

# PERSATUAN GEOLOGI MALAYSIA

# WARTA GEOLOGI

## NEWSLETTER OF THE GEOLOGICAL SOCIETY OF MALAYSIA

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### About the Society

The Society was founded in 1967 with the aim of promoting the advancement of earth sciences particularly in Malaysia and the Southeast Asian region.

The Society has a membership of about 600 earth scientists interested in Malaysia and other Southeast Asian regions. The membership is worldwide in distribution.

## **Triaxial compressive strength of a stylolitic, medium grained marble from the Kuala Lumpur Limestone**

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**Abstract:** Hoek Cell tests of a stylolitic, medium grained marble from the Kuala Lumpur Limestone show that its failure under triaxial conditions of loading can be discussed using the empirical Mohr-Coulomb criterion of failure. Assuming validity of this criterion, the marble has a triaxial shear strength (or inherent shear strength at zero confining pressure) ( $S_0$ ) of 35 MPa and an angle of internal friction ( $\phi$ ) of 36°.

### **INTRODUCTION**

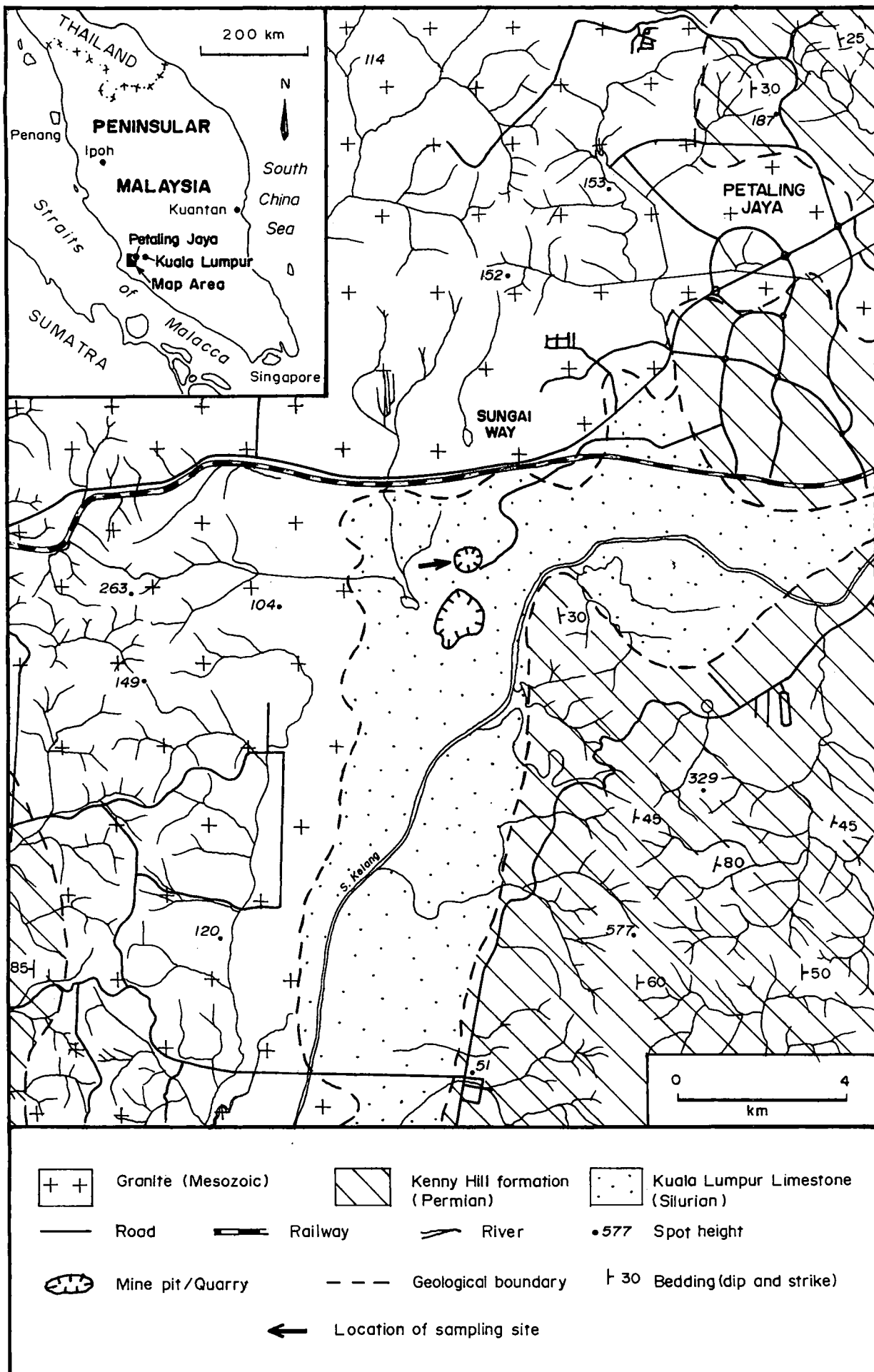
The strength of rock material under triaxial test conditions is an important criterion to be determined as natural rock masses exist in a triaxially stressed state (AIT, 1981). The triaxial test can thus be considered to be one which determines the reaction of samples of rock material to confining pressures similar to those found in the earth's stress field. In fact, because it is so commonly assumed that the intermediate and minor principal stresses in the earth's crust are equal, the standard triaxial test is performed on a cylindrical sample loaded axially to simulate the major principal stress, and radially to simulate the minor principal stress (Farmer, 1968).

Conventional triaxial testing equipment is, however, usually expensive and slow to operate with twenty or more tests often being required to predict the strength of a rock material with satisfactory accuracy. As a result, a simple design of the triaxial cell has been developed, primarily to speed up the testing procedure (Hoek and Franklin, 1968). This cell, known as the "Hoek Cell", has a confining pressure applied to it and is used in conjunction with a conventional compression testing machine to apply axial force to the sample via two spherically seated platens (Fjaer *et al.*, 1992).

In this paper are presented the results of the triaxial testing of marble cores from the Kuala Lumpur Limestone utilizing the "Hoek Cell". In view of the total absence of literature on this particular topic in Malaysia, the results represent the first published data on the triaxial compressive strength of marble from the Kuala Lumpur Limestone.

### **KUALA LUMPUR LIMESTONE**

In the Sungai Way area of Selangor State in Peninsular Malaysia (Fig. 1) are found marbles (recrystallized limestones) that have been mapped as a part of the Kuala Lumpur Limestone (Yin, 1976). This Formation consists almost entirely of carbonates with relatively little impurity, though regional metamorphism and a superimposed contact metamorphism close to Mesozoic granite intrusions, has caused marmorization and largely obliterated the original sedimentary features (Gobbett, 1964). The Formation is of a Middle to Upper Silurian age, and over most of its mapped area, is a crystalline calcitic marble, frequently containing a small percentage of magnesium, while dolomitic limestone and dolomite are locally dominant. Surface outcrops are limited to a few localities and the Formation is mostly only found in mine pits and subsurface quarries below a cover of alluvial sediments of variable thickness.



**Figure 1.** Bedrock geology of the Sungai Way area, Peninsular Malaysia (After Yin, 1976). Note – Alluvial deposits are not shown.

### SAMPLING SITE

In the Sungai Way area, the marble bedrock forms an irregular, pinnacle and trough topography beneath gravelly to sandy and clayey alluvial sediments of some 5 to 35 m in thickness. The pinnacles, which are of various shapes and sizes, are often pock-marked with cavities and are separated by troughs of sinuous and elongate shape. The tops of the pinnacles furthermore, show an approximately accordant surface that dips eastward at about 5°.

The bedrock is variously coloured from white to light and dark grey and is fine to coarse grained. These colours and textures are patchily distributed in the area, though a thin inter-banding of light and dark grey layers is often seen. Secondary calcite veins are also found within the bedrock which is cut by several joints and faults of variable strikes and dips. Along these structural discontinuity planes, which show very irregular to smooth faces, secondary iron oxide and hydroxide stains are sometimes found.

In thin-sections, the bedrock shows effects of both recrystallization and deformation, though these effects are variably distributed in the area. The thin-sections also show that the bedrock consists exclusively of recrystallized calcite, though secondary iron oxide grains are sometimes seen.

### METHOD OF STUDY

In the course of a rock slope stabilisation program at an old mine pit/quarry in the Sungai Way area, several orientated (dipping 30° towards North), and vertical, boreholes were drilled some 10 m apart over an area of about 2,000 m<sup>2</sup>. A continuous core of some 0.7 m long from one of these boreholes was made available for laboratory tests. This core of 51.59 mm (2.031 in) diameter was sawn into three smaller samples, each of 84.94 mm (3.344 in) length. The samples could not unfortunately be cut to longer lengths in view of the maximum sample length of 86.36 mm (3.50 in) allowed by the compression load frame. The length to diameter ratio of 1.67 of the samples was, however, not expected to significantly affect the triaxial compressive strength for Mogi (1966) has shown

that failure strengths at high confining pressures are independent of the length to diameter ratio.

Prior to the Hoek Cell tests furthermore, visible textural and structural features of each of the samples was noted, whilst their densities and unit weights were determined according to the suggested method of ISRM (1979) using saturation and buoyancy techniques. The samples were then air-dried for a week before being placed in the Hoek Cell and tested with a ELE 1100 kN compression load frame at a loading rate of 20 MPa per minute.




Thin-sections of the tested samples show them to have a heterogranular-granoblastic texture with coarse, irregular anhedral of calcite (of 0.2 to 1.0 mm size) scattered through a much finer grained calcite mosaic (of 0.02 to 0.1 mm size). The coarser grained crystals, which are elongate and often lensoid in shape, occur in streaky bands that alternate with similar streaky bands of the finer grained crystals. These finer bands can be considered to represent rock material that has been granulated by shearing and that has recrystallized after deformation ceased, whilst the coarser bands are composed of strained calcite in process of granulation (Williams, Turner and Gilbert, 1969). In view of the approximately equal amounts of both coarse, and fine, grained calcite crystals, the tested rock material is termed a medium grained marble. Stylolites, which are clearly visible in hand specimen, are also seen in the thin-sections and marked by thin dark lines of variable orientations and serrated shapes.

### RESULTS AND DISCUSSION

Results of the Hoek Cell tests are presented in Table 1, whilst a principal stress plot of the axial failure stress ( $\sigma_1$ ) versus the confining pressure ( $\sigma_3$ ) is shown in Fig. 2. Plots of the Mohr circles corresponding to each pair of the axial failure stress ( $\sigma_1$ ) and confining pressure ( $\sigma_3$ ) in a shear stress - normal stress ( $\tau - \sigma$ ) diagram are shown in Fig. 3.

In the principal stress plot (Fig. 2), a linear relationship is seen between the axial failure stress ( $\sigma_1$ ) and the confining pressure ( $\sigma_3$ ); this relationship expressed by:

Table 1: Results of Hoek Cell tests

Sample Number	Confining Pressure	Axial Stress At Failure	Angle Between Shear Plane And Horizontal	Sketch Of Sample After Failure
32a	30 MPa	248.2 MPa	59.0°	
32b	20 MPa	209.5 MPa	59.0°	
31b	10 MPa	170.1 MPa	58.0°	

