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CATATAN GEOLOGI (GEOLOGICAL NOTES)

THE RAUB-BENTONG LINE - AN INTERPRETATION BASED ON GEOLOGICAL INVESTIGATIONS IN THE MANCHIS-SIMPANG PERTANG AREA, NEGRI SEMBILAN

LOGANATHAN, P. & LEONG Kok Hoong, Geological Survey of Malaysia

Introduction

The Raub-Bentong Line, was suggested by Hutchison (1973) to denote a palaeosubduction zone demarcated by a schist belt of Lower Palaeozoic age in the foothills east of the Main Range (Fig. 1). This schist belt was said to contain 'numerous ophiolitic bodies of serpentinite and metabasite' (Hutchison, op. cit).

The concept of a palaeosubduction zone in the foothills has, however, been questioned by Haile and others (1977) on grounds that the foothills lack 'some expected features of a former subduction zone, as for instance (the presence of) glaucophane schist, major melange, flysch sediments, and jadeitised greywacke'.

This paper, based on geological investigations in the Manchis-Simpang Pertang area (southeast of Bentong and through which the 'Line' passes), approaches the problem from a mineralogical view point. The barometric characteristics of the schists through which the Raub-Bentong Line passes should possess evidence of the existence, or otherwise, of high pressure metamorphism and of high grade metamorphic facies series at the Line.

Geology

The oldest lithological unit in the Manchis-Simpang Pertang area is a sequence of quartz-mica schist, graphitic in places, of pre-Early Siluro-Devonian age. Overlying the schist unit is a formation of radilarian chert, phyllite and subgreywacke of Siluro-Devonian age. Although bodies of serpentinite and metabasites occur predominantly within the schists, however, serpentinite has also been observed in the Siluro-Devonian formation occurring as sills(?) between the bedded metasediments. It was noted that none of the typical ophiolitic assemblage of rocks is present in the study area (Loganathan, in prep.).

Petrographic studies of the schists showed that the main assemblage is quartz-sericite-chlorite + albite (Plate 1). High grade metamorphic minerals were not observed in the schists. The schists can therefore be assigned to the lower grade greenschist facies.

Permission has been obtained from the Director-General, Geological Survey Malaysia to publish this paper.

