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PERSATUAN GEOLOGI MALAYSIA
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Tujuan Persatuan Geologi Malaysia adalah untuk memajukan sains bumi, terutamanya di Malaysia dan tempat-tempat berhampiran. Sesiapa yang ingin menjadi ahli Persatuan sila dapat 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 nearby areas. Anyone interested in becoming a member of the Society should obtain the necessary forms from the Hon. Secretary.

Some Bahasa Malaysia (Malay) geographical terms

Bukit (Bt)	- hill	Kuala (K.)	- mouth of river
Genting (Gtg.)	- pass	Pulau (P.)	- island
Gunung (G.)	- mountain	Sungai (S.)	- river
Jalan (Jln.)	- road, street	Tanjung (Tg.)	- cape
Kampung (Kg.)	- village	Teluk (T.)	- bay

G E O L O G I C A L N O T E S

Overtured Structures in Kenny Hill Formation, Selangor

H.D. Tjia, Jabatan Kajibumi, Universiti Kebangsaan Malaysia

The deformed metasedimentary rocks of Kuala Lumpur and surroundings may be divided into two sequences, one of lower Palaeozoic and the other of late-upper(?) Palaeozoic age. Locally the lower Palaeozoic rocks have been observed to possess isoclinal folds with NNW to northerly strikes and eastward dipping foliations or axial planes. Gobbett (1964) suspects that the rocks have been deformed into generally east-west trending structures by mid-Palaeozoic time.

The probably late-upper Palaeozoic metasediments constitute the so called Kenny Hill formation that is composed of almost non-fossiliferous interbeds of argillite, lutite, and arenite (all with tuffaceous admixtures) that generally possess a low degree of metamorphism. The pelitic layers are shale, mudstone, and phyllite with thicknesses in the range up to a few decimetres. The psammitic layers are locally schistose and have thicknesses in the dm to m range. The common primary structures consist of graded bedding, cross lamination, flaser bedding (often with rip-off structures), up to 4 m wide scour-and-fill structures, organic tubes, and small isoclinal to recumbent slump folds. Mid-Mesozoic (130-185 my; Hutchison, 1973, p. 237) granite is intrusive into the sequence. A detailed lithologic description of the Kenny Hill rocks has been published by Stauffer (1973).

Gobbett & Tjia (1973, fig. 10.4) have compiled earlier evidence and have presented the structure of the Kenny Hill formation as a 7 km wide, generally north-south striking, open syncline with moderate dips. Yin (in prep., cited by Stauffer, 1973, p. 90) has noted decollement structures at the base of the formation overlying the Silurian-Devonian Kuala Lumpur Limestone; a possible low-angle thrust is suggested. Based on sedimentological and some negative structural evidence, Choy (1970) and Yeap (1970) are convinced that the Kenny Hill beds must be interpreted as a single synclinal structure.

At Bukit Pantai, unusual sedimentary structures (pseudo-nodule, probably load-casted ripples, a special type of groove cast, and sole injections) together with moderate dips (25° - 27°) in Kenny Hill beds have led me to suggest overturning of at least a 50 metre sequence across the strike. I further proposed that the formation in the Kuala Lumpur area may well represent large-scale isoclinal to recumbent structures (Tjia, 1974).

Tan & Yeap (1975) observe that the Kenny Hill rocks "..... are almost entirely devoid of any tectonic features indicative of intense compression or stretching such as slaty cleavage, boudinage or tectonically deformed clasts of mineral grains".

In a recent paper Tjia (1976) shows that isoclinal to recumbent folding and thrust faulting in consistent direction are widely distributed in Selangor and represent tectonic deformation. The localities studied include islets in the Strait of Malacca off the Selangor coast, two localities in Ulu Langat, three localities at Universiti Kebangsaan Malaysia's campus at Bangi, one each at Shahalam and Bukit Gasing, and three other localities within Kuala Lumpur. Structural evidence for the interpretation consists of small to median scale isoclinal to recumbent folds, low-angle to ordinary reverse faults, uniformly tilted layers which occasionally shows inversion by sedimentary (graded bedding, scour fills) and structural features (mainly highly inclined foliation associated with gently dipping fracture and slaty cleavages). Since the printing of this article, a 20 m high and 100 m long slope has been cleared at the Bangi campus near the administration building. A sketch of the structure at that locality is shown in figure 1.

The deformation at the north end of the section is partially masked by weathering and slope wash. However, the general picture suggests refolding. In other words, the present isoclinal antiform and synform may have been a single synform before the latest folding. The attitudes of fold limbs and thrust fault indicate transport towards WNW, which is in agreement with a similar interpretation for the State of Selangor (Tjia, 1976).

Figure 2 is a copy of the Bukit Damansara section published in the former article. The section is especially interesting for its suggestion of recumbent folds at its west end.

I agree with Tan & Yeap (1975) that signs of intense compression or stretching in the Kenny Hill rocks are not common. On the other hand, the occurrences of slaty cleavage in association with inverted foliation and the presence of at least median scale isoclines and recumbent folds are proofs for tectonic deformation and cannot be explained as representing slumping. The scarcity of structural features referred to by Tan & Yeap may have been due partly to wide spacing of zones of brittle deformation (= thrust fault zones) with more ductile deformation of the rocks between these zones, and partly to the limited extent of many outcrops that were studied by former investigators. In my studies, reverse fault zones in Kenny Hill rocks rarely show up in excess of 50 cm widths. Among the few exceptions is the 60 cm, N350E striking and 10 to 20 degrees eastward dipping reverse fault zone at Bukit Damansara (fig. 2). Generally the reverse fault zones are about 20 cm thick.

Finally, the above mentioned structural style of the Kenny Hill rocks very well agrees with those predicted and interpreted according to R.W. van Bemmelen's free-gliding epidermal or mesodermal types of secondary tectogenesis. These types of gravity tectonic structures have also little evidence of crystalline deformation because they only involve the higher levels of the earth's crust.

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Captions of figures (see opposite page)

Figure 1. Probably refolded isoclinal structures in phyllite/schistose tuff interfoliations exposed in a slope near the administration building of Universiti Kebangsaan Malaysia at Bangi. Movement towards NW is suggested.

The top part joins the lower section at the jagged edges.

