 0409 (telephone 2711013; telex: RS 26085) or to Industrial and Trade Fairs International Limited, Radcliffe House, Blenheim Court, Solihull, West Midlands, B91 2BG (telephone 021 705 6707; telex 337073).

Calendar

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

1980

- Jul 4 - 7 : General meeting of the International Mineralogical Association (IMA), Orleans, France. Scientific and poster sessions, field excursions. (Secretariat de la 12eme Assemblée Generale de l'IMA, B.R.G.M., BP 6009, 45018, Orleans, Cedex, France).
- Jul 7 - 17 : 26th International Geological Congress, Paris, France. Paul Sangnier, Secrétaire General du 26eme C.G.I., Maison de la Geologie, 77-79 rue Claude-Bernard, 75005, France. (Nov-Dec 1977).
- Jul 14 - 24 : International Symposium on water-rock interaction, Edmonton, Alberta, Canada. Sponsored by IAGC and the Alberta Research Council. (B. Hitchon, Alberta Research Council, 11315, 87th Avenue, Edmonton, Alberta, Canada T6G 2C2).
- Jul 29 - : Second European Conodont Symposium (ECOS II), Austria and Aug 10 : Czechoslovakia. Symposium with pre- and post-symposium field trips co-sponsored by the Geological Survey of Austria and Geological Survey of Czechoslovakia. (ECOS II, Geological Survey of Austria, P.O. Box 154, Rasumofskygasse 23, A-1031, Vienna, Austria).
- Sep 6 : Congress on Science and Technology in Resource Development. Secretary, Jubilee Science Congress, c/o Malaysian Scientific Association, P.O. Box 911, Kuala Lumpur. (Nov-Dec 1979).

- Sep 8 - 13 : World Conference on Earthquake Engineering, Istanbul, Turkey, A. Gurpinar, Secretary, 7 WCEE, Yuksel Caddesi 7/B, Ankara, Turkey.
- Sep 10 - 26 : International Course on Applied Mineral Economics for Developing Countries. Sponsored by AGID in cooperation with the Govt. of State of Braiba and CPRM. Dr. Elisen D'Angelo Visconti Neto, CPRM/DAF, President of Organizing Committee, Ave. Pasteur no. 404 - Rio de Janeiro, 22.292, Rio de Janeiro, Brazil.
- Sep 16 - 19 : Eurotunnel '80, Basle, Switzerland. Conference on Tunneling in Europe. (Secretary, Institute of Mining and Metallurgy, 44 Portland Place, London, W1N 4BR, U.K.). (Mar-Apr 1980).
- Oct 5 - 8 : Complex sulphide ores, Rome, Italy, Organized by IMM in association with Consiglio Nazionale delle Ricerche (Laboratorio per il Trattamento de Minerals). The Secretary, IMM, 44 Portland Place, London W1N 1BR, U.K.
- Oct 6 - 10 : Second International Tinplate Conference, London, England. Conference Secretariat, International Tin Research Institute, Fraser Road, Perivale, Greenford, Middlesex UB6 7AQ, England. (Mar-Apr 1980).
- Oct 6 - 13 : Workshop on Age Dating by the Unesco Geosciences Network. Prof. B.K. Kim, Executive Secretary, Geosciences Newtork, Seoul National University, Seoul, South Korea. (Mar-Apr 1980).
- Oct 9 - 11 : UNESCO - International Symposium on Metallogeny of Mafic and Ultramafic Complexes: The Eastern Mediterranean - Western Asia area, and its comparison with similar Metallogenic Environments in the world, Athens, Greece. Prof. S. S. Augustithis, UNESCO International Symposium - Project No. 169, National Technical University, Dept. of Mineralogy - Petrography - Geology, P.O. Box 1482, Athens, Greece. (Mar-Apr 1980).
- Oct 13 - 17 : Second International Conference of Scientific Editors, Amsterdam, Holland. (J.L. Heller, U.S. Geological Survey, MS 303, Box 25046, Federal Center, Denver, Co. 80225, USA).
- Oct 26 - 30 : Fundamentals of Computer Processing of offshore mineral and other geological data, (Seminar/Workshop), Bangkok, Thailand. Sponsored by Dept. of Mineral Resources, Asian Inst. of Technology and CCOP. (Pisoot Sudasna, Dept. of Mineral Resources, Ministry of Industry, Rama VI Road, Bangkok, Thailand).

1981

- 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 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).
- 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 X3015, Randburg, 2125 South Africa). (Jan-Feb 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).
- Sep 1 - 6 : Second International Conference, Graptolite working group of 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).

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 2H6).
- 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.