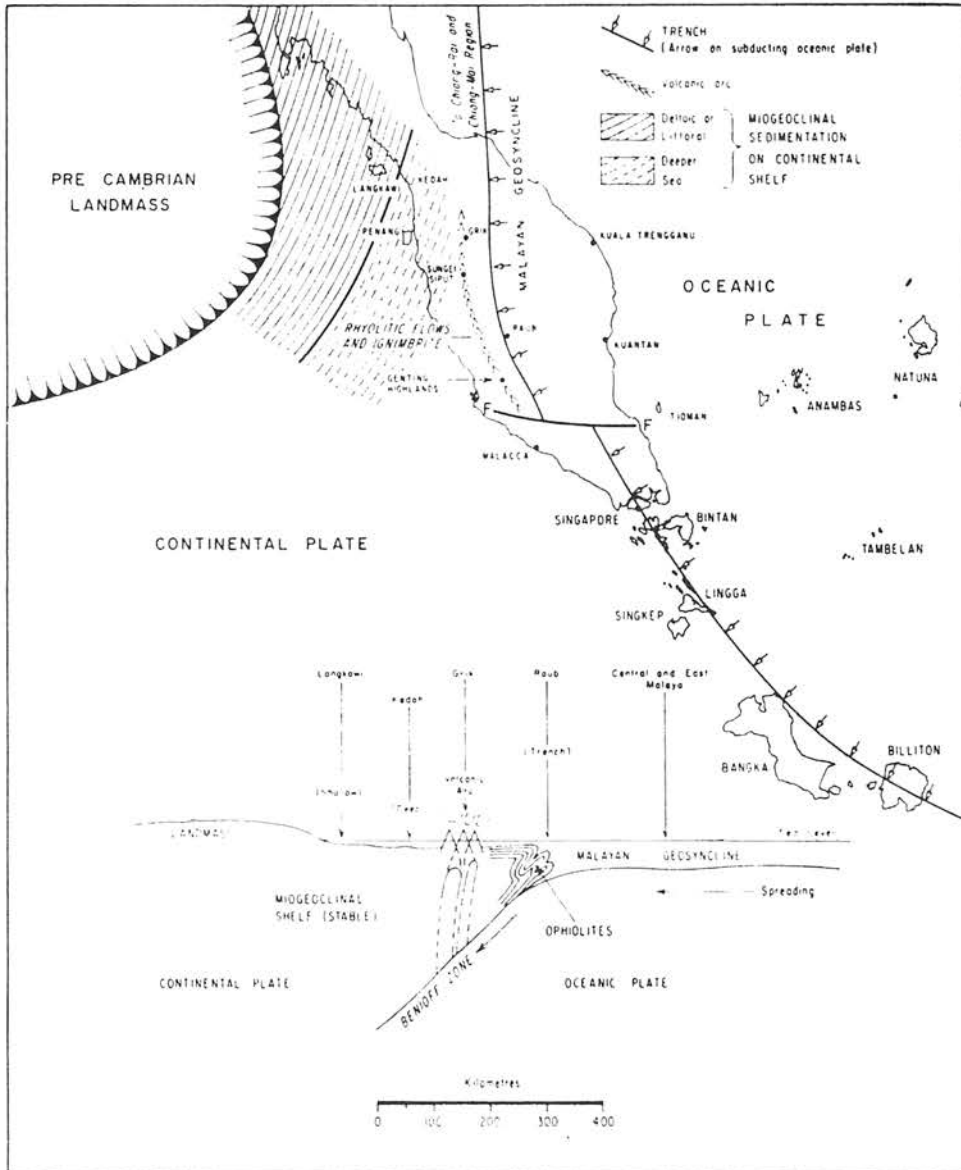


Fig. 1. Palaeo-tectonic scheme for the Lower Palaeozoic of the Malay Peninsula region. An easterly oceanic plate is subducting beneath a westerly continental plate. The diagrammatic cross section shows the relationship of the various tectonic features in terms of subduction along the inferred Benioff Zone (from Hutchison, 1973).

Experimental methods

a) Preparation of the samples

All schist samples were prepared as powders (manual grinding) and transferred into lindemann tubes for mounting into the powder camera.

b) Diffractometric analysis

Diffractometric analyses were carried out using a Philips PW 1010 using $\text{CuK}\alpha$ radiation and exposed for 3 hours. The 2θ value for the 060 peak in each case was read from the film obtained and converted to d-spacings. The b_0 value is equal to 6 times the d-spacing for the 060 peak.

The b parameter was measured on three samples of micas obtained from the schists. Sample locations are shown in Figure 2 and the results in Table 1.

Table 1 - Location of samples and their b_0 values

No.	Location	b_0 value
1.	Lat. $2^{\circ} 58'$ N; Long. $102^{\circ} 10'$ E	9.026 Å
2.	Lat. $2^{\circ} 59\frac{1}{2}'$ N; Long. $102^{\circ} 12\frac{1}{2}'$ E	9.026 Å
3.	Lat. $3^{\circ} 01\frac{1}{2}'$ N; Long. $102^{\circ} 12'$ E	9.013 Å

Results

The mean b_0 value obtained for the three samples is 9.02 Å which on the empirical scale given by Sarsi and Scolari (1974) would equate with a Barrovian (intermediate pressure) type of metamorphism.

Although the number of samples analysed is not large, the results nevertheless show that b_0 values indicative of the high - pressure glaucophane schist facies (mean 9.055 Å: Sarsi & Scolari, 1974) are absent. Thus it appears that the Raub-Bentong Line passes through a set of metamorphic rocks of low greenschist-intermediate pressure facies.

Conclusion

Faulting and metamorphic alteration could be used to explain the presence of the serpentinite and other metabasites. Slivers of upper mantle peridotitic material could have been upfaulted along this 'Line' and subsequently altered.

The process of serpentinisation is still a poorly understood one and the problem of serpentinisation reactions has been discussed by many authors (Thayer, 1966; Johannes, 1968) and will not be reviewed here. Another problem is the timing of serpentinisation,

whether it was *in situ* or took place prior to the emplacement of the peridotitic material. Misra and Keller (1978) have attempted to explain this in their study of the Southern Appalachian metabasites, United States of America. They believe that the sheared nature of the serpentinites at the margins of most of the Blue Ridge peridotite bodies suggests that serpentinitisation mainly occurred prior to emplacement. This, they state, 'is consistent with the hypothesis of solid-state emplacement of mantle peridotite'. The serpentinite bodies in the study area are similarly sheared and relict olivine and/or pyroxene crystals are observed. Serpentinitisation probably continued after emplacement during regional metamorphism.