Figure 2. More than 250-m long slope at Bukit Damansara housing development complex exposing isoclinal and probably recumbent folds in Kenny Hill layers. Tectonic motion is westward.

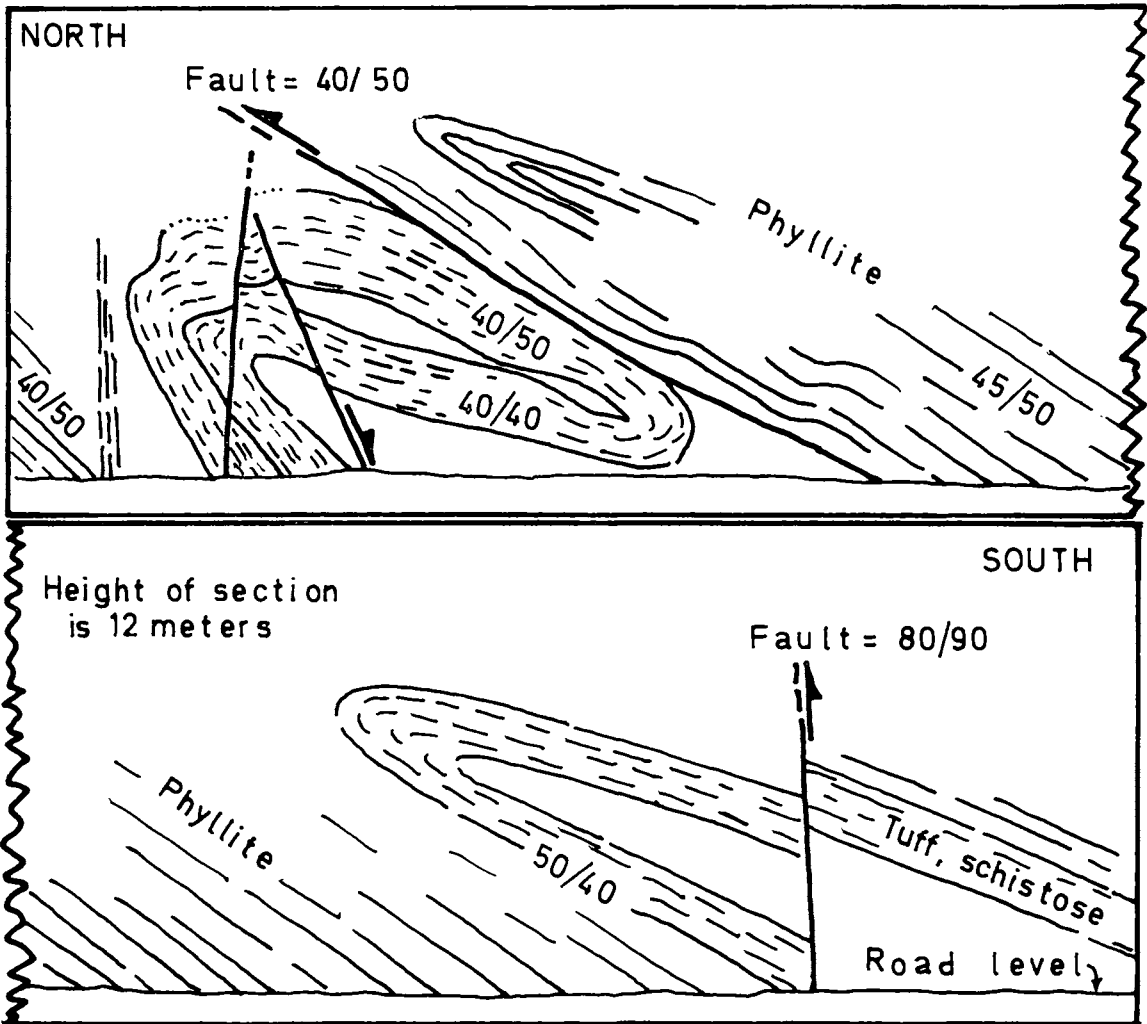


Fig. 1

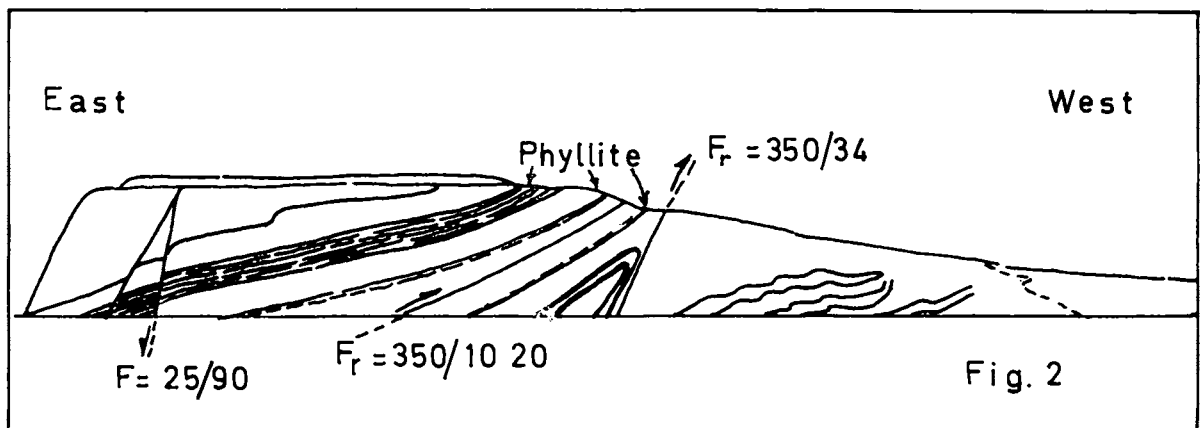


Fig. 2

Implications of a Quartz Dyke near Kuantan, Pahang

P.H. Stauffer, Jabatan Geologi, Universiti Malaya

Vertical dykes of brecciated quartz are a well-known feature of the Main Range of Malaya, but have hardly ever been reported from elsewhere in this country. The one exception of which I am aware is a quartz dyke mapped and described by Fitch (1952) at Bukit Rengin, about six km west of Kuantan, Pahang (see fig. 1). In August 1975, during field work with the Third Year Geology class from the University of Malaya, we were able to reexamine this feature, which is now in part very well exposed because of clearing and excavation for building sites. Our observations indicate that this quartz dyke sheds some light on regional structural and tectonic problems.