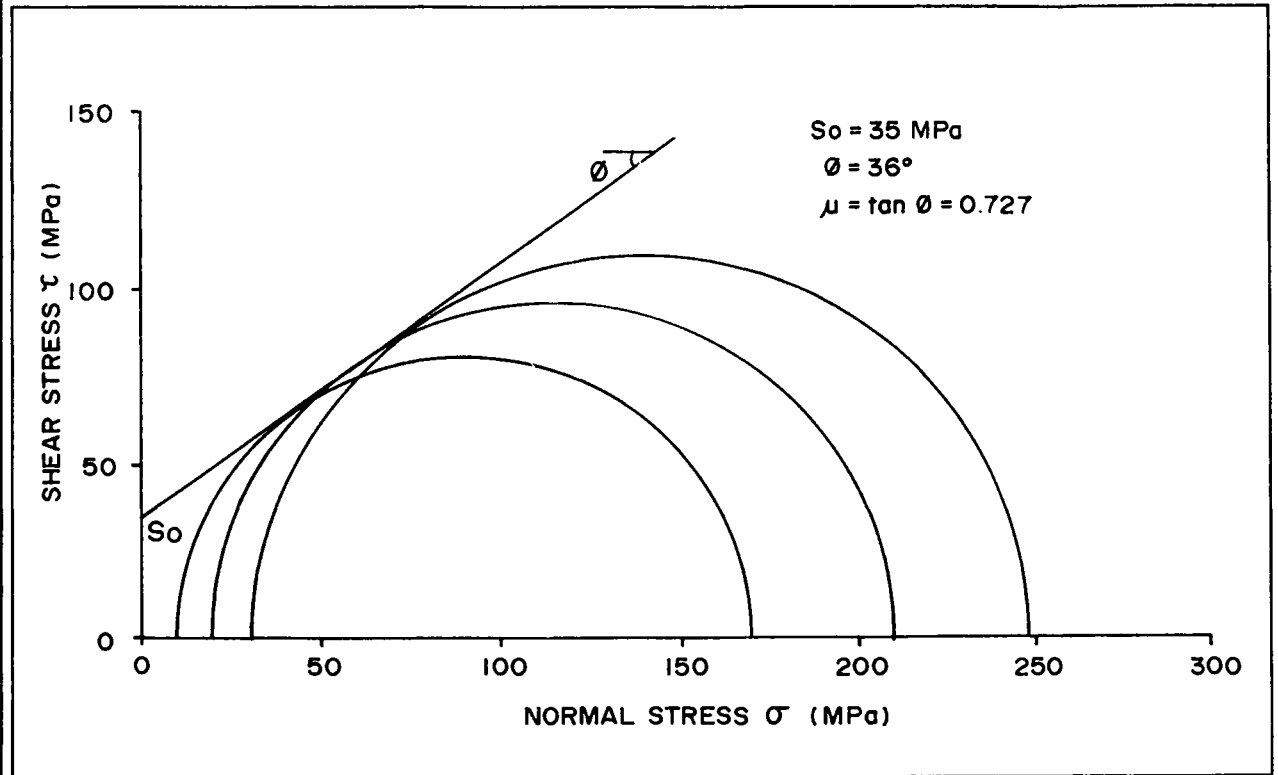
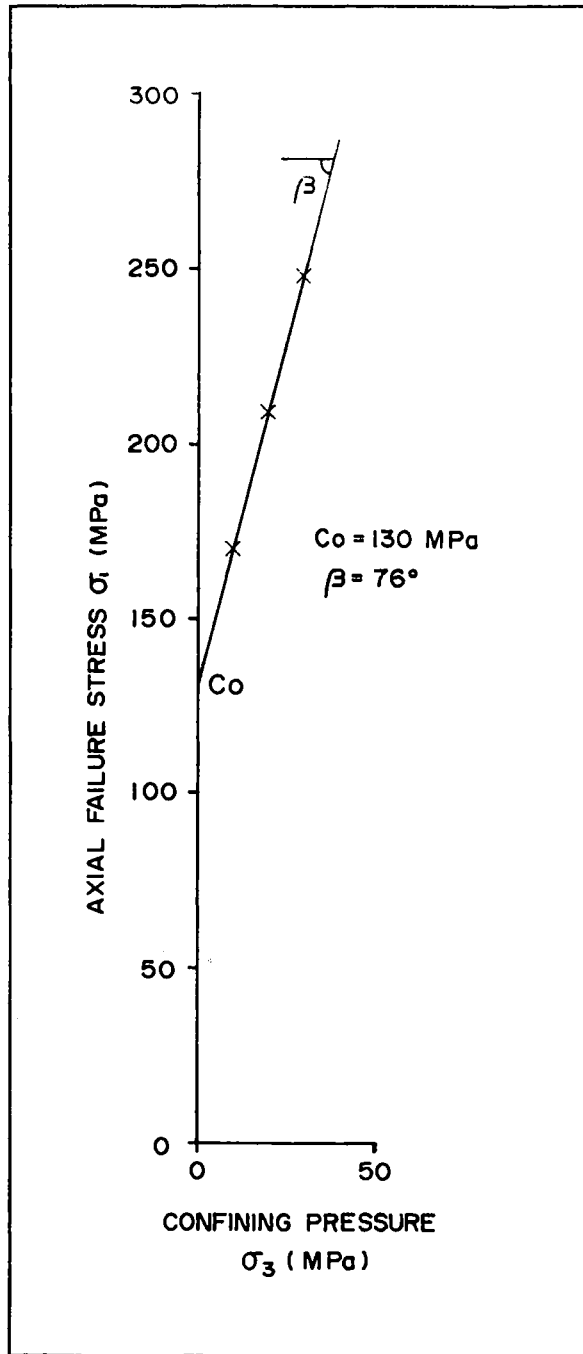


Figure 3. Mohr circle plots of experimental data.

Figure 2. Principal stress plot of experimental data.

$$\sigma_1 = C_0 + \sigma_3 \tan \beta$$

where  $C_0$  is considered to be the uniaxial compressive strength for a specimen having a length to diameter ratio of 2 and  $\beta$  being a constant (Obert and Duvall, 1976).

In the case of the present tests (Fig. 2),  $C_0$  has a value of 130 MPa and  $\beta$  a value of  $76^\circ$ . There is little published data with which to compare these values, except for Hendron (1975) who quotes average  $C_0$  values of 103 to 138 MPa, and a  $\beta$  value of  $83^\circ$ , for triaxial tests on limestone.

In the shear stress – normal stress plot (Fig. 3), it is also possible to draw a straight line that touches the Mohr circles. This line, which is called the Mohr envelope, can be considered to be an experimental determination of the function  $f$  of Mohr's hypothesis of failure which states that at failure the normal ( $\sigma$ ) and shear ( $\tau$ ) stresses in the plane of failure are related in the form  $\tau = f(\sigma)$  (after Farmer, 1968). If a linear form of the function  $f$  is assumed, as shown by the results of the present tests, we then have the Mohr-Coulomb criterion of failure which can be written in the form (after Fjaer *et al.*, 1992)

$$\tau = S_0 + \mu\sigma$$

where  $S_0$  is considered to be the inherent shear strength (at zero confining pressure), or triaxial shear strength (Obert and Duvall (1976), and  $\mu$  is the coefficient of internal friction which is related to the angle of internal friction ( $\phi$ ) by

$$\mu = \tan \phi.$$

In the case of the present tests (Fig. 3),  $S_0$  has a value of 35 MPa, while  $\phi$  has a value of  $36^\circ$  and  $\mu = \tan \phi = 0.726$ . These values are comparable with published data, as Farmer (1968) who quotes  $S_0$  values based on triaxial tests of between 14.7 and 29.4 MPa, and  $\phi$  values of between  $35^\circ$  and  $50^\circ$ , for various types of marble.

It is finally to be noted that the Mohr-Coulomb criterion of failure not only specifies the state of stress at failure, but also predicts the orientation of the failure plane (Obert and Duvall, 1976). From a consideration of the

Mohr's representation of the two dimensional state of stress, it is evident that the normal to the failure plane will be inclined at an angle  $\theta$  to the  $\sigma_1$  direction (Fjaer *et al.*, 1992), where  $\theta = (\pi/2) + (\phi/2)$ . In view of the  $\phi$  value of  $36^\circ$  determined in the present tests, the failure planes should therefore be orientated at an angle of  $27^\circ$  to the long axes of the samples as  $\sigma_1$  is directed parallel to the axes. In the tested samples, however, the orientation of the failure planes does not exactly coincide with the predicted orientations as they are orientated between  $31^\circ$  and  $32^\circ$  to the long axes.

## CONCLUSION

Arising from the above discussion, it is concluded that the failure of the stylolitic, medium grained marble under triaxial conditions of loading can be discussed using the empirical Mohr-Coulomb criterion of failure. Assuming validity of this criterion, the marble has a triaxial shear strength (or inherent shear strength at zero confining pressure) ( $S_0$ ) of 35 MPa and an angle of internal friction ( $\phi$ ) of  $36^\circ$ .

## ACKNOWLEDGEMENTS

En. Roshdy drafted the figures. This study forms part of an on-going research project supported by IRPA Grant 04-07-04-172 from the Malaysian Government. Equipment used for the tests was purchased with a grant provided by Projek Lebuhraya Utara-Selatan Sdn. Bhd. (PLUS).

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# CATATAN GEOLOGI

## Geological Notes

### Some radiolaria from the chert block of Lubok Antu Mélange, Sarawak

BASIR JASIN<sup>1</sup> & N.S. HAILE<sup>2</sup>

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<sup>2</sup>Petroleum Research and Scientific Services, Ulu Kelang, Selangor.

Present address: Talbot Research, England.

**Abstract:** Several species of radiolaria were identified from a radiolarite sample collected from a road-cut at Lubok Antu road. The radiolaria consist of *Pseudodictyomitra* cf. *carpatica*, *Pseudodictyomitra pseudomacrocephalus*, *Pseudodictyomitra* sp., *Archaeodictyomitra* sp., *Thanarla elegantissima*, *Thanarla praeveneta*, *Rhopalsosyringium majurensis*, *Xitus spicularius*, *Xitus* sp., *Stichomitra* sp., *Theocorys* sp., *Theocorys antiqua*, *Triactoma* sp., *Holocryptocanium barbui*, *Cryptamphorella conara*, and *Holocryptocanium tuberculatum*. This assemblage indicates that the age of the chert is Albian-Cenomanian, Cretaceous. It is younger than previously thought.

#### INTRODUCTION

The Lubok Antu Mélange was established by Tan (1979) for a rock unit composed of blocks and fragments of mudstone, shale, sandstone, chert, hornfels, basalt, gabbro, limestone and serpentinite embedded in a highly sheared mud matrix. The occurrence of chert blocks has been reported by Haile (1957) and Tan (1979). The largest chert block is that forming Bukit Buluk about 5.5 km in length (Tan, 1979).

The radiolaria from the chert were first studied by Hinde (in Molengraaff, 1900). He concluded that the age of the chert was probably Jurassic, but possibly Early Cretaceous. A.G. Davies has identified some radiolaria from thin sections of twelve chert specimens (in Haile, 1957). He suggested that the age of the chert was between Middle Jurassic and preCenomanian. Professor Emile A. Pessagno Jr. has identified some radiolaria assemblages ranging from the Hauterivian to Aptian, Early Cretaceous (in Tan, 1979).

#### MATERIAL AND METHOD

One sample was collected by N.S. Haile from a road cut Lubok Antu Road about 1.7 km south junction with south access road to Batang Ai hydroelectric scheme, and about 5 km. north of Lubok Antu town (Fig.1). The chert is underlain by highly weathered igneous rock. The chert sample was crushed and soaked in hydrofluoric acid for several days. The sample was washed and filtered through filter paper. Radiolaria were picked by using paint brush. The well preserved specimens were photographed by using Scanning Electron Microscope.

#### RESULT AND DISCUSSION

Sixteen species of radiolaria were identified. The most common forms are *Holocryptocanium tuberculatum*, *Holocryptocanium barbui*, *Cryptamphorella conara*, *Thanarla praeveneta*, *Thanarla elegantissima*, and *Xitus spicularius*. The rare species are *Pseudodictyomitra pseudomacrocephala*, *Pseudodictyomitra* sp.,