Summary

The author believes that the Raub-Bentong Line, although a real feature, does not represent a palaeosubduction trench as

- i) expected geological features of a palaeosubduction zone are lacking,
- ii) barometric characteristics of the white mica in the schists through which the Line passes do not exhibit the expected high pressure metamorphism,
- iii) high pressure minerals are not observed in thin-section studies of the schists, and
- iv) the serpentinite could be explained as being due to upper mantle material, upfaulted as solid-state peridotite and subsequently altered.

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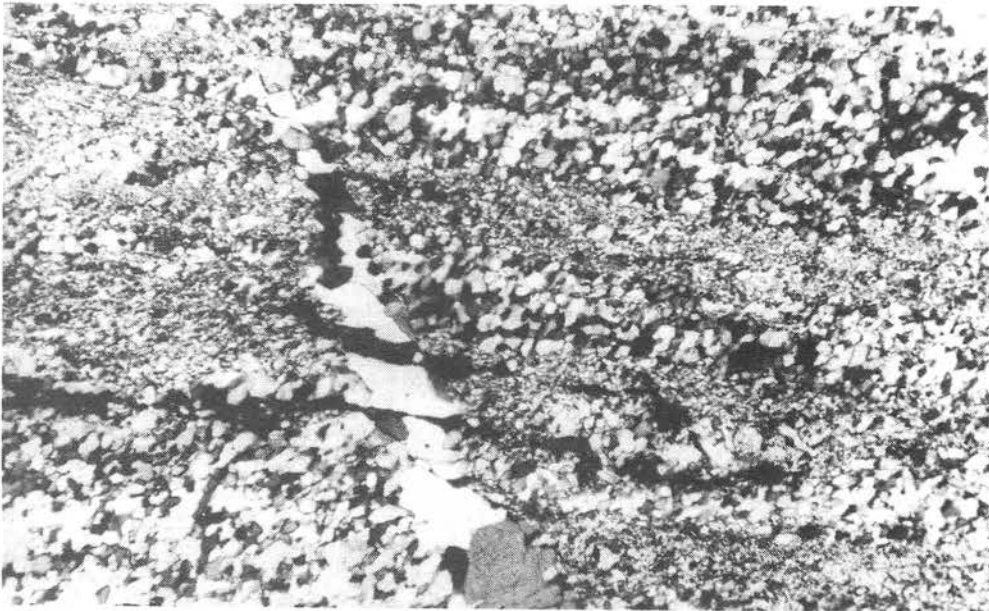


Plate 1 - Quartz-mica schist with alternating laminae of mosaic of quartz grains and incipient sericite flakes and chlorite fibres. (Crossed nicols, 10X).

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Revised manuscript received 6 July 1983.

WESTWARD TRANSPORT OF LOWER PALAEOZOIC ROCKS AT BUKIT MERAH QUARRY NEAR BUTTERWORTH

TJIA, H.D. & IBRAHIM Komoo, Department of Geology, Universiti Kebangsaan Malaysia

Weathered, regularly stratified pelitic rocks outcrop at a quarry known as Bukit Merah, 7 km east of Butterworth (Fig. 1). According to Courtier's (1974) map, Bukit Merah is composed of the Sungai Patani Formation of Early Palaeozoic age. The original hill has been excavated into two remnant hillocks. In late 1981 one of us (IBK) studied the southern hillock. A year later together we studied new outcrops that became exposed in this active quarry. Between the two visits the east side of the southern hillock has receded some 30 metres.

Figure 2 is an outcrop on the east side sketched in 1981 at locality 1. It suggests a large recumbent fold and the general structure appears to strike NNE - SSW. At the same time, at locality 2 was also seen a medium class isoclinal fold having an axial plane dipping approximately 60 degrees in 280° direction.

Figure 3 shows an outcrop in the hill side very close to locality 3. A medium to large recumbent fold overlies a concave fault that strikes NNE. The fold axis is gently inclined towards N 20° E, or in other words, it runs parallel to the strike of the concave fault and the two appear genetically related. The outcrop suggests that the upper portion was thrust towards WNW.