Fitch (1952) describes Bukit Rengin as being formed of rhyolitic rocks cut by a large quartz vein, which is mostly massive, in part saccharoidal, and in part showing a boxwork of intersecting quartz veinlets. He says it is the only "really large" quartz vein in the Kuantan area (p. 37), and he regards it as a late stage of the intrusion of tin granites in the area (p. 32).

Field examination of the Bukit Rengin quartz dyke shows it to be closely similar to the Klang Gates quartz dyke and other quartz dykes in the Main Range. Like them, it consists of brecciated and rebrecciated quartz, with numerous generations of veins formed partly by free-growth crystals. Some of the youngest fractures are incompletely filled, leaving open spaces lined by euhedral crystal terminations. Areas of saccharoidal quartz may be remnants of the original dyke rock. The country rock, which is exposed on the flanks of the hills, appears to be a rather altered fragmental volcanic rock, with abundant quartz crystals and some larger fragments of sandstone and mudstone in a fine-grained matrix. It is also veined with quartz. These rhyolitic rocks have been described as mainly ash-flow tuffs by Hanif (1975), who also shows the quartz dyke on his map but does not discuss it in the text of his thesis.

The brecciated nature of the quartz dyke suggests that it formed in association with significant movement along a fault and represents repeated filling of the fault trace. This inference is supported by the strong veining, shearing and local brecciation of the volcanic rock, and by the presence of fragments of this rock found rarely within the quartz dyke. The quartz dyke itself, and the most prominent quartz veins appear to be nearly vertical, suggesting that this fault is a wrench fault.

Although actual contacts at the edges of the quartz dyke are poorly seen, its trend direction can be accurately inferred from the

elongate ridges held up by it. These trend 130° to 150° in different parts. The thickness of the dyke can also be assessed, and where best exposed on Bukit Rangin it reaches at least 35 m.

If the Bukit Rangin quartz dyke represents a fault with significant movement, it should extend both to the northwest and to the southeast. Examination of its possible extension to the northwest is highly instructive. Some 15 km to the northwest of Bukit Rangin is a line of karst hills of Carboniferous limestone including (from south to north) Bukit Panching, Bukit Charas, Bukit Sagu, and Bukit Tenggek. This line of hills shows a prominent discontinuity or offset, Bukit Sagu and Bukit Tenggek being to the west of the strike extension of the two more southerly hills. Fitch (1952, p. 22) interpreted this discontinuity as indicating that the limestone occurs in two separate lenses, with the two more southerly hills representing a higher stratigraphic level. There is, however, no age difference detected from the faunas in the limestone. Tan (1972) considered several possible solutions to the problem, including offset along a fault, but concluded that evidence from the Panching area was not sufficient to resolve the question.

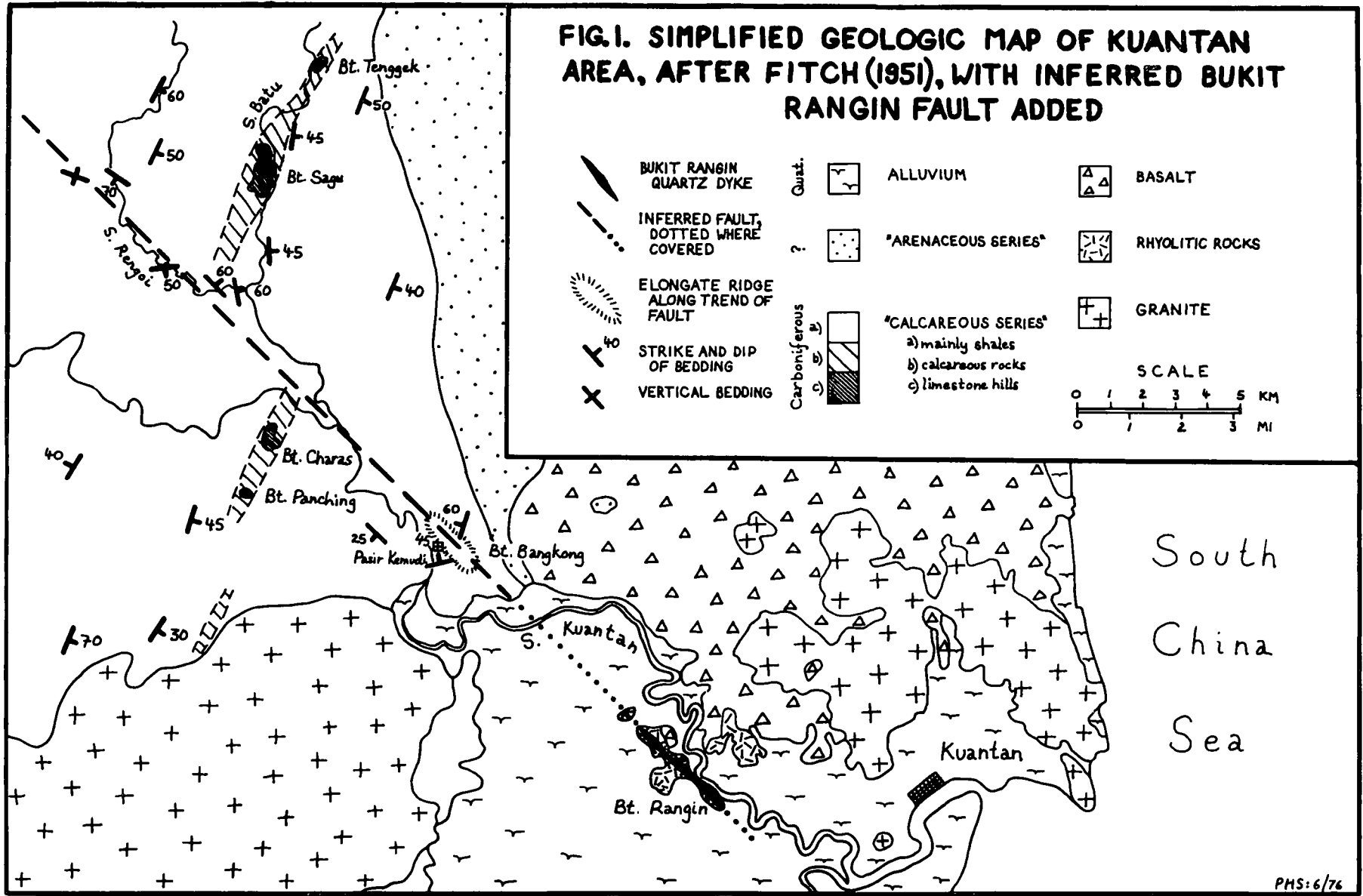
The line extending the trend of the Bukit Rangin quartz dyke to the northwest passes neatly between the two separate pairs of limestone hills (see fig. 1). In light of this it now seems highly probable that the arrangement of these hills is due to displacement along a fault following this trend. In support of the inference of this fault, it may be noted that anomalous strikes (i.e. differing significantly from the general strike of about 20°) occur in the shales of the "Calcareous Series" at several places along the trend of the inferred fault - near Pasir Kemudi, near the Sungai Rengoi-Sungai Batu junction, and along Sungai Rengoi.