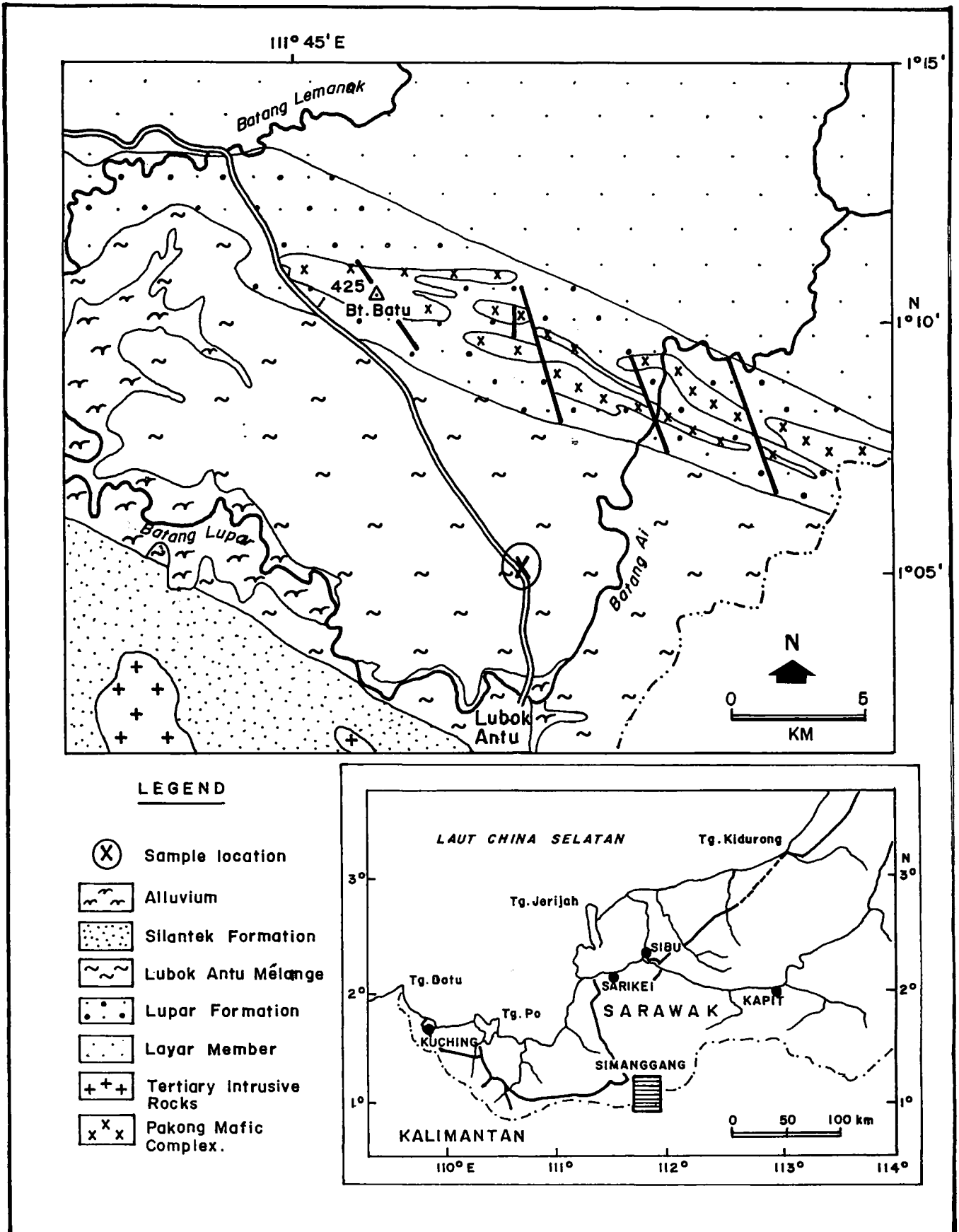
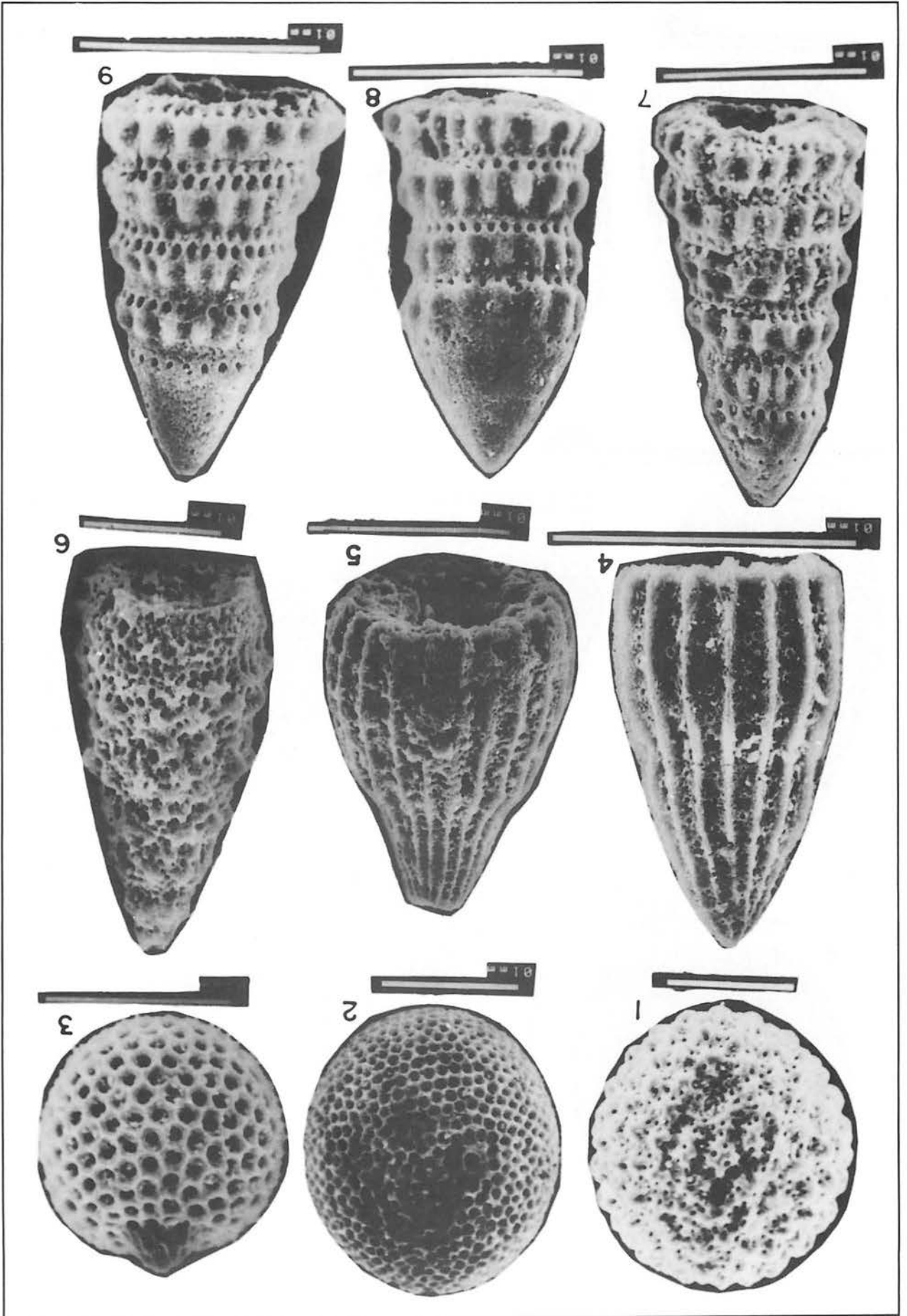


Figure 1. Geological map showing sample location.



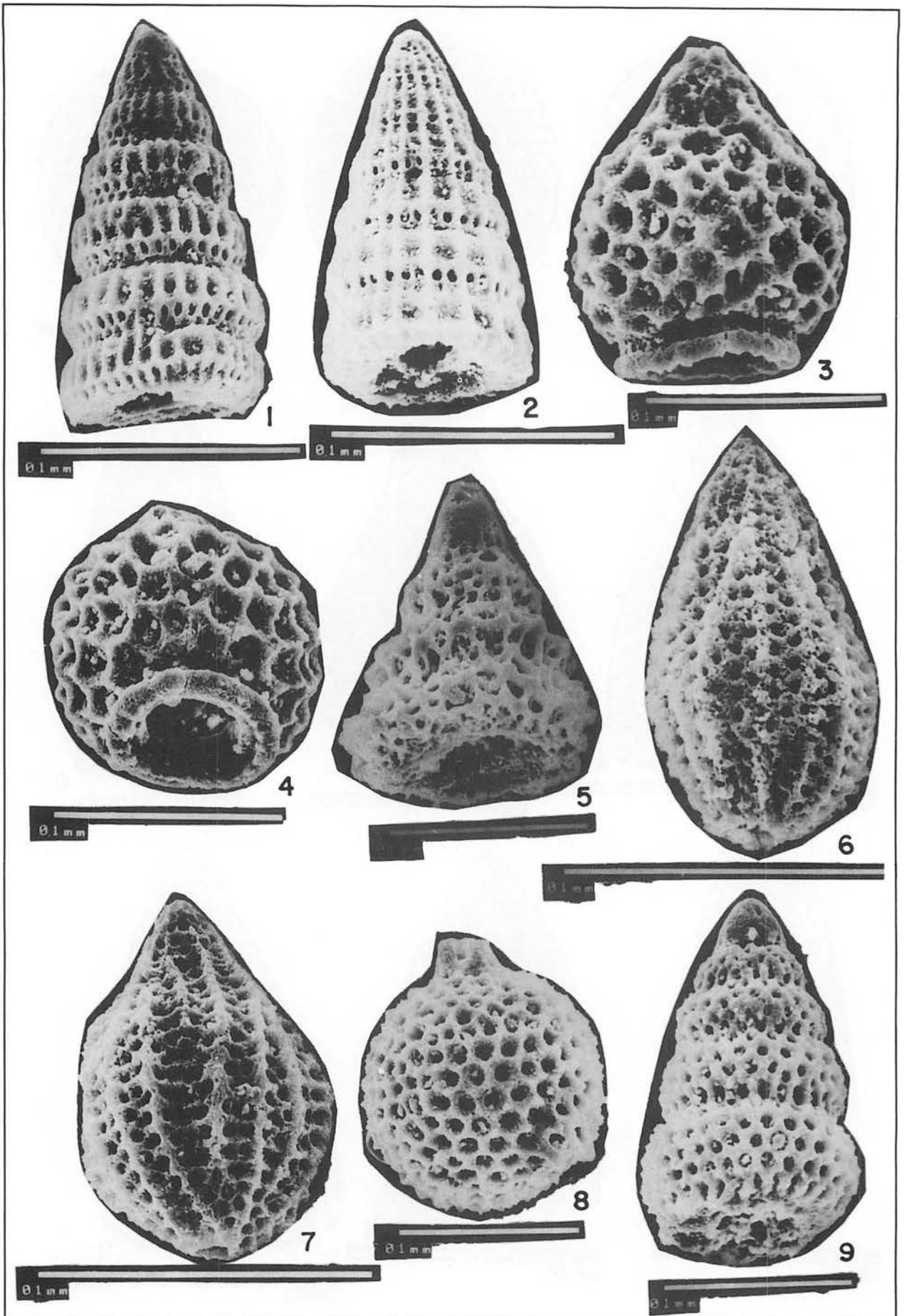


Plate 2. (scale bar 0.1 mm)

*Pseudodictyomitra cf. carpatica*, *Archaeodictyomitra* sp., *Rhopalsosyringium majurensis*, *Xitus* sp., *Theocorys* sp., *Theocorys antiqua*, *Triactoma* sp., and *Stichomitra* sp. (Plate 1 and 2).

The radiolarian chert was probably deposited on basic or ultrabasic igneous rocks. The underlying igneous rock is highly weathered and now altered to clay, and the radiolaria in the chert are well preserved. This suggests that the chert was not metamorphosed, and therefore the igneous rock is older than the chert. The igneous rock probably represents the top part of the ophiolite sequence which formed during the early period of rifting or sea floor spreading prior to the deposition of the chert.

The presence of *Holocryptocanium tuberculatum*, *Holocryptocanium barbui*, *Cryptamporella conara*, *Thanarla praeveneta*, *Thanarla elegantissima*, *Pseudodictyomitra pseudomacrocephalus*, *Rhopalsosyringium majurensis*, and *Theocorys antiqua* suggests the age of the chert ranges from the Albian to Cenomanian.

The present age is slightly younger than previously established by Pessagno (in Tan, 1979). The present age is only based on one sample. More samples are needed in order to determine the precise age of the various chert blocks. It seems that the chert blocks may have different age. The age of the chert may range from the Hauterivian to Cenomanian.

The age of the present study chert sample is equivalent to the age of the shale containing *Orbitolina* sp. identified by Crews (in Haile,

1957). The study of radiolarian chert in Lupar valley will be continued. More samples have been collected for further study.

## CONCLUSION

The radiolarian assemblage from one sample collected from the road cut at Lubok Antu road indicates that the age of the chert is Albian-Cenomanian which is younger than previously thought. It is possible that different chert blocks may have different age. A detailed study of radiolarian chert must be carried out in order to define the more precise age of the chert.

## ACKNOWLEDGEMENTS

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\* \* \* \* \*

Manuscript received 28 June, 1993

## Captions to plates

### Plate 1. (Scale bar 0.1 mm)

1. *Holocryptocanium tuberculatum* Dumitrica
2. *Holocryptocanium barbui* Dumitrica
3. *Cryptamporella conara* (Foreman).
4. *Thanarla praeveneta* Pessagno.
5. *Thanarla elegantissima* (Cita).
6. *Xitus spicularius* (Aliev).
7. *Pseudodictyomitra pseudomacrocephala* (Squinabol).
8. *Pseudodictyomitra cf. pseudomicrocephala*.
9. *Pseudodictyomitra* sp.

### Plate 2. (scale bar 0.1 mm)

1. *Pseudodictyomitra cf. carpatica*
2. *Archaeodictyomitra* sp.
3. *Rhopalsosyringium majurensis* Schaaf
4. *Rhopalsosyringium majurensis* Schaaf (apertural view).
5. *Xitus* sp.
6. *Theocorys* sp.
7. *Theocorys antiqua* Squinabol.
8. *Triactoma* sp.
9. *Stichomitra* sp.

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# BULETIN PERSATUAN GEOLOGI MALAYSIA

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**BULLETIN OF THE GEOLOGICAL SOCIETY OF MALAYSIA**

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## **Annotated bibliography of the geology of the South China Sea and adjacent parts of Borneo**

Emphasis on publications relevant to Petroleum Geology

Compiled and annotated by  
**N.S. HAILE**

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## PERTEMUAN PERSATUAN Meetings of the Society

### Esso contributes to Geological Society of Malaysia

Esso today contributed RM26,000 to the Geological Society of Malaysia (GSM) to help promote the advancement of geological sciences in Malaysia.

Of this amount, RM20,000 will be used to sponsor local university students to participate in the 1994 American Association of Petroleum Geologist (AAPG) International Conference and Exhibition scheduled to be held in Kuala Lumpur from August 21-24 next year. The selection of the students will be made by the GSM.

The other RM6,000 is to sponsor the GSM-organised 17th Petroleum Geology Seminar scheduled to be held in Kuala Lumpur from December 7-8, 1993.

Esso Exploration Manager, J.L. Hall presented the cheque to GSM President Fateh Chand at the Geology Department of Universiti Malaya this morning.

The AAPG international conference, sponsored by the American Association of Petroleum Geologists and hosted by GSM, is expected to be attended by geologists, geophysicists and other petroleum industry professionals and managers worldwide. Titled "Southeast Asian Basins: Oil and Gas for the 21st Century", the conference will address exploration and exploitation issues in the region including the application of the best geoscience technologies.

According to Hall, the conference will be an excellent learning experience for students as they prepare to become geoscience professionals and enter the petroleum industry.

"They will have the opportunity to participate in discussions by experts, both local and abroad, on a broad range of geoscience topics as well as attend short courses and field trips in the surrounding region," he said.

He said the sponsorship of these educational programmes were part of Esso's contribution to Malaysia's growth. "We believe that through our activities with local universities and societies like GSM, we are complementing the Government's efforts to develop a skilled workforce to assist in the industrialisation of Malaysia," he said.

Hall noted that an adequate supply of well-qualified, well-trained and experienced manpower was critical for the rapid development of the oil and gas industry. The modernisation of the industry and the utilisation of more advanced exploration and development geoscience technology also required the right level of trained and skilled personnel to apply the new technologies of the future.

He added that Esso will continue to play its role in the development of Malaysia's human resources. "We are committed to developing young geoscience students in Malaysia into geoscientists for tomorrow," he added.

October 7, 1993

*Warta Geologi, Vol.19, No.5*

**Speech by Fateh Chand, President, Geological Society of Malaysia, at the cheque presentation on 7th October 1993**

Tuan Pengerusi Majlis, Mr. J.L. Hall of Esso Production Malaysia Incorporated, Dr. Khalid Ngah, General Chairman of AAPG Organising Committee, Ladies & Gentlemen

Good morning,

The Geological Society of Malaysia is indeed grateful to Esso Production Malaysia Incorporated for its generous donation of RM26,000 of which RM20,000 will be used by the Geological Society of Malaysia in co-hosting with the American Association of Petroleum Geologists the international convention to be held in August 1994 in Kuala Lumpur. This is a very important event for the geologists particularly for those involved in the petroleum industry. Some 1,500 participants are expected from all over the world although the bulk of them will be from U.S.A. This amount will go a long way in assisting local geologists and geoscientists to participate in this convention. Regarding this aspect, the Society has set-up a committee to review all applications for funding to attend the convention.

The Geological Society of Malaysia is also hosting the annual petroleum geology seminar in December this year. Esso Production Malaysia Incorporated have also donated RM6,000/= for the holding of this seminar. The objective of this on-going seminar is to provide a forum for exchange of scientific and technical information and advancement in petroleum exploration and development. Again, although the bulk of participants will be from the industry, the Society, by holding the seminar here, will ensure that a large number of students will participate too.

On behalf of the Society, I like to thank Esso Production Malaysia Incorporated for their understanding and kind gesture. I also wish to add that Esso Production Malaysia Incorporated has been a strong supporter of the Geological Society of Malaysia in the past. They have been regularly contributing towards the successful hosting of the Society's activities. We hope this understanding, support and cooperation will continue in the years to come.

Once again I wish to thank Esso Production Malaysia Incorporated for the donation. Thank you.

**Speech by J.L. Hall, Exploration Department  
Manager, EPMI, at the cheque presentation to  
the Geological Society of Malaysia at Geology  
Lecture Hall, Dept. of Geology on October 7, 1993**

Mr. Fateh chand  
(President of the Geological Society of Malaysia,  
Dr. Khalid Ngah  
General Chairman of AAPG,  
Mr. S.P. Sivam  
Vice-President of GSM,  
Dr. Ahmad Tajuddin Ibrahim  
Secretary of GSM,  
Dr. Shamsuddin Haji Taib  
Acting Head of Geology Department, University of Malaya,  
Ladies and Gentlemen,

Selamat pagi.

I am very pleased to be here today to present this cheque for 26,000 Ringgit to the Geological Society of Malaysia. Of this amount, 20,000 ringgit is being granted to sponsor university students to attend the 1994 American Association of Petroleum Geologists (AAPG) International Conference and Exhibition scheduled to be held in Kuala Lumpur in August next year. The remaining sum of 6,000 Ringgit will be used to help sponsor the 17th Petroleum Geology Seminar in December this year.

We believe that students selected by the Society to attend the AAPG International Conference will find it an invaluable experience. They will be able to attend discussions by experts, both local and international, on a broad range of topics pertaining to the exploration and exploitation problems in Southeast Asian basins. They will also be able to attend short courses and associated field trips. We believe that the Conference will be an excellent learning experience for them as they prepare to become geoscience professionals.

Similarly, the 17th Petroleum Geology Seminar in Kuala Lumpur from December 7-8, will provide a forum for the exchange of scientific and technology

information and advancement in petroleum exploration and development. This major annual event of the Society has been well-attended by the geoscience community, both local and abroad.

I'd like to take this opportunity to congratulate GSM for hosting these conferences which we believe will help further promote the advancement of the geological sciences in Malaysia. We hope that the Society will continue with its outstanding work.

We, at Esso, see our involvement in these educational programs as part of our contribution to Malaysia's development. Our involvement with local universities includes supporting various research projects and providing practical training to students.

We also participate in technical seminars and career talks. And, of course, we have hire a number of University of Malaya graduates over the years. We currently have 13 geoscience employees who are graduates of the University of Malaya, three of which are here with me today.

Hee Kong Hin, Exploration Operations Supervisor; Mohd Noor Ismail, Field Development Supervisor; and Krishnan D. Senior Exploitation Geologist.

We believe that through our activities with local universities and societies like the GSM, we are complementing the Government's efforts to develop a skilled workforce to assist in the industrialization of Malaysia.

An adequate supply of well-qualified, well-trained and experienced manpower is critical for the rapid development of the oil and gas industry. The modernization of the industry and the utilization of more advanced exploration technology will also require the right level of trained and skilled personnel to apply the new technologies of the future.

Esso will continue to play its role in the development of Malaysia's human resources. We are committed to developing young geoscience students in Malaysia into geoscientists for tomorrow.

It now gives me great pleasure to present this cheque to the Geological Society of Malaysia.

Sekian, terima kasih.

## Esso contributes to Geological Society of Malaysia



1. GSM President, Fateh Chand, thanking Esso for the generous donation.
2. Mr. J.L. Hall with his speech.
3. Presentation of the RM26,000.00 cheque.
- 4 & 5. The large turnout at the presentation.

## Report on Environmental Impact Assessment Course

The two-day course on Environmental Impact Assessment (E.I.A.) was successfully conducted at the Geological Survey HQs in Kota Kinabalu (8 & 9 September), Kuching (13 & 14 September) and at the University of Malaya in Kuala Lumpur (16, 17 & 18 September). The response was overwhelming with participants from academic, government agencies and the private sector, 22 in Kota Kinabalu, 22 in Kuching and 52 in Kuala Lumpur so much so that an extra day has to be added to the Kuala Lumpur course to accommodate all the participants for the workshop session on the second day of the programme.

The programme for the first day consisted of illustrated talks, video and case studies covering such topics as Environmental Science, E.I.A. Methodology, Role of Environmental Impact Statements (E.I.S.), E.I.S. Techniques and Environmental Auditing. The programme succeeded in giving the participants a good overview of the various components involved in E.I.As. The case studies were particularly helpful as they were based on actual examples which the two course instructors, Dr. Christopher Bowler and Mr. John Bull, had been involved in.

Day Two was a workshop day with the participants divided into four different groups. Each group was given the background data for a particular site to be developed and its members had to work together to produce a sand-tray model of the proposed project. They were required to draft out suitable recommendations and suggestions on proposals for its development within an E.I.A. context. The groups then evaluated and discussed the proposals put forward by the other groups.

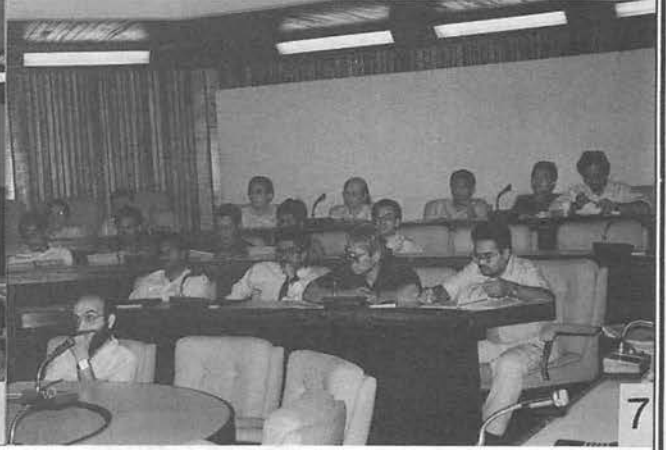
It was not only a good learning experience but great fun as the members warmed up to their roles either as proposers or objectors to the projects. Most participants felt that they had learnt something useful and enjoyed themselves during the two days.

C.P. Lee & P.S. Lim

### Captions to photos

1. C.P. Lee, the course Organiser with his Welcoming Address.
2. Mohd. Ali Hasan, Head of UM Geology Department, opening the K.L. Workshop.
3. Course Instructor, John Bull with his introduction.
4. Course Instructor, Chris Bowler with opening comments
- 5-7. Participants from various government bodies and private companies attending the workshop in MU.
8. John Bull with some witty comments on one of the project proposals.
9. Andrew Martin, Deputy Director of the British Council which sponsored the course instructors' flights from UK giving his comments on one of the projects.
10. Aziz Hussin presenting his group's proposal.
11. Working hard on the data with lots of small group interaction.
12. "I don't believe it would work!" Rusli Abdullah.
13. Chris Bowler, Joy and Peck Chin in deep discussion.

# Environmental Impact Assessment Course



# Environmental Impact Assessment Course





## BERITA-BERITA PERSATUAN News of the Society

### KEAHLIAN (Membership)

The following applications for membership were approved:

#### Full Members

- |   |   |
|---|---|
| <p>1. Lee Hong Shien<br/>Core Laboratories (M) Sdn. Bhd., Lot 10,<br/>Jalan 51A/223, 46100 Petaling Jaya.</p> <p>2. Harry Christopher Clear<br/>P.O. Box 2880 Dallas, Texas, U.S.A. 75221-2880.</p> <p>3. Rosnan Yaacob<br/>Pusat Perikanan dan Sains Samudera,<br/>Universiti Pertanian Malaysia, 21030 K.<br/>Trengganu.</p> <p>4. Noriza Mohd. Amin<br/>Core Laboratories (M) Sdn. Bhd., Lot 10B,<br/>Jalan 51A/223, 46100 Petaling Jaya.</p> <p>5. Allan Wayne Spencer<br/>20 Jalan Imam Bonjol, Jakarta, Indonesia.</p> <p>6. Jerome A. Eyer<br/>ESRI/USC, 901 Sumtek, Ste 401, Columbia,<br/>S. Carolina, U.S.A. 29208.</p> <p>7. Mustafa bin Abdullah aka Stephen Byrnes<br/>MACEE, 355 Jalan Ampang, Kuala Lumpur.</p> <p>8. Ibrahim bin Lah<br/>33 Jalan SS5C/6, Kelana Jaya, 47301<br/>Petaling Jaya.</p> <p>9. Lee Chow Hooi<br/>81 Jalan SS1/13, 47300 Petaling Jaya.</p> | <p>10. Kamaruddin b. Zakaria<br/>KBBC, Pergau Hydro Electric Project,<br/>Locked Bag 74, 17500 Tanah Merah.</p> <p>11. Abdul Rashid Bachik<br/>Makmal Penyiasatan Kajibumi, Peti Surat<br/>1015, Jalan Sultan Azlan Shah, 30820 Ipoh.</p> <p>12. Hamka Istamar<br/>No. 10, Jalan Saga 4, Taman Saga, 68000<br/>Ampang.</p> <p>13. Poh Kwong Wee<br/>65, Jalan 82/26, Taman Sri Rampai,<br/>Setapak, 53300 Kuala Lumpur.</p> <p>14. Barry Dean Huffer<br/>107 Jalan Pengakalan Sir, 24000<br/>Kemaman, Trengganu.</p> <p>15. Habibah Bt. Hj. Jamil<br/>Jabatan Geologi, Universiti Kebangsaan<br/>Malaysia, 43600 Bangi.</p> <p>16. Liaw Kim Kiat<br/>Geological Survey Department, P.O. Box<br/>560, 93712 Kuching.</p> <p>17. Rusli Abdullah<br/>Makmal Penyiasatan Kajibumi, Jalan<br/>Sultan Azlan Shah, Ipoh.</p> |
|---|---|

#### Student Members

- |  |  |
|--|--|
| <p>1. Rengga AK Gendang<br/>Jabatan Geologi, Universiti Malaya, 59100<br/>Kuala Lumpur.</p> <p>2. Mohd. Yazid Mohd Dan<br/>Jabatan Geologi, Universiti Malaya, 59100<br/>Kuala Lumpur.</p> | <p>3. S. Ramesh s/o v. Subramaniam<br/>Jabatan Geologi, Universiti Malaya, 59100<br/>Kuala Lumpur</p> <p>4. Razip Ismail<br/>Jabatan Geologi, Universiti Malaya, 59100<br/>Kuala Lumpur.</p> |
|--|--|

# GEOLOGICAL SOCIETY OF MALAYSIA PUBLICATIONS

BULLETIN OF THE GEOLOGICAL SOCIETY OF MALAYSIA  
 WARTA GEOLOGI - NEWSLETTER OF THE GEOLOGICAL SOCIETY OF MALAYSIA

## ADVERTISING SPACE ORDER FORM

RATES:	WARTA GEOLOGI		BULLETIN	
	Format: 20 cm X 28 cm		Format: 18 cm X 25 cm	
	Black & White	Colour	Black & White	Colour
Inside full page per issue	M\$300	M\$600	M\$1000	M\$1500
Inside half page per issue	M\$200	M\$500	M\$500	M\$800
Inside full page for 6 issues	M\$1500	M\$3000	-	-
Inside half page for 6 issues	M\$1000	M\$2500	-	-

Artwork and positive films or slides (for colour or black & white) should be supplied by the advertiser.