Examination of aerial photographs of the area provides further support for the existence of a major structure along the trend of Bukit Rangin. Near Pasir Kemudi, the 2 km long ridge of Bukit Bangkong lies just along the trace of the inferred fault. This hill, although made up of "Calcareous Series" shales striking mainly about north-south (Fitch, 1952, p. 6), has a sharp linear crest aligned at about 145° , approximately parallel to the fault. This linear crest could represent another quartz dyke, or may be held up by shales hardened in some way along the fault.

Farther to the northwest, where the Sungai Rengoi follows the trace of the inferred fault, this stream exhibits a number of short but conspicuously linear reaches oriented parallel to that trace.

It is perhaps worth noting, also, that the Bukit Bangkong iron mine, to the northwest of Bukit Bangkong, is located about 1500 metres from the trace of the inferred fault.

FIG. 1. SIMPLIFIED GEOLOGIC MAP OF KUANTAN AREA, AFTER FITCH (1951), WITH INFERRED BUKIT RANGIN FAULT ADDED



If the above interpretation of the discontinuity in the Panching area limestone is correct, then the fault of Bukit Rangin shows about 4 km of left-lateral movement.

A further implication of the Bukit Rangin quartz dyke arises from its great similarity to the quartz dykes of the Main Range. Like them, it is a vertical body of brecciated quartz, almost totally barren of other minerals, achieving thicknesses locally of tens of metres, and its trend of about 135° is in the middle of the range of trends shown by Main Range quartz dykes. The inferred left-lateral movement on the Bukit Rangin fault agrees with the sense of movement of faults occupied by quartz dykes in the Main Range area (Stauffer, 1968) and indicates that all the quartz dykes may represent parts of a pattern of faults caused by the same stress system. This in turn suggests that at the time these faults formed eastern and western Malaya were already firmly united and behaving as a single tectonic block.

The time of formation of the faults represented by the quartz dykes in the Main Range must be Jurassic or younger, since they cut granites which mostly have late Triassic magmatic ages (Hutchison, 1973). It has been speculated that this fault system formed during the breakup of Gondwanaland (Burton, 1967), which may have included the separation of Malaya from a continental mass formerly adjoining on the west (Stauffer, 1974), and if this is correct it would seem that that separation could not have taken place earlier than the Jurassic.

Acknowledgments

A. Unya, T.W. Cheah, S.W. Yeap, S.K. Lam, D. Percival, T.H. Lim, and D. Selvaraj participated in the field work at Bukit Rangin which stimulated this note. C.S. Hutchison urged me to look at the aerial photographs, which proved a fruitful exercise.

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Evidence for the Occurrence of an Older Granitoid in Pulau Tioman, Pahang

T.T. Khoo, Jabatan Geologi, Universiti Malaya

The geology of Pulau Tioman has much to fascinate mineralogists, petrologists and even Quaternary geologists. Some of its most beautiful rocks are those produced by explosive volcanism. The object of this note is to describe one of these and to discuss its possible mode of origin and implications.

The rock occurs as several large blocks at the headland near the mouth of Sungai Baharu, north of Kampung Juara (fig. 1). This rock is composed of abundant pebble to boulder size fragments of a white granitoid and a dark grey volcanic rock embedded in a fine-grained groundmass. The rock fragments make up a greater portion of the rock than the groundmass and more of them are boulder size than pebble size. Granitoid fragments are more abundant than the volcanic fragments in the rock. A remarkable feature of the fragments is that most of them, especially the larger ones, have rounded edges. A sketch of the rock is shown in figure 2.

In thin-section the groundmass is seen to be composed of a fine-grained quartzo-feldspathic mosaic. Embedded in the groundmass are larger quartz crystals and altered rock fragments. The larger quartz crystals are anhedral, sometimes well rounded and sometimes show resorbed edges. They are often cracked and shattered but display rather sharp extinction. They make up about 5% of the groundmass and their sizes range from 0.3 mm to 2 mm across. The altered rock fragments occur as biotite-quartz-feldspar aggregates, amphibole-clinopyroxene aggregates, quartzofeldspathic aggregates, etc. These aggregates are made up of small crystals of the minerals mentioned. The aggregates are randomly orientated and they vary in shape from tabular pieces about 2 mm in length to elongate streaks. The minerals in the quartzofeldspathic aggregates are only slightly coarser grained than in the groundmass and such aggregates are not easily distinguished from the groundmass. The altered rock fragments constitute at least 10% of the groundmass.

The alteration of the rock fragments is probably due to metamorphism. Rocks in the area shown in figure 1 have been found to have a metamorphic imprint and sometimes clear garnet crystals can be found in the metamorphosed rocks. The rocks in the area are traversed by numerous granitic veins. Therefore, it is likely that the rock described here is metamorphosed and its groundmass could have been even finer grained before metamorphism.

What is the origin of this rock? The rock could be an agglomerate, which is a rock composed mainly of tephra, a large proportion of

which are bombs. The bombs can be derived directly from the molten magma of the same eruption and also torn from the wall of the conduit or from the basement beneath the volcano. Bombs derived from molten magma can be rounded during flight and bombs derived from the conduit or basement can be rounded by milling in the vent before ejection. The description of the Tioman rock resembles an agglomerate.