Please send the completed form below together with remittance payable to "Geological Society of Malaysia" to

The Editor,  
 Geological Society of Malaysia  
 c/o Dept. of Geology,  
 University of Malaya,  
 59100 Kuala Lumpur, Malaysia.

For further information, please ring 03-7577036.

The Editor,  
 Geological Society of Malaysia,  
 c/o Dept. of Geology,  
 University of Malaya,  
 59100 Kuala Lumpur.

We would like to take up advertising space in WARTA GEOLOGI/BULLETIN in the form (please tick as appropriate):

	WARTA GEOLOGI		BULLETIN	
	Black & White	Colour	Black & White	Colour
Inside full page	one issue <input type="checkbox"/>	one issue <input type="checkbox"/>	one issue <input type="checkbox"/>	one issue <input type="checkbox"/>
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Inside half page	one issue <input type="checkbox"/>	one issue <input type="checkbox"/>	one issue <input type="checkbox"/>	one issue <input type="checkbox"/>
	six issues <input type="checkbox"/>	six issues <input type="checkbox"/>	issues <input type="checkbox"/>	issues <input type="checkbox"/>

Artwork/Positive film/slide\*    enclosed     not enclosed

Company .....

Address .....

Enclosed cheque/money order/bank draft\* ..... for M\$ .....

Person to be contacted ..... Tel .....

Designation ..... Signature .....

\* Please delete as appropriate

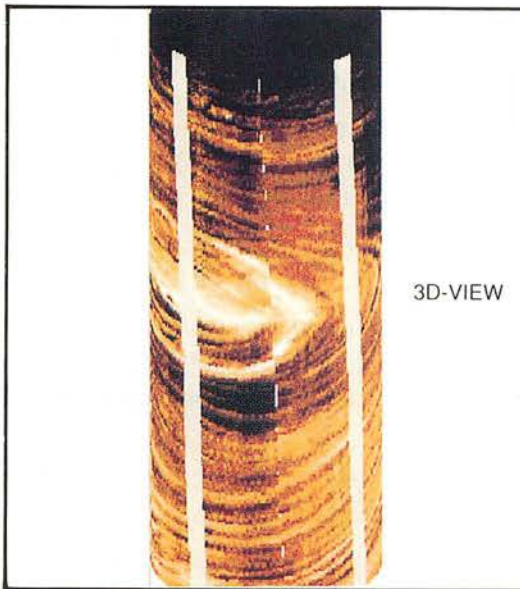
# Fullbore Micro Imager\*

Formation imaging using microelectrical arrays has benefited the oil industry since its introduction in the mid-80s. The FMI\*, Fullbore Formation MicroImager tool, is the latest-generation electrical imaging device. It belongs to the family of imaging services provided by the MAXIS 500\* system with its digital telemetry capability.

The FMI log, in conductive muds, provides electrical images almost insensitive to borehole conditions and offers quantitative information, in particular for analysis of fractures.

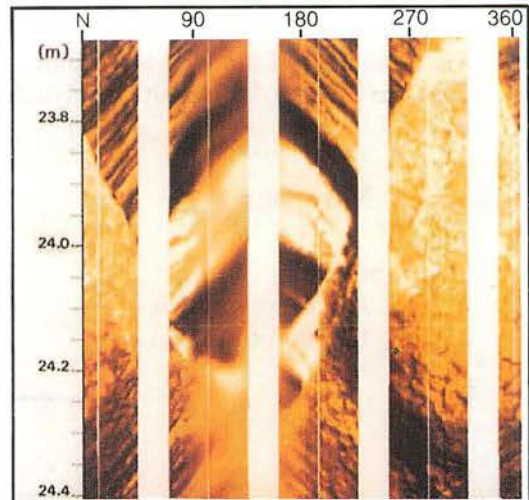
The FMI tool combines high-resolution measurements with almost fullbore coverage in standard diameter boreholes, thus assuring that virtually no features are missed along the borehole wall. Fully processed images and dip data are provided in real time on the MAXIS 500 imaging system.

The tool's multiple logging modes allow wellsite customization of results to satisfy client needs without compromising efficiency.

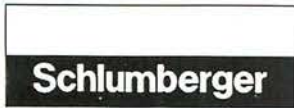
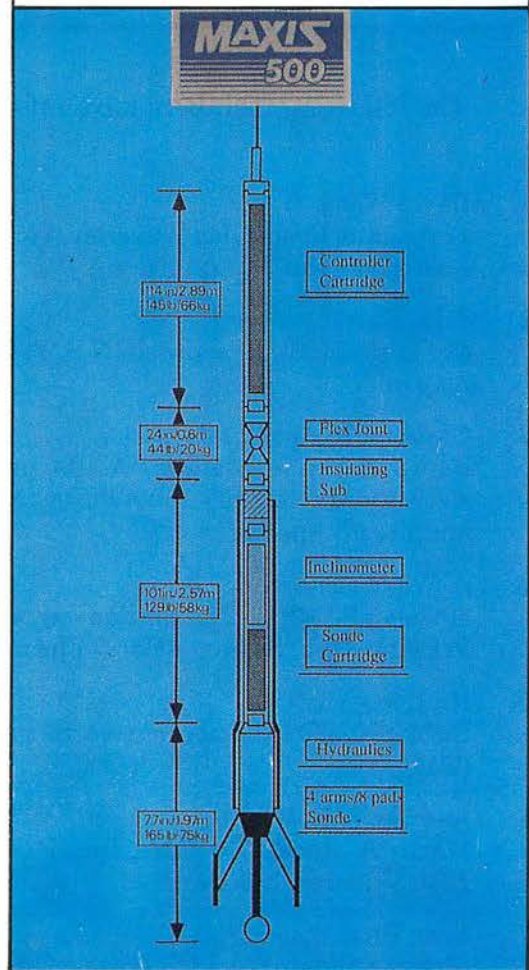


3D-VIEW

"Bullseye" structure



Fault without associated drag



- |  |  |
|--|--|
| <p>5. Abdul Halim Mat Rasit<br/>Jabatan Geologi, Universiti Malaya, 59100<br/>Kuala Lumpur.</p> <p>6. Mohamad Yusof bin Che Sulaiman<br/>Jabatan Geologi, Universiti Malaya, 59100<br/>Kuala Lumpur.</p> | <p>7. Nor Asmah binti Abdul Aziz<br/>Jabatan Geologi, Universiti Kebangsaan<br/>Malaysia, 43600 Bangi.</p> <p>8. Azmi Ab. Rashid<br/>Jabatan Geologi, Universiti Malaya, 59100<br/>Kuala Lumpur.</p> |
|--|--|

### Associate Member

1. Tan Kim Yoke  
A-10/1, The Highway Centre, 11/2 Jalan  
51/205, 46050 Petaling Jaya.

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GSM

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## PETUKARAN ALAMAT (Change of Address)

The following members have informed the Society of their new addresses:

- |  |   |
|--|---|
| <p>1. David Wong<br/>17 Arianne Road, Glen Waverley, Victoria,<br/>Australia 3150</p> <p>2. John Ringis<br/>41 Chisholm St, Greenwich, N.S.W. 2065,<br/>Australia</p> <p>3. Cicerona A. Angeles Jr<br/>B4/L2 Eastside Manors, A. Raymundo<br/>Avenue, Maybunga, 1600 Pasig, Metro<br/>Manila, Philippines</p> <p>4. A. Wayne Spencer<br/>39 Jalan PJS 9/18, Bandar Sunway, 46150<br/>Petaling Jaya, Selangor Darul Ehsan</p> <p>5. Ha Kong Yin<br/>Bk 377 #03-302, Clementi Ave. 5, Singapore<br/>0512.</p> <p>6. Andrew W.R. Wight<br/>Maxus Southeast Sumatra, Inc., P.O. Box<br/>2759, Jakarta, Indonesia.</p> <p>7. Tong Khai Wah<br/>c/o Sun Oiltools Pte. Ltd., Loyang Offshore<br/>Base, Loyang Crescent, Singapore 1750.</p> | <p>8. Zamri Ramli<br/>Pej. Peny. Kajibumi, Tk. 9, Wisma<br/>Persekutuan, 20200 Kuala Terengganu,<br/>Terengganu.</p> <p>9. Yin Ee Heng<br/>19 Jln. SS22/38, Damansara Jaya, 47400<br/>Petaling Jaya.</p> <p>10. Chieng Yih Yaw<br/>P.O. Box 560, 96108 Sarikei, Sarawak.</p> <p>11. Ng Chak Ngoon<br/>No. 14, Jalan SS19/5B, Subang Jaya, 47500<br/>Petaling Jaya, Selangor Darul Ehsan.</p> <p>12. Max. H. Holtby<br/>7795 Falcon Crescent Mission, B.C.,<br/>Canada, V2V 3A8</p> <p>13. Haji Mohd. Redzuan Mohd. Ramli<br/>Ajil Minerals Sdn. Bhd., Km. 27, Jalan<br/>Kuala Berang, Wakaf Tapai, 21040 Marang,<br/>Terengganu Darul Iman.</p> <p>14. Timothy James Hargreaves<br/>Fletcher Challenge China Ltd., C213 Beijing<br/>Lufthansa Center Offices, 50 Liangmaqiao<br/>Road, Chaoyang District, Beijing 10016,<br/>Peoples Republic of China.</p> |
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GSM

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## PERTAMBAHAN BAHARU PERPUSTAKAAN (New Library Additions)

The Society has received the following publications:

1. Geology and mineral resources of sungai Tiang area, Kedah Darul Aman by Teoh Lay Hock.
2. 1991 annual report: Geological Survey of Malaysia.
3. SOPAC News, vol. 10, no. 1-3, 1993.
4. AAPG Explorer, Aug, Sept & Oct 1993.
5. Belgium Geological Service, Professional Paper no. 261. 1993/3 & no. 262, 1993/4.
6. Journal of Sciences of the Hiroshima University, vol. 9, no. 4, 1993.
7. AAPG Bull. vol. 77/7, 77/8, 77/9, 1993.
8. A directory of Science & Technology Information databases in Malaysia, 1993.
9. Explanatory text of the geologic map of Taiwan, Scale 1:50,000, Sheets 54, 60: Chengkung & Tungho, 1993.
10. Bulletin of the National Science Museum, vol. 19, nos. 1 & 2, 1993.
11. Seatrad Centre, Report of investigation no. 88, 1993.
12. Acta Palaeontologica Sinica, vol. 31, no. 6, 1992 & vol. 32, nos 1 & 2, 1993.
13. USGS Bulletin 1992: 1917-N, 2006, 1993, 2000-B, 1917-K, 1917-O, 1955, 2017, 1979, 1998, 2037, 2015, 1988-C, 2003, 2042-C, 2025, 2036, 2026; 1993: 1839-L, 1904-P, 1995-C, 1989-D, 1904-L, 1994, 2050, 2029, 2043.
14. USGS Prof. Papers: 1992: 1200-FL, 1405-B, 1526; 1993: 497-H, 1506-F, 1553-B.
15. USGS Circular 1993: 1111, 930-M, 1081, 1088; 1992: 1082, 1091.
16. Palaeontological abstracts, vol. 7, no. 4, 1992, vol. 8, nos. 1 & 2, 1993.
17. Acta Micropalaeontologica Sinica, vol. 9, no. 4, 1992.
18. SEATRAD, annual report 1992.
19. Geological Service of Belgium, Professional Paper 1993/5 - no. 263, 1993.
20. Earthquakes & Volcanoes, vol. 23, no. 4, 1992.
21. IMM transactions, Section A: May-Aug 1993.
22. IMM Bulletin no. 1013 & 1014, 1993.
23. Chronique de la recherche Miniere, no. 511, 1993.
24. Bulletin of the National Science Museum, vol. 19, no. 3, 1993.
25. Proceedings of the annual geological conference: Technical Papers vols. 2, 3 (1991) & 4 (1992).
26. Quaternary Geology Bulletin 3 by Loh Chiok Hoong.
27. Map report no. 2 by T. Suntharalingam & no. 6 by P. Loganathan.