However, the description of the rock also resembles that of an intrusive breccia, which is a rock consisting of rounded or faceted blocks of any rock type enclosed in an igneous groundmass, sometimes tuffaceous. Intrusive breccia occurs as cross-cutting pipes or dykes of various dimensions. It is popularly believed to be formed by deep-seated explosive gas action ahead of rising magma. The rising gases with rock fragments and ash in suspension are believed to be capable of transporting torn blocks of wall rocks for considerable distances and at the same time the blocks can become rounded or faceted by attrition and abrasion during transport. The Tioman rock just described could therefore also be an intrusive breccia.

From the above discussion it appears that sometimes one should be more hesitant to call an agglomerate-like rock an agglomerate unless the mode of occurrence of the rock is known or some other distinctive evidences are available.

The published geological map of Pulau Tioman by Bean (1973) shows all the granitoids in the island as probably of Jurassic age* and all the volcanics as probably of Triassic age. Even though the ages are uncertain it is quite definite from the legend that it is believed that the volcanics are relatively older than the granitoids. There are, in fact, good field evidences to show that the volcanics are older, e.g. the intrusion of granitic rocks into the volcanics at the Kg. Juara area. The occurrence of granitoid boulders in the rock described above, however, indicates the possible presence of an older granitoid in the island which may or may not be exposed. Bearing in mind the possible origins of the rock, it appears that the granitoid boulders are either fragments of a granitoid basement above which the palaeo-volcanoes were built or fragments of coarse-grained equivalent of the volcanics formed at depth. If the latter case is true, the granitoid boulders will be of the same age as the volcanics. If the former case is true, the occurrence of an Upper Palaeozoic or older granitoid basement in Pulau Tioman is possible.

* A granitoid specimen from Pulau Tioman was found to give a K-Ar age of 74 ± 2 my. This result shows that the specimen is no younger than Upper Cretaceous.

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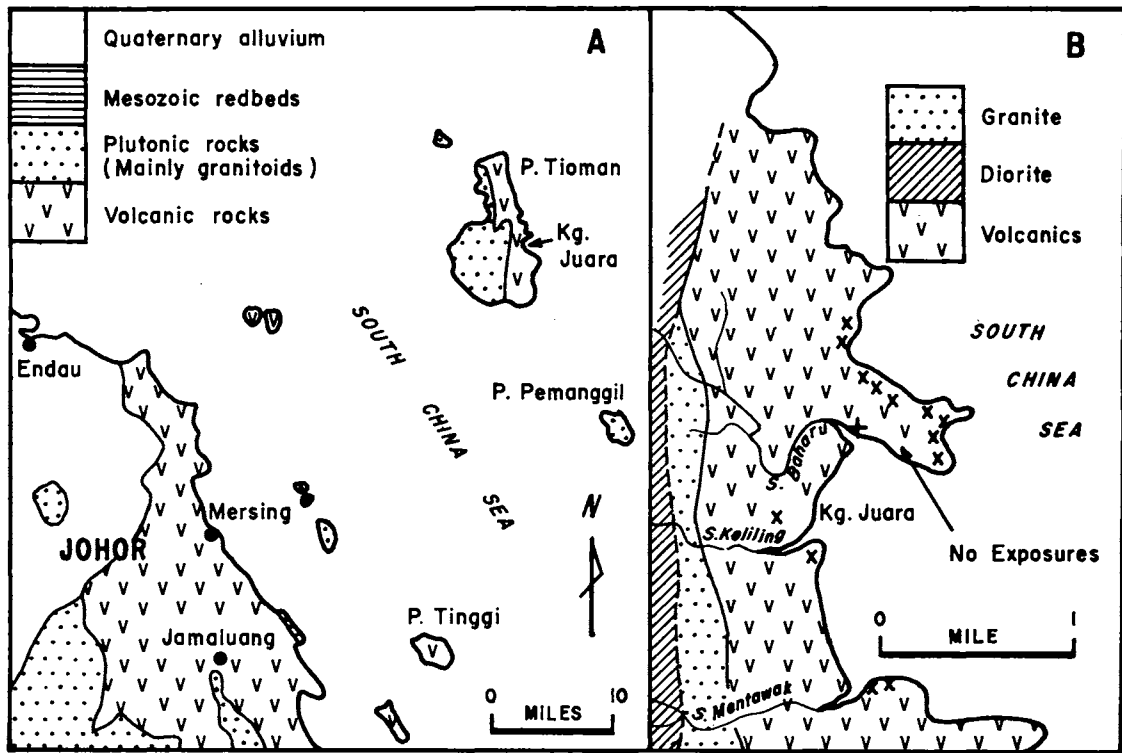


Fig. 1: A - Location and general geology of the area.
 B - Geology of the Kg. Juara area, P. Tioman.
 + locality of agglomerate-like rock
 x locality of volcanic rocks invaded by granitoid

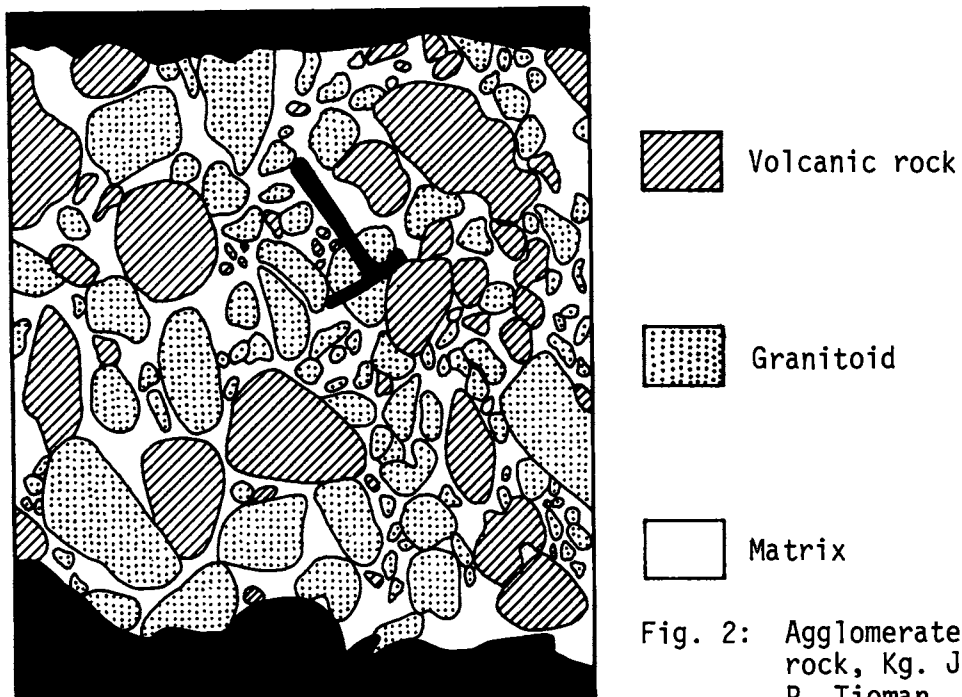


Fig. 2: Agglomerate-like rock, Kg. Juara, P. Tioman.

M E E T I N G S O F T H E S O C I E T Y

I.J. Griesson: Computer applications and systems in exploration

Mr. I.J. Griesson from Exxon Production Malaysia delivered the talk to members of the Society in the lecture hall of the Dept. of Geology, University of Malaya at 5.00 p.m. on 22 July 1976.

In this talk he gave a general outline of the role of computers in the processing of seismic data. An account on the relative sizes of computers used in the processing of raw data, their functions and capacities was given. The role and need of high speed computers in the processing of seismic data were stressed. It was an informative talk.

NKC

A.R. Berger: The Donegal granites

Dr. A.R. Berger of Memorial University delivered the talk at 5.00 p.m. on 2 August 1976 in the Dept. of Geology, University of Malaya. About 50 lucky people attended the talk. Dr. Berger is one of the experts on the geology of Donegal, particularly the granitoids, and has worked on the granitoids with Prof. W.S. Pitcher for some years. Together they have written the now classic book on the "Geology of Donegal: a study of granite emplacement and uproofing".

The geology of Donegal has been intensively studied since the early '50s when the granite controversy was at its height. It was thought by Prof. H.H. Read, one of the chief protagonists, that much of the problems of the granite controversy could be elucidated if the geology of a granitoid terrain could be studied in great detail. The Donegal area was chosen.

One of the facts which Donegal geologists like to mention with much pride, and Dr. Berger is no exception, is that the geology of Donegal has been the subject of well over 120 papers and numerous doctorate theses mainly from London and Liverpool universities. The Donegal area has not only been well trodden by some of the best British petrologists but also by quite a number of eminent petrologists from developing countries, e.g. Prof. M.K. Akaad (Egypt), Dr. R.S. Sinha (India) and Dr. M.H. Naggar (Egypt).

Given only about an hour, Dr. Berger wisely kept his talk mainly on the four main plutons in Donegal - the Main Donegal, Thorr, Rosses and Ardara. The Fanad, Tooris, Barnesmore and Trawenagh Bay plutons were superficially mentioned to illustrate the complexities of the geology of the granitoids of the relatively small area. The envelopes of the plutons were also described briefly.

The various Donegal plutons were late Caledonian and were emplaced within a rather short range of time. The invaded rocks are low grade regional metamorphics of Dalradian lithologies. The Dalradian sequences exposed in Donegal are in fact much better than those in the Scottish highlands.

The oldest pluton is the Thorr body which has been cut by the later Rosses and Main Donegal plutons. The Thorr pluton is granodioritic and typically very xenolithic. Some of the xenoliths appear to be spalled-off slabs of roof rocks which have sunk into the magma. The Thorr magma also appears to have reacted with the xenoliths giving rise to compositionally different granitoids adjacent to the xenoliths. Trend surface analysis confirmed this observation.

The Rosses pluton is a cauldron subsidence with four concentric rings of granitoids. The composition of the granitoids appear to be contaminated by the subsidence of columns of roof rock into the magma. The contact between 2 rings of granitoids is sharp and sometimes step-like. At one locality the contact between 2 rings is rich in beryl which has been mined.

The Ardara pluton is a diapir with a foliated outer rim and a non-foliated core. Field evidences suggest that the pluton grew by two upwellings of magma which exerted considerable outward pressure on the country rocks. The earlier magma formed the foliated rim of the diapir.

The Main Donegal pluton is the most complex of all the Donegal plutons. The granitoid is foliated with bands of darker granitoid and inclusion trains. One explanation is that the pluton is emplaced by lateral wedging combined with horizontal stretching. However, Dr. Berger believes that the pluton, before final consolidation, could be rather elliptical in outline but due to deformation the body stretched and became elongate. He said that during deformation orientation of inclusions forming trains resulted. To illustrate the mechanism he gave an analogy of the compression of a piece of butter between two vertical steel plates.

Dr. Berger concluded his talk by pointing out that the belief that cauldron subsidences represent high-level intrusions and diapirs suggest deeper level intrusions should be evaluated as the Donegal plutons were emplaced within a short range of time and at about the same level.

An interesting discussion followed his talks. There were questions on trend surface analysis of the Thorr pluton, on his plate-and-butter mechanism for the deformation of the Main Donegal pluton and on the occurrences of kyanite in the aureole rocks.

TTK

Forum on "The role and prospects of Malaysian geologists"

The forum was held at 5.00 p.m. on 13 August 1976 in the Dept. of Geology, University of Malaya. It was organised on the occasion of the 20th Anniversary open day of the Dept. (see other News). Members of the panel were

- (a) Encik D. Santokh Singh (Geological Survey of Malaysia)
- (b) Mr. D.R. Walker (Chamber of Mines, States of Malaya)
- (c) Mr. J.H. Armitage (Exxon Production Malaysia)
- (d) Emeritus Prof. Chin Fung Kee (Jurutera Consultants) and
- (e) Dr. M. Ayob (Petronas).

Encik W.K. Lee, the President of the Society, chaired the meeting. About 120 people were present and the meeting went on for 2 hours. Dr. A. Nawawi, Dean of Science, University of Malaya, representing the Vice-Chancellor of the University, delivered an opening address. A brief report of the proceedings is given below.

Dr. A. Nawawi

At present the number of students interested in reading geology as one of the subjects has to be limited owing to the space problem. However, with the introduction of the new degree structure the number of students able to read geology will increase and also emphasis will be placed on courses of value to the country.

Encik Santokh Singh

In the immediate future the role of geologists in the country will not change much and basic geological and mineral resources mapping of the country still have to be done. The prospects of geologists wishing to serve in the Survey will depend on the vacancies arising such as by staff resigning to join the private sector.