PERSATUAN GEOLOGI MALAYSIA  
Geological Society of Malaysia

**PERSIDANGAN  
TAHUNAN  
GEOLOGI '94**

*Annual Geological  
Conference '94*

11th & 12th June 1994

Primula Resort  
Kuala Trengganu

*First Circular  
September 1993*



## Registration Form

**GEOLOGICAL SOCIETY OF MALAYSIA  
ANNUAL GEOLOGICAL CONFERENCE '94  
11th & 12th June 1994**

Name: Prof/Dr/Mr/Ms \_\_\_\_\_

Profession: \_\_\_\_\_

Company/Organisation: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Type of membership: \_\_\_\_\_

Please tick appropriate boxes:

I intend to participate in the above Conference.  
 I intend to present a paper/poster entitled: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

I will not require accommodation  
 I will require accommodation:  
 Primula Resort (RM130.00 nett per day)  
 Sri Hoover Hotel, Seaview Hotel or Batu Burok  
Chalet (RM65.00–RM75.00 nett per day)

From: \_\_\_\_\_ to: \_\_\_\_\_

I intend to participate in the Pre-conference fieldtrip (RM20.00)  
 I intend to participate in the Post-conference fieldtrip (RM20.00)  
(Accommodation at participants own expense)  
 I am interested in the spouse programmes  
 I want to join MAS group travel and back  
 I want to travel by Society's coach (RM10.00)

Please complete and return to the Geological Society of Malaysia before  
31st March 1994.

# PERSATUAN GEOLOGI MALAYSIA Geological Society of Malaysia

## PERSIDANGAN TAHUNAN GEOLOGI '94 Annual Geological Conference '94

### OBJECTIVES

The Geological Society of Malaysia is planning to hold the 1994 Annual Geological Conference on the 11th & 12th June, 1994 at the Primula Kuala Trengganu Resort, Trengganu. The Conference is the ninth in a series of such annual conferences organised by the Society.

Papers presented at the previous conferences have contributed significantly to the better understanding of the geology of Malaysia in particular and the S.E. Asia region in general. In addition, the Conferences have provided the forum for exchange of scientific and technical information among the many participants from companies as well as research organisations in the region and those interested in the geology and resources of the region.

### PAPERS

In the wake of many outstanding papers that have been presented at the eight previous Conferences, the Geological Society of Malaysia would greatly appreciate your contribution of a paper to this Conference.

Papers on any topic relevant to the understanding of geology, energy and mineral resources of Malaysia and the S.E. Asia region would be most welcomed.

Please inform us of your intention to present a paper at this Conference before 28th February, 1994. Papers can be presented in either an oral or poster format. Extended abstracts for both oral and poster presentation should include relevant illustrations and data and should be submitted at the latest by 31st March, 1994. Please indicate your preference for an oral and/or poster presentation.

Full papers submitted before 15th April, 1994 will be made available to all registrants. Authors are also encouraged to submit their full paper after the Conference for consideration for publication in the Society's Bulletin series.

### REGISTRATION

All intending participants are advised to register early for the Conference as a large turnout will be expected this year.

Advance registration for the Conference will be accepted until 20th May, 1994. Late registration will be accepted at the Society's

Registration Desk at the Conference venue. Presenters of papers at the Conference will be exempted from payment of registration fees.

Membership	Advance Registration Fees	Late Registration Fees
Full/Associate Members	RM20.00	RM30.00
Non-Members	RM70.00	RM80.00
Student Members	RM5.00	—
Student Non-Members	RM15.00	—

Payment by crossed cheques, bank drafts or cashiers orders is acceptable and should be made payable to the "Geological Society of Malaysia". Outstation cheques should include sufficient bank charges.

Please send registration fees together with the attached Registration Form to:-

The Treasurer,  
Geological Society of Malaysia,  
c/o Department of Geology,  
University of Malaya,  
59100 Kuala Lumpur,  
MALAYSIA.

to reach us before 31st March, 1994

### ACCOMMODATION

Accommodation will be at the participants' own expenses but reservations can be arranged upon request on a first-come-first-serve basis at the following rates:

Primula Resort, single/double : RM130.00 nett per day  
Hotel Sri Hoover, Hotel Seaview & Batu Burok Chalet —  
double : RM60.00 - RM75.00 nett per day

Please indicate clearly in the Registration Form if arrangements for accommodation is required.

### TRAVEL, FIELDTRIPS & SPOUSE PROGRAMMES

We are trying to arrange group travel (minimum 10) with MAS from Kuala Lumpur to Kuala Trengganu and back.

A two-day pre-Conference fieldtrip around Kuala Trengganu and a two-day post-Conference fieldtrip to Pulau Perhentian is being proposed. Activities for spouses are also being planned. To facilitate planning, please indicate your interest to participate on the Registration Form. The Society reserves the right to cancel the various activities if there are not enough participants. Details of the activities will be sent separately or included in the Final Circular.

A coach to Kuala Trengganu will be arranged by the Society. Places on first-come-first-serve basis.

## BERITA-BERITA LAIN Other News

### FIRST CIRCULAR

## INTERNATIONAL GEOLOGICAL CORRELATION PROGRAM (IGCP) PROJECT 321

Fourth International Symposium  
and Field Excursion  
on

### GONDWANA DISPERSION AND ASIAN ACCRETION

**22-27 August, 1994, Seoul, Korea**

Organized by: IGCP 321 Korean Working  
Group

Hosted by: Department of Geological  
Sciences, Seoul National  
University

With the support and cooperation of:

Korean National IGCP Committee  
UNESCO-IGCP PROJECT 321  
Seoul National University  
Geological Society of Korea  
Korea Institute of Geology,  
Mining and Materials

The Organizing committee of the Fourth International Symposium and Field Excursion of IGCP Project 321 cordially invites the participation of all geoscientists who are interested in the program.

#### AIMS

- To provide a forum for the exchange of

information and opinion on all aspects of Gondwana dispersion and Asian accretion.

- To consolidate and develop further the findings and insights made at earlier meetings in Kunming (1991), Kyoto, and Kochi (1992), and Kuala Lumpur (1993).
- To discuss the tectonic evolution of the Ogcheon belt and the relationship between North and South China blocks.

#### PROGRAM

##### Symposium

Both oral (in English) and poster presentations are planned.

Date: 22-23 August, Monday-Tuesday, 1994

Place: Hoam Conference Hall,  
Seoul National University

##### Field Excursion

24-25 August:

North Ogcheon belt, including thrust boundaries between Precambrian basement and Ogcheon belt (Pyeongchang - Tanyang area).

26-27 August, 1994:

Central and southern Ogcheon belt (Chungju - Suanbo - Goesan area).

#### ACCOMMODATION

**Hoam Guest House,  
Seoul National University**

Available from 21-24 August, 1994

##### Hotels

Participants are expected to make their own arrangements. List of hotels will be furnished on request to the Organizing Secretary. The Organizing Committee will assist field trip participants to book accommodation for the evening of 27 August on request.



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**REGISTRATION FEES**


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Fees (provisional)	Registration
\$100	Symposium, abstract, 2 lunches, 1 dinner
\$300	All above plus hostel accommodation from 21-24 August (including meals)
\$300	Field Excursion – transport, accommodation, field guide and meals from 24 August to the noon of 27 August.

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**CALL FOR PAPERS**


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Participants who are interested in presenting papers are to complete the reply slip. Submit abstracts or extended abstracts (up to two pages

A4 text and one page A4 for figures) before May 1, 1994. Accepted papers will be published in an issue of the Journal of Southeast Asian Earth Sciences.

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**IMPORTANT DATES**


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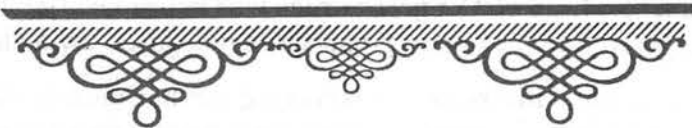
- Reply to First Circular: December 1, 1993
- Distribution of Second Circular: February 1, 1994
- Abstract Deadline: May 1, 1994
- Registration Deadline: July 1, 1994

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**CORRESPONDENCE**


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Write to: Dr. Moon-sup CHO  
 Organizing Secretary  
 IGCP 321 Fourth Symposium  
 c/o Department of Geological Sciences  
 Seoul National University  
 Seoul, 151-742 Korea  
 (Fax: 822-871-3269; Tel: 822-880-6732)



**PERSIDANGAN  
 TAHUNAN  
 GEOLOGI '94**

*Annual Geological  
 Conference '94*

==== 11th & 12th June 1994 =====

Primula Resort  
 Kuala Trengganu

**XV CONGRESS OF THE COUNCIL OF MINING  
AND METALLURGICAL INSTITUTIONS**

*Changes of Dates*

South Africa's first general election for all the people of the country has recently been set for 27 April 1994.

This long-awaited advent of a true democracy should herald a new era of peace, unity and prosperity for a country so rich in resources and manpower.

The election date coincides with the 15th Congress and its Southern African programme of technical and sight-seeing visits long planned for 23 April to 14 May.

The Organising Committee does not wish to hold Congress when very many people will be preoccupied with the elections, and has therefore decided to postpone Congress and its itinerary of visits to the following dates in September 1994:

**Sunday 4 to Thursday 8 September 1994 – Congress Sessions at Sun City Complex**  
**Friday 9 to Saturday 24 September 1994 – Post-Congress tours**

The second information brochure on Congress which was in preparation for issue in August will accordingly be delayed and mailed to prospective delegates towards the end of 1993.

A reminder: All those persons interested in receiving further details about the Congress should, **if they have not already done so**, send their names and addresses to me at the following address without delay:

Bill Emmett  
Congress Manager  
P.O. Box 809 Johannesburg 2000 South Africa  
Telephone: (27) (11) 838-8211 Fax: (27) (11) 838-4255

*Update*

There has been an extremely good response from throughout the world to the Preliminary Announcement brochure for the 15th CMMI Congress to be held in Southern Africa in April/May 1994. Planning for the Congress is proceeding apace and the following information is provided to keep prospective delegates and affiliates informed about our plans:

1. **Saturday 23 to Thursday 28 April 1994**  
Participants should plan to arrive at Sun City ± 1½ hours by road from Johannesburg) on Saturday 23 or Sunday 24 April 1994. Registration for Congress will take place on both those days.

The welcoming function on Sunday 24 April will take the form of a cocktail party in the Ballroom followed by a video and laser display in the Super Bowl at Sun City and the official opening of EXPO'94 which is to run in conjunction with Congress on the ground floor of the Super Bowl. The cocktail party is scheduled to start at 17:00.

The formal opening and plenary session of Congress will take place in the Super Bowl at 09:30 on Monday 25 April. After the morning's plenary session Congress will divide into parallel technical sessions at which papers will be presented in the four technical programmes

- Mining
- Extractive Metallurgy
- Metals Technology
- Geology

(An excellent response has been received to the call for papers and the relevant technical committees are processing abstracts received.) The parallel sessions will take place each morning and afternoon until Thursday morning 28 April. The closing plenary session will be held on that afternoon.

The formal part of Congress at Sun City will close with an "under the stars" function on the evening of Thursday 28 April.

## 2. Friday 29 April to Saturday 14 May 1994

Detailed planning is progressing well for a wide-ranging programme of excursions by road, rail and air throughout Southern Africa to take Congress to places of technical interest and scenic beauty.

## 3. Hotel accommodation

For the first part of Congress from 23 or 24 April, hotel accommodation has been reserved at the four hotels making up the Sun City complex, viz.

- the Palace;
- the Cascades;
- the Sun City hotel; and
- the Cabanas.

## 4. Affiliates programme

A number of interesting events are being planned for affiliates and these will include fashion shows, displays of jewellery specially designed for the occasion and a variety of sight-seeing excursions to places of interest in the vicinity of Sun City.

## 5. Second brochure

It is planned that a brochure setting out detailed information about the Congress and its activities will be mailed in August 1993. Included in this brochure will be the following forms:

- application for registration
- hotel reservations
- excursion reservations

It is hoped that these forms will be returned to the Congress organisers by the end of November 1993.

## 6. Travel assistance

South African Airways has been appointed the official carrier for the Congress to assist prospective delegates on routes which it operates.

In addition the following companies have been appointed by Congress to work in close collaboration with South African Airways to ensure that Congress delegates and their affiliates obtain the best possible rates:

### North and South America

Corporation for Professional Conferences, Inc.  
73 Deer Park Avenue, Suite 2

Babylon, NY 11792 USA

Telephones: 516-661-6779 516-661-6869

Fax: 516-661-6914

Toll Free: 800-621-4414

Contact Person: *Mr Paul V Elmstrom, President*

### Great Britain and Europe

Portman Travel Group

618 Kingston Road, London SW20 8DN

Telephone: 081-543-9611

Fax: 081-540-8217

Contact Persons: *Mr Tony Grasso, Director; Mr Peter Livesy, Director*

# COASTAL ZONE

## CANADA '94

HALIFAX, N.S.

20-23 September 1994

### International Conference Cooperation in the coastal zone

**Announcement and  
first call for papers  
and participation**

#### WE INVITE YOU

To participate in Coastal Zone Canada '94 (CZC'94), a major international conference to be held in Halifax, Nova Scotia, Canada on 20-23 September, 1994. The theme of the conference is "Cooperation in the Coastal Zone".

Our purpose is to bring together coastal zone inhabitants and users, scientists and engineers, academics, government and industry representatives and public interest groups to explore innovative approaches for dealing with the challenges that are faced in the coastal zone. Local, national and international issues will be reviewed, and attendance of international participants is encouraged.

The format of CZC '94 has been designed to promote discussion of structures and strategies for developing new partnerships in coastal zone management. Cooperative approaches and new working relationships will be examined, and the sharing of new and existing knowledge, experience, and technologies among coastal zone stakeholders will be undertaken.

#### THE CONFERENCE WILL:

- provide a unique opportunity for cooperative interaction between diverse communities of interest in the coastal zone
- explore key coastal issues at local, regional and international levels and identify potential solutions through cooperative management approaches
- present new knowledge, both scientific and non-scientific, about coastal zone processes, policies and activities
- provide information about, and examples of, new technologies having a potential role in coastal zone management
- identify the multi-disciplinary skills and knowledge base required to effectively manage coastal zone issues, and
- contribute to the development of a Coastal Zone strategy for Canada within the context of the United Nations Conference on the Environment and Development (UNCED'92 and Agenda 21)

#### WHO SHOULD ATTEND ...

All coastal zone stakeholders, residents, community-based organizations, aboriginal groups, scientists and engineers, academics, government (municipal, provincial and federal), primary resource users, industry and business, and the military. International participants are especially encouraged to attend.

#### AN INNOVATIVE FORMAT ...

Has been adopted to encourage communication among the diverse groups of participants.

#### Following a KEYNOTE ADDRESS,

- A Plenary Panel Session will engage representatives of community interests, academia, government, and industry in a dialogue on Cooperative Coastal Zone Management, with active participation from the audience.

- This will be followed by **Case-Study Workshops** on local, regional, and international Coastal Zone Management issues.

- Alongside the workshops there will be **Concurrent Paper Presentation Sessions** throughout the first two days.

- A **Public Meeting** is planned for the evening of the second day to enable a broad discussion of coastal zone issues having particular importance to the community.

- The final day will feature **Round Discussions** addressing predeter issues related to the theme.

- The conference will close with the **Presentation of Recommendation** addressing specific issues and a **Consideration of Guidelines** for cooperative coastal zone management.

Simultaneous translation (English and French) will be provided for plenary sessions. Individuals interested in participating in the presentations should consult the Presentations Insert of this brochure.

### PAPERS AND CASE STUDY PRESENTATIONS ARE INVITED ...

From the following national, and international, coastal and ocean-related subject areas:

- Community Initiatives
- Conservation and Protection
- Information and Data Management
- Science and Engineering
- Resource Management and Development
- Aboriginal Rights and Issues
- Coastal Policy and Administration
- Regional and International Issues

Other coastal and ocean-related subjects are encouraged. Proposals for round-table sessions are also invited.

### A MAJOR TRADE SHOW AND EXHIBITION...

Is planned to allow private companies and public organizations involved in coastal/marine activities to meet with attendees and discuss innovative technologies, approaches and business opportunities. See Trade Show Insert for details.

### POSTER SESSIONS...

Will be a prominent feature of the conference, and those interested in submitting a poste should consult the Presentations Insert for instructions.

### WORKSHOPS AND SEMINARS...

May be held in conjunction with CZC '94 by individuals, organizations or companies interested in doing so. Interested parties should contact Mr. Larry Hildebrand through the Conference Secretariat.

### ADDITIONAL ACTIVITIES...

Will include field trips (short and long), a reception, banquet, other social events, conjunctive meetings and events sponsored by other organizations.

### PUBLICATIONS

Presented papers will be published in Conference proceedings (see brochure insert for details) available at registration. A conference summary of the workshops, roundtable discussions, and the final plenary session's recommendations and guidelines for cooperative coastal zone management will be published following the conference.

**GENERAL INFORMATION**

**Conference Co-Chairs:** Mr. Brian Nicholls (Fisheries and Oceans Canada) and Mr. Larry Hildebrand (Environment Canada)

**CZC '94 Conference Secretariat:** Bedford Institute of Oceanography, P.O. Box 1006 Dartmouth N.S. Canada B2Y 4A2 Phone (902) 429-9497 Fax (902) 429-9491

**Sponsoring Agencies**

- Council of Maritime Premiers
- Nova Scotia Dept. of Fisheries
- New Brunswick Dept. of Fisheries and Aquaculture
- Dalhousie University
- Acadia University
- Saint Mary's University
- Technical University of Nova Scotia
- Simon Fraser University
- MacLaren Plansearch Ltd.
- Nova Scotia Land Use Committee
- Environment Canada
- Fisheries and Oceans Canada
- Energy Mine and Resources Canada
- Nova Scotia Dept. of Municipal Affairs
- Oceans Institute of Canada
- National Research Council Institute for Marine Biosciences
- Canadian Coast Guard
- Nova Scotia Dept. of Economic Development
- Prince Edward Island Land Use Coord. Committee
- Nova Scotia Museum
- Nova Scotia Dept. of the Environment
- Canada/Nova Scotia Offshore Petroleum Board

**RESPONSE FORM**

Name .....

.....

Position .....

.....

Affiliation .....

.....

Address .....

.....

.....

Phone .....

Fax.....

YES I am interested in

Attending the conference

Presenting a paper

Presenting a poster

Leading a session

Having a Trade Show exhibit booth

Receiving further information about CZC '94

*Return Response Form to:*

**CZC '94 Conference Secretariat:**  
 Bedford Institute of Oceanography  
 P.O. Box 1006  
 Dartmouth N.S.  
 Canada B2Y 4A2



## THE INTERNATIONAL SYMPOSIUM ON STRATIGRAPHIC CORRELATION OF SOUTHEAST ASIA

### THE INTERNATIONAL SYMPOSIUM ON STRATIGRAPHIC CORRELATION OF SOUTHEAST ASIA

BANGKOK, THAILAND  
NOVEMBER 15-20, 1994



#### FIRST CIRCULAR INFORMATION AND CALL FOR PAPERS

Organized by:  
The Department of Mineral Resources  
IGCP 306 Coleaders and Thai Working Group

Co-organizers:  
Chulalongkorn University  
Geological Society of Thailand

#### INTRODUCTION

The Department of Mineral Resources and the IGCP project 306: "Stratigraphic correlation of Paleozoic and Mesozoic sediments in Southeast Asia" are organizing "THE INTERNATIONAL SYMPOSIUM ON STRATIGRAPHIC CORRELATION OF SOUTHEAST ASIA" with the cooperation of Chulalongkorn University, and Geological Society of Thailand.

In this century the Southeast Asia region has witnessed rich resources of petroleum, coal, industrial and metallic minerals. According to this economic importance, extensive research on local stratigraphy and natural resources have been carried out. For the coming symposium, a concerted effort from IGCP member countries and all related geoscientists needs to study, correlate, and exchange the stratigraphy and related knowledge among the Southeast Asia countries. The result from this symposium will be a foundation and benefit to the progressive development of the region.

The stratigraphic study in Thailand has been continually carried out since 1931. The first scientific meeting on stratigraphy was held in Bangkok in 1974 to arrange and establish the systematic stratigraphy in Thailand. The second and third meetings were held in Bangkok and Haad Yai in 1983 and achieved the stratigraphic correlation between Thailand and Malaysia.

This international symposium will be the fourth stratigraphic meeting in Thailand and will cover the stratigraphic correlation of the Southeast Asia region.

#### OBJECTIVES

1. to correlate the stratigraphy in Southeast Asia.
2. to review and update the stratigraphical knowledge of South Asia.
3. to provide the venue for all stratigraphers, other scientists and interested persons to exchange their ideas and experiences.
4. to bring together researchers from various

parts of the world to exchange information, ideas and experiences pertaining to stratigraphic correlation in Southeast Asia and neighbouring regions.

5. to promote a better understanding for future research co-operation.

#### THEMES

1. Stratigraphic records in Southeast Asian countries.
2. Paleo-environment, historical evolution of deposition in this region.
3. Biostratigraphic records and correlations.
4. Economic materials and mineral resources potential in Southeast Asia.

#### PARTICIPATION

All interested stratigraphers, biostratigraphers, paleontologists, petroleum geologists, economic geologists, and other scientists concerned are cordially invited to participate in this symposium.

#### LOCATION AND DATE

The symposium will be held in Bangkok during 15-17 November 1994 and the field excursion will be in the western part of Thailand on 18-20 November, 1994. The weather in November is very pleasant with average temperature 25°C. Light winter clothings will be sufficient. The official language of the symposium is English.

#### STRUCTURE AND TENTATIVE PROGRAM

The symposium will be structured into keynote address and technical session on 15-17 November 1994, followed by 2 days excursion covering Pre-Cambrian to Cenozoic rocks in the western part of Thailand. Based on the response of this First Circular, the technical program will be arranged and informed in the Second Circular.

#### REGISTRATION FEES

Registration fees for the Symposium are:

Symposium Participation: B2,500 (US\$100)  
Excursion: B4,000 (US\$160)

The registration fees include Proceedings, and functional expenses. Excursion fees include transportation, guidebook, accommodation and meals during the trip.

**ALL PRE-REGISTRATION FEES  
SHOULD BE PAID BY BANK DRAFT TO:  
"SE-ASIA CORRELATION"**

#### CALL FOR ABSTRACT AND PAPER

The organizing committee invites the submission of papers to be considered for presentation at the symposium with the following guidelines:

**ABSTRACT:** typed abstract on A-4 sheet (size 297 x 210 mm) approximately 400 words.

#### PAPERS:

1. It is recommended that the author would prepare electronic form in floppy disk (IBM-PC) or compatibles, 5.25" or 3.5" disk). Preferred word processor includes MS-Word, Word-perfect, Word Star, CU writer, and ASCII.
2. submit 2 copies of papers (text and illustration)
3. submit clear original illustration (Figures/Tables) for final proceedings preparation. Please locate title of paper, author(s), and no. of figure/table at the back.
4. the size of figure and table is able to be designed in 4 block size: 6.25" x 9.5", 6.25" x 6.25", 3" x 5", and 3" x 3".
5. The length of paper should not exceed 5,000 words or 10 pages.

**DEADLINE FOR ABSTRACT:  
15 MARCH, 1994**

Correspondence: Dr. Thanis Wongwanich  
(Secretary)

Office: Geological Survey Division  
Department of Mineral Resources  
Rama 6 Road, Rachatewee,  
Bangkok 10400, THAILAND  
Telephone: (662) 2461694  
FAX: (662) 2459855  
Telex: 84763 DEPMIRE TH



## Eight Regional Conference on Geology, Minerals and Energy Resources of Southeast Asia

### GEOSEA '95, Manila, Philippines

#### INVITATION TO GEOSEA '95

**MANILA** is once again host to this prestigious triennial event. Like the GEOSEA conferences in Kuala Lumpur (1972, 1984), Jakarta (1975, 1987), Bangkok (1978, 1991) and Manila (1981), GEOSEA '95 promises to be another successful forum in the Geosciences.

**THE GEOLOGICAL SOCIETY OF THE PHILIPPINES (GSP)**, as organizer, cordially invites geoscientists and others concerned with earth resources for sustainable development, to the Eighth Regional Conference on Geology, Minerals and Energy Resources of Southeast Asia (GEOSEA '95).

#### DETAILS

**DATE:** February 15 to 18, 1995  
**VENUE:** Metro Manila, Philippines  
**THEME:** "Geology, Minerals and Energy Resources for Sustainable Development"  
**LANGUAGE:** English

#### CALL FOR PAPERS

The GEOSEA '95 organizers wish to invite technical papers for presentation in the following areas of interest.

#### *General Topics*

General Geology/Stratigraphy, Sedimentology and Paleontology/Structural Geology and

Tectonics/Petrology and Geochemistry/Geophysics/Metallic and Non-Metallic Mineral Resources/Energy Resources/Water Resources/Engineering and Quaternary Geology/Mineral Economics

#### *Special Topics*

Volcanism, Earthquakes and other Geologic Constraints to Sustainable Development/Structural Geology, Tectonics and Seismotectonics of Southeast Asia/Environmental Geoscience for Sustainable Development of Coastal and Maritime Zones/Mineral and Energy Resource Assessment for Sustainable Development/Geotechniques in the Establishment and Maintenance of Energy Systems

#### *Education, Information and Resource Management*

GIS in Geological Education, Information and Resource Management/Geological Information for Joint Development Areas/Mineral and Energy Resources Development Policies, Mining and Energy Laws and Laws of the Sea/Curricula of Geoscience Courses in Asian Institutions/Geological Laboratory Capabilities/Offshore Survey Capabilities of Asian Geological Institutions/Geological Awareness Outreach and Promotion.