Future prospects for Malaysian geologists is bright as rapid urban and rural development of the country will create a demand for raw materials such as road metal and cement which will require the skills of the geologists. The professional services of geologists will also be required in many future projects and in the tin mining industry.

It is important for the profession to show that it has much to contribute to the country such as in the fields of mineral exploitation, environmental controls, etc.

Mr. D.R. Walker

As richer and more accessible mineral deposits become scarcer, mining has now become more and more sophisticated and the services of geologists are really essential. As an indication of this trend, the number of geologists directly employed by mining companies at present is about 25 compared to none some fifteen years ago. Geologists have much to contribute to Malaysia and that opportunities to exercise their skills will be available.

Mr. J.H. Armitage

A new recruit in Exxon will have to spend about 2 years at well sites and the next 10 years on jobs such as computer applications, regional studies and geophysics. After this there will be opportunities for promotion to project leader, chief geologist, etc.

Exxon at present has 6 geologists graduated from the University of Malaya and one of them is now a project leader. Some of them have been sent overseas to gain more expertise. There are plans to hire more geologists.

The Chairman

The outcome of the negotiations between the petroleum companies and Petronas will have significant influence on the role and prospects of Malaysian geologists in the industry.

Dr. M. Ayob

It is hoped that an agreement between Petronas and the petroleum companies will be made soon and explorations will go on as planned.

Geologists keen in joining the petroleum industry should be adventurous and hardworking; often working at unusual places and hours which may be rather awkward for female geologist. Relevant courses such as

computering, geophysics and palaeontology should be studied at universities for those wishing to join Petronas.

Prof. Chin Fung Kee

Undergraduates should be given adequate field training. Too narrowly specialized graduates may not be able to be employed if the jobs they are trained for are not available. If the right kind of graduates are produced there should be no fear that they will not be able to find suitable employment.

The Chairman

Questions are invited from the floor.

Dr. C.S. Hutchison

What are good fields for female geologists?

Santokh Singh: Micropalaeontology.

Walker : Pollen micropalaeontology.

Armitage : There are successful female geologists in the petroleum industry.

Chin : There should be nothing to hamper a strong girl regarding the choice of field.

Ayob : Laboratory-oriented fields appear to be most suitable.

Encik E.B. Yeap

What are the monetary incentives for geologists in the various organisations employing geologists?

Santokh Singh: Salaries in the Survey range from \$750 to about \$2700 per month. Geologists in the field will get \$15 a day as 'hardship allowance'.

Walker : A fresh graduate will get about \$1300 in the mining industry.

Armitage : Salaries paid by the petroleum industry are comparable to those paid by the mining industry. However, job satisfaction should be more important than monetary rewards in selecting jobs.

- Chin : Agreed with Mr. Armitage that job satisfaction is more important. One cannot make a million from any profession and professionals who are now millionaires probably become so by careful investments.
- Ayob : Petronas tries to give attractive salaries as well.
- Hutchison : Higher risks may go with jobs commanding higher salaries.
- Armitage & Chin: Professionals in the private sector work very much harder for the little extra they get.

Encik Abdul Ghani Rafek

Is there a redundancy of geologist at present? Some recent graduates are still unemployed.

- Santokh Singh: Recently there were 2 vacancies for geologists to serve in the Geological Survey in Sabah and there were only 2 applicants!
- Armitage : Exxon and probably other petroleum companies may increase their intake of geologists once a satisfactory agreement is negotiated with Petronas.
- Walker : Agreed with Mr. Armitage that at present there is a 'low' in job opportunities for geologists. More geologists may be required once the economic and investment climates become brighter.
- Ayob : Services of geologists will be required as the area of exploration widens to include areas under deeper waters.

Mr. S.P. Sivam

This question is directed at Mr. Armitage. What are the opportunities for local geologists to become members of the 'international staff' of foreign petroleum companies?

- Armitage : Exxon has invested a lot of time and money in the training of local geologists and would, of course, like to 'keep' them. However, there are problems in placing local geologists elsewhere. For example, the Indonesian authorities would like to see trained Indonesian geologists remaining in Indonesia and the Malaysian authorities would like the companies to train local staff. So it will be difficult to place the Indonesian geologists here.

The Chairman

Prof. H.D. Tjia, what is the expansion and recruitment programme of the Dept. of Geology, Universiti Kebangsaan Malaysia?

Prof. H.D. Tjia: The Dept. will place emphasis on engineering geology as the University of Malaya is concentrating on mining geology. The economic geology section of the Dept. will be rather small. In addition there will be sections on basic geology, geophysics and 'soft-rock' geology.

Mr. Mohd. Shah

To what extent can geologists contribute towards the search for groundwater in Malaysia to alleviate drought and also possibly as an export item since there are plans to export water to the Middle East in oil tankers?

Santokh Singh : The Survey has discovered groundwater at several places such as Kota Baru, Kelantan and the programme to search for groundwater will be expanded. Groundwater geology is one field in which geologists can be gainfully employed.

Encik Chan See Chin

How many local geologists are employed by the petroleum companies in Malaysia?

Armitage : Exxon has 6 local geologists. It is uncertain how many Shell has.

Ayob : Only one local geologist was employed by them before 1973. After that date they recruited more probably because the Malaysians decided to participate in the petroleum industry as well.

Armitage : More local geologists were recruited later because of developments in the exploration projects.

Mr. D.R. Walker

Malaysian geologists are highly regarded overseas. How many undergraduates in the audience are keen to serve overseas?

Chairman : Will those keen to do so please put up their hands. (Only one hand was seen!)

The Chairman

Local geologists are also very flexible. One of them is doing very well in mineral trading and another is a successful executive in an aerated water company.

Dr. C.S. Hutchison

Propose a vote of thanks to the panel for a very interesting and successful forum.

TTK

NEWS OF THE SOCIETY

Resignation of the Hon. Secretary

Mr. S.P. Sivam has resigned as the Hon. Secretary of our Society in early July. Encik Andrew Spykerman from the Associated Mines has been coopted to fill the post.

Resignation of the Assist. Secretary

Encik S. Paramanathan has resigned as the Assist. Secretary on 10 August 1976. He has gone to Belgium to conduct some research on tropical soils. It is likely that he will be away for more than 6 months.