Details on the format of manuscripts for submission will be announced in the next Circular.

**GEOLOGICAL FIELD EXCURSIONS**

Pre- and post-congress excursions will be organized. They shall include visits to active volcanoes and active faults, mine sites (gold, copper, chromite), geothermal areas and power plants. Details will be included in the next Circular.

**DEADLINES AND REGISTRATION**

**Deadlines**

*Submission of Title:* August, 1993  
*Submission of Abstract:* to be announced  
*Submission of Manuscript:* to be announced

**Registration**

*Early Registration:* on or before August, 1994  
 US\$300.00

*Late Registration:* September, 1994 onwards  
 US\$350.00

*Field Excursion Registration:* to be announced

**MORE DETAILS**

For further particulars, please contact:

*The Secretariat  
 GEOSEA '95 Organizing Committee  
 Geological Society of the Philippines  
 North Avenue, Diliman Quezon City  
 Philippines*

*Tel: 99 85 44  
 FAX: (632) 99 85 44  
 (632) 951635  
 (632) 711-3077  
 (632) 712-4656*

**GEOSEA '95**

February 15-18, 1995  
 Metro Manila, Philippines

**Reply Form**

Name: .....

Organization/Address: .....

.....

.....

.....

.....

Telephone: ..... Fax: .....

- I intend to attend the conference
- I intend to submit an abstract for oral presentation
- I intend to submit an abstract for the poster session
- I intend to attend field trips
  - 1. Mayon Volcano-Tiwi Geothermal Field-Paracale Gold Mines (3 days)
  - 2. Pinatubo Volcano-Dizon Porphyry Copper-Zambales Ophiolite (2 days)
  - 3. Pinatubo Lahars-Baguio Gold and Copper Mines (3 days)
  - 4. Taal Volcano-Makban Geothermal Field-Caliraya Hydroelectric Plant-Calaca Coal-fired Power Plant (2 days)
  - 5. Ecotourism areas-Offshore Oilfields (3 days)
- I/my institution intend/s to exhibit..... products.

*Provisional title of paper*

.....

.....

Detach this form and send to:

**The Organizing Committee  
 GEOSEA '95  
 Geological Society of Philippines  
 North Avenue, Diliman, Quezon city  
 PHILIPPINES**

# KALENDAR (CALENDAR)

## 1993

### →→→ November 1993←←←

**November 5-21**

**CIRCUM-PACIFIC AND CIRCUM-ATLANTIC TERRANE**, Int'l mtg., Guanajuato, Mexico. (David G. Howell, USGS, MS 902, 345 Middlefield Road, Menlo Park, Calif. 94025. Fax: 415354-3224)

**November 15-30**

**INTERNATIONAL GEOLOGICAL CORRELATION PROGRAMME**, mtg., Santiago, Chile. (M. Vergara, Universidad de Chile, Departamento de Geologia y Geofisica, Casilla 13518-Correo 21, Santiago, Chile. Fax: 56-2-6963050)

**November 15-30**

**LOW TEMPERATURE METAMORPHISM: PROCESSES, PRODUCTS AND ECONOMIC SIGNIFICANCE** (IGCP Project 294 Thematic Meeting), Santiago, Chile. (Professor M. Vergara, Universidad de Chile, Departamento de geologia y Geofisica, Casilla 13518-Correo 21 Santiago, Chile. Telefax: 56 2-6963050)

## 1994

**Jan 27-28**

**DYNAMIC GEOTECHNICAL TESTING**, symposium, Reno, Nev. (Dorothy Savini, American Society for Testing and Materials, 1916 Race St., Philadelphia, 19103-1187. Phone: 215/299-5413)

**June 5-11**

**GEOCHRONOLOGY, COSMOCHRONOLOGY AND ISOTOPIC GEOLOGY (ICOG-8)**, mtg., Berkeley, Calif. (Garniss H. Curtis, Institute of Human Origins-Geochronology Center, 2453 Ridge Road, Berkeley, 94709. Phone: 415/845-4003. Fax: 415/845-9453)

**June 6-10**

**EUROPEAN ASSOCIATION OF EXPLORATION GEOPHYSICISTS** (56th Annual Meeting and Exhibition), Austria Center, Vienna, Australia. (Evert Van der Gaag, Business Manager, European Association of Exploration Geophysicists, Utrechtseweg 62, NL-3704 HE Zeist, the Netherlands. Phone: (03404) 56997; telefax (03404) 62640; telex: 33480)

**June 12-15**

**AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS**, ann. mtg., Denver. (AAPG, Box 979, Tulsa, Okla. 74101. Phone: 918/584-2555. Fax: 918/584-0469)

**July 1-5**

**HYDROMETALLURGY**, int'l mtg., Cambridge, England, by Society of Chemical Industry and Institution of Mining and Metallurgy. (SCI, 14/15 Belgrave Square, London, England SW1X8PS. Phone: 071 235 3681. Fax: 017 823 1698) [December '92]

**Aug 21-24**

**AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS**. Int'l. mtg., Kuala Lumpur, Malaysia. (AAPG Box 979, Tulsa, Okla. 74101. Phone: 918/584-2555. Fax: 918/584-0469)

## 1995

**Mar 5-8**

**AMERICAN ASSOCIATION OF PETROLEUM GEOLOGISTS**, ann. mtg. Houston. (AAPG, Box 979, Tulsa, Okla. 74101. Phone: 918/584-2555. Fax: 918/584-0469)

**May 29-June 2**

**EUROPEAN ASSOCIATION OF EXPLORATION GEOPHYSICISTS** (57th Annual Meeting and Exhibition), Glasgow, UK. (Evert van der Gaag, European Association of Exploration Geophysicists, Utrechtseweg 62, NL-3704 HE Zeist, The Netherlands. Phone: (03404) 56997; telefax: (03404) 62640; telex: 33480)

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# BULETIN PERSATUAN GEOLOGI MALAYSIA

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BULLETIN OF THE GEOLOGICAL SOCIETY OF MALAYSIA

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SPECIAL ISSUE ON PETROLEUM GEOLOGY VOL IV

KANDUNGAN (CONTENTS)

- 1 **C-GC-MS and its application to crude oil analysis**  
Paul A. Comet, Ooi Siew Tin & Yap Ai Bee
- 27 **Estimating reserves in thinly-laminated sands with the help of Petrographic Image Analysis (PIA)**  
T. Kennaird, D. Bowen & J.W. Bruinsma
- 39 **DMO and NMO as applied in seismic data processing**  
Jiunnyih Chen
- 53 **Seismic processing applications on a personal computer**  
Geophysical Service Malaysia Sdn. Bhd.
- 65 **The hydrocarbon potential and tectonics of Indochina**  
Masao Hayashi
- 79 **Structural and stratigraphic configuration of the Late Miocene Stage IVC reservoirs in the St. Joseph Field, offshore Sabah, NW Borneo**  
H.D. Johnson, J.W. Chapman & J. Ranggon
- 119 **Sedimentology and reservoir geology of the Betty Field, Baram Delta Province, offshore Sarawak, NW Borneo**  
H.D. Johnson, T. Kuud & A. Dundang

Editor  
G.H. TEH

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DECEMBER 1989

No. 25

Price: M\$40.00

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  
59100 Kuala Lumpur  
MALAYSIA

# BULETIN PERSATUAN GEOLOGI MALAYSIA

## BULLETIN OF THE GEOLOGICAL SOCIETY OF MALAYSIA

### KANDUNGAN (CONTENTS)

- 1 Environment of placer gold deposits in northern Pahang  
Tan Teong Hing & Lim Kin Leong
- 13 A gravity survey of Perlis, Kedah and Penang  
Alan J. Burley & Jamaludin Othman
- 21 Prospect over and around a strange hill  
K.F.G. Hosking
- 35 Stratigraphy of the Mantanani Islands, Sabah  
M.B. Idris & K.H. Kok
- 47 A summary of the Quaternary geology investigations in Seberang Prai, Pulau Pinang and Kuala Kurau  
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Aw Peck Chin
- 201 Texture and composition of cave rock phosphate in Peninsular Malaysia  
Aw Peck Chin

Editor

G.H. Teh



APRIL 1990

No. 26

Price: M\$40.00

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  
59100 Kuala Lumpur  
MALAYSIA

# BULETIN PERSATUAN GEOLOGI MALAYSIA

## BULLETIN OF THE GEOLOGICAL SOCIETY OF MALAYSIA

### SPECIAL ISSUE ON PETROLEUM GEOLOGY Vol. V

#### KANDUNGAN (CONTENTS)

- 1 A Triassic "reefal" limestone in the basement of the Malay Basin, South China Sea: Regional implications  
Fontaine Henri, Rodziah Daud & Singh Updesh
- 27 Depositional environments, diagenesis, and porosity of reservoir sandstones in the Malong Field, offshore West Malaysia  
Noor Azim Ibrahim & Mazlan Madon
- 57 A discussion of "SNIFFER" geochemical surveying offshore Malaysia  
Mark E. Geneau
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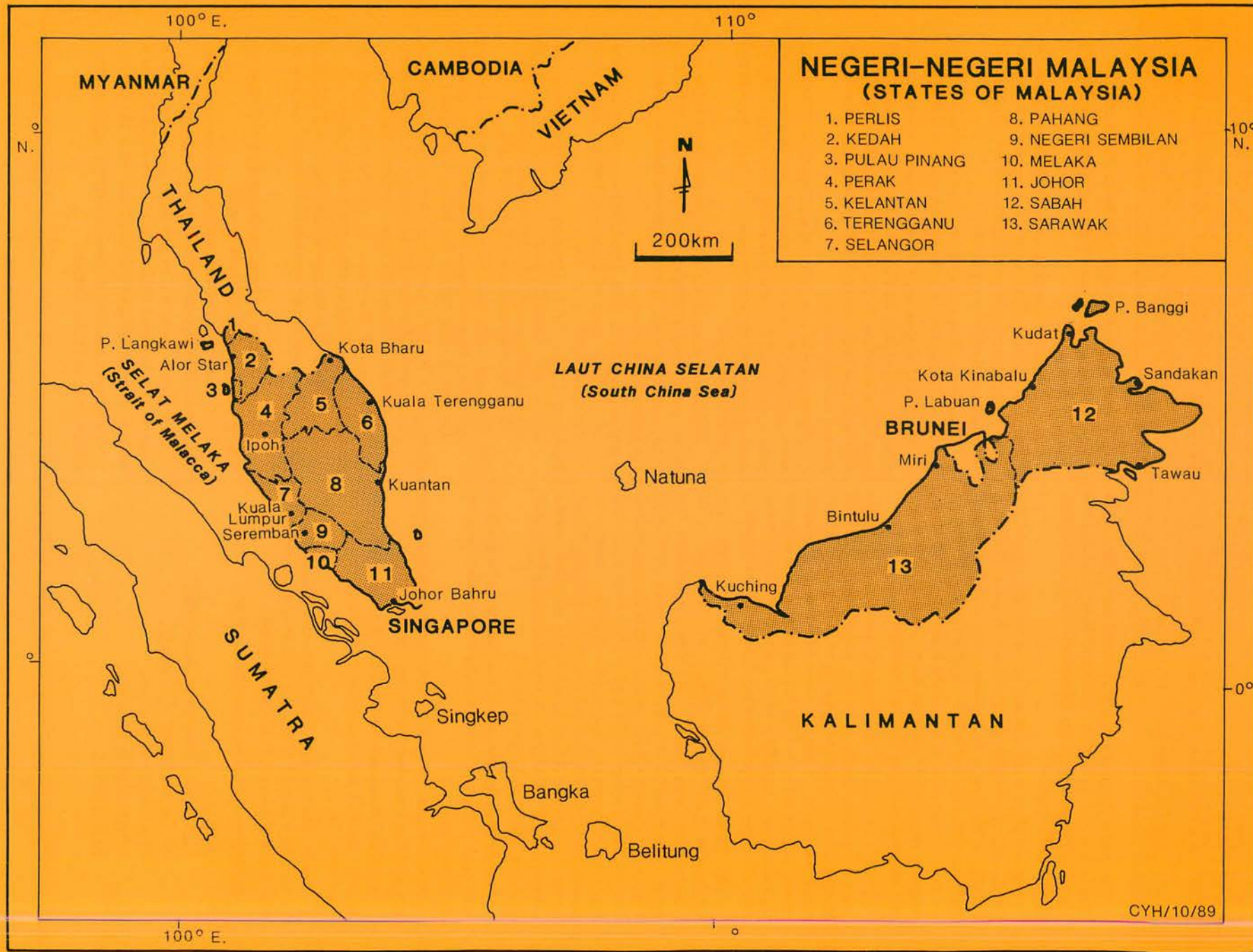
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