Encik J.K. Raj, a Councillor, has been coopted to be the new Assist. Secretary. A Councillor position is therefore vacant and will be filled by cooption.

IMA Meeting, Sydney

Dr. B.K. Tan, Vice President, represented the Society at IMA meetings in Sydney. He was in Sydney to attend AGID Council meetings and the 25th International Geological Congress.

Dr. C.S. Hutchison, the Chairman of the IMA subcommittee, was unable to attend the Sydney IMA meetings.

Ipoh Discussion Meeting

The response to the circular announcing the meeting is encouraging. Several members have indicated that they will present papers. The date of the meeting which has been tentatively fixed on 10 December is still not finalised. Members will be informed periodically on the developments.

NEWS OF MEMBERS

A Letter from Sitges

Calle Isla de Cuba, 23, 1^o, 3,
Sitges, (Barcelona)
Spain.

July 18 1976

Dear Whye Kwong

On the night* I was so overwhelmed by the occasion that I was unable to thank you adequately for the wonderful party you gave us and for the beautiful pewter stein that will always occupy a prominent place in our flat. Wherever I fill this beautiful example of the metal-worker's art with beer, and I have every reason to believe that it will be very often!, I shall remember the Geological Society, although it will not require the presence of a piece of pewter for me to do that.

Being a member of the Society has been, for me, a delightful experience. It has enabled me to make many friends, to meet all manner of interesting people, and to enlarge my geological experience.

The Society's rate of growth has been tremendous. It is now widely known and appreciated throughout the Geological World, largely, I think, because of the conferences it has organised and/or hosted, and the important contributions it has made to the geological literature of Southeast Asia. May it continue to grow and contribute and flourish.

I must also thank you for honouring me with Honorary membership of the Society.

Again, many thanks, from both of us, for many things.

Yours sincerely

Ken Hosking

* Farewell dinner party for the Hoskings. Ed.



Whats in the box? Natasha opening the present from well-wishers. Looking on is the Treasurer.



A pewter stein! Ken showing it to everybody. Gentleman enjoying his drink is the President.

New Addresses

J.H. Dayvault, P.O. Box 268, Santa Cruz, Ca. 95060, USA.

W.F. Hooper, Gulf Energy & Minerals Co. Int., P.O. Box 2100, Houston,
Texas 77001, USA.

R.B. Lulofs, Serendah Estate, Serendah, Selangor.

R.F. Ollington, 26 Princes Avenue, Southminster, Essex, England.

W.R. B. Omer-Cooper, Expl. Dept., BHP, GPO Box 86A, Melbourne, Vic. 3001,
Australia.

S.S. Sarkar, UNAZA, B.P. 862, Kinshasa XI, Zaire.

J.M. White, Jr., Conoco, Suite 201, Wharf Office Bldg., 2220 Buckhorn,
Woodlands, Texas 77380, USA.

O T H E R N E W S

IMA

Members of the Society will be saddened to learn of the death of Miss Marjorie Hooker, the Secretary of the International Mineralogical Association, on 4 May 1976 following an illness of several months.

CSH

Users' School on Quantitative Colour

The date are now confirmed as

Thursday, 30 Sept. - mid-day Saturday 2 Oct.

at Dept. of Geology, Imperial College, London, SW 7.

Accommodation for attending members will be at the Royal Hotel, Woburn Place, London.

The course will comprise 4 lectures, one discussion, 2 whole afternoons on practical work with modern apparatus. For further details, please contact Dr. N.F.M. Henry, Dept. of Mineralogy and Petrology, Downing Place, Cambridge CB2 3EW.

CSH

Indonesian Petroleum Association - Carbonate Seminar

A circular on the Indonesian Petroleum Association's Carbonate Seminar was received in mid-July. Part of the circular is reproduced below. Registration fee is US\$200.

"The Professional Division of the Indonesian Petroleum Association announces a Carbonate Seminar on aspects of oil exploration in

carbonate rocks to be held in Jakarta between 12th and 19th September, 1976. The aim of the Seminar are to bring together those working in and those interested in carbonates in Indonesia to exchange ideas and to discuss the problems involved.

Attending the Seminar will be Dr. R.G. Bathurst, who will present papers on aspects of carbonate sedimentation and diagenesis. Dr. Bathurst, from the University of Liverpool, United Kingdom, is internationally known for his extensive work on carbonates.

The Seminar will consist of two parallel sessions:

OPEN SESSION

This will be a one day session on Monday, 13th September open to any interested parties. There will be illustrated talks on various aspects of carbonate rocks in Indonesia, seismic interpretation and modern reefs. There will be opportunities to view films on carbonate sedimentology.

The session in Jakarta will be followed by a 2 day field excursion to examine the Miocene carbonates in West Java.

A programme will be circulated shortly.

CLOSED SESSION

This seminar will, for logistical reasons, be confined to 40 participants and will span a full week from Monday 13th September through to Sunday 19th September inclusive. The programme will be as follows:

Monday	13th) Presentations and discussions in Jakarta
Tuesday	14th	
Wednesday	15th	
Thursday	16th) Examination of the modern reefs of the Pulau Seribu, Java Sea
Friday	17th	
Saturday	18th) Field excursion to the Miocene reefs West Java".
Sunday	19th	

Dept. of Geology, University of Malaya - 20th Anniversary

The Department of Geology, University of Malaya celebrated their 20th Anniversary on 13 - 14 August 1976. On these two days the Department was visited by staff and students of the University, pupils from local schools and members of the public, both young and old. One of the early visitors was YB Encik Moktar Hashim, the Deputy Minister of Defence Malaysia, who read geology in his Final year at the University.

The visitors had plenty to see. They saw an exhibition of colour and black-and-white photographs of geological interest, film shows on external processes and earthquakes, exhibits on Malaysian stratigraphy, models of various methods of tin mining, a demonstration of reflected light microscopy and polishing of opaque minerals, exhibits of rocks, minerals and fossils, etc. They also toured various laboratories such as thin-sectioning, X-ray, palaeomagnetism and electron microscopy.

The most conspicuous exhibit was a 12 m long crustal and mantle section from the Indian Ocean to the Celebes Sea interpreted by Dr. P.H. Stauffer. The section easily provoked comments and conversation among geologists visiting the Department.