At locality 4 we saw a large fault striking 313° and dipping 25° towards NE underlying pelitic beds of similar attitude. Below the fault the foliation of pelitic beds is different, strike is 250° and dip is 17° towards north. Striations on the fault plane pitch down-dip and fault markings, like accretion steps and accretion spalls, indicate that the upper part slipped down towards northeast.

On the southwest corner of the southern hillock is exposed a one-metre wide, blue gray mylonite zone that strikes 15° and dips 80° towards east. Fault striations within the zone are inclined 12° from the horizontal into NNE direction and fault markings suggest right lateral motion.

We were not able to establish the inter-relations between this mylonite zone, the concave thrust fault, or the fault at locality 4. Future excavations may expose these relationships. However, we believe that the main structure at Bukit Merah consists of recumbent folding that accompanied mass transport laterally towards west.

Similar recumbent folds in this part of the Peninsula are known from the Triassic bedded limestone exposed on the north wall of Gunung Keriang near Alur Star and on the north side of Bukit Kalong near Kodiang (see photograph by D.J. Gobbett in

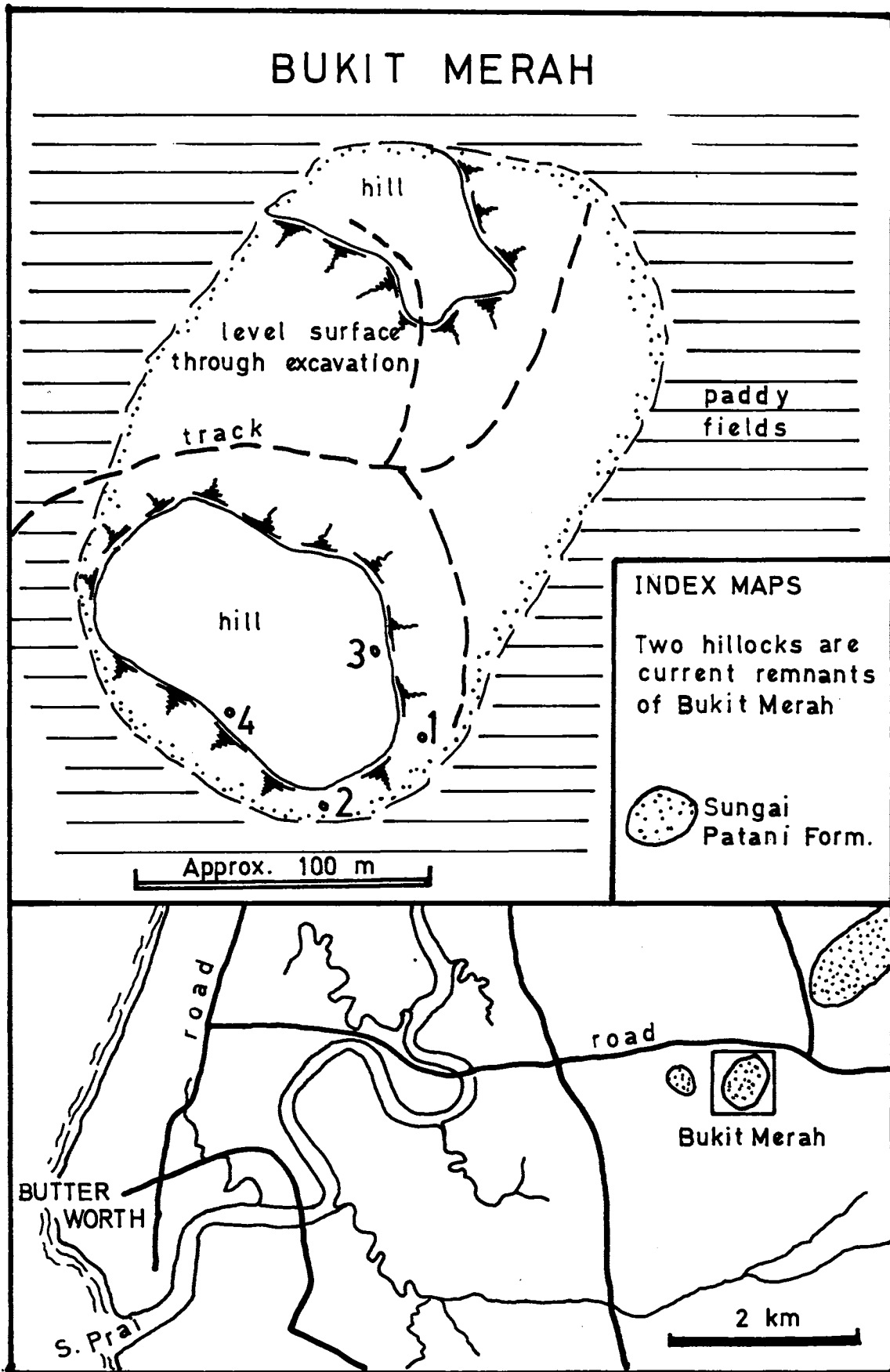


Fig. 1. Index maps of Bukit Merah. The upper map shows the situation of the quarry in 1982; numbers indicate localities discussed in the note.

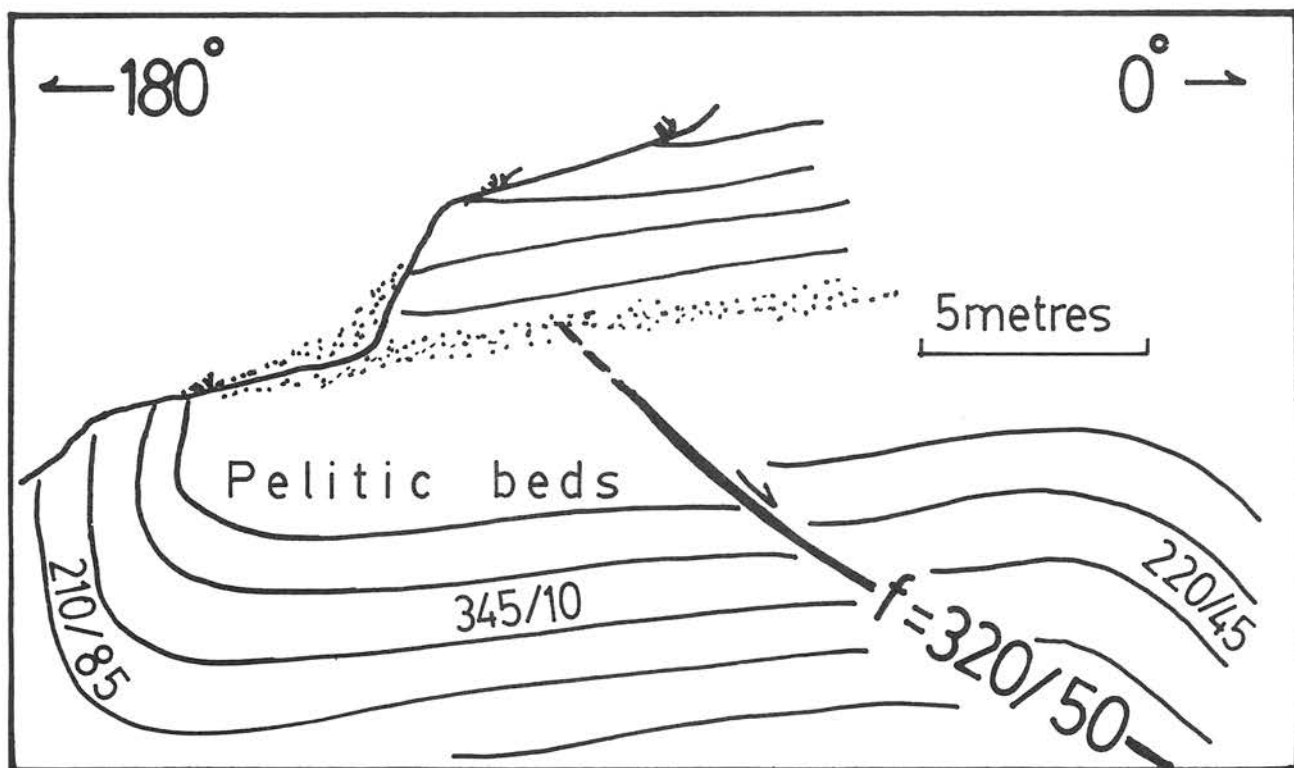


Fig. 2. Outcrop in the hillside in 1981 at locality 1. A large recumbent fold is suggested.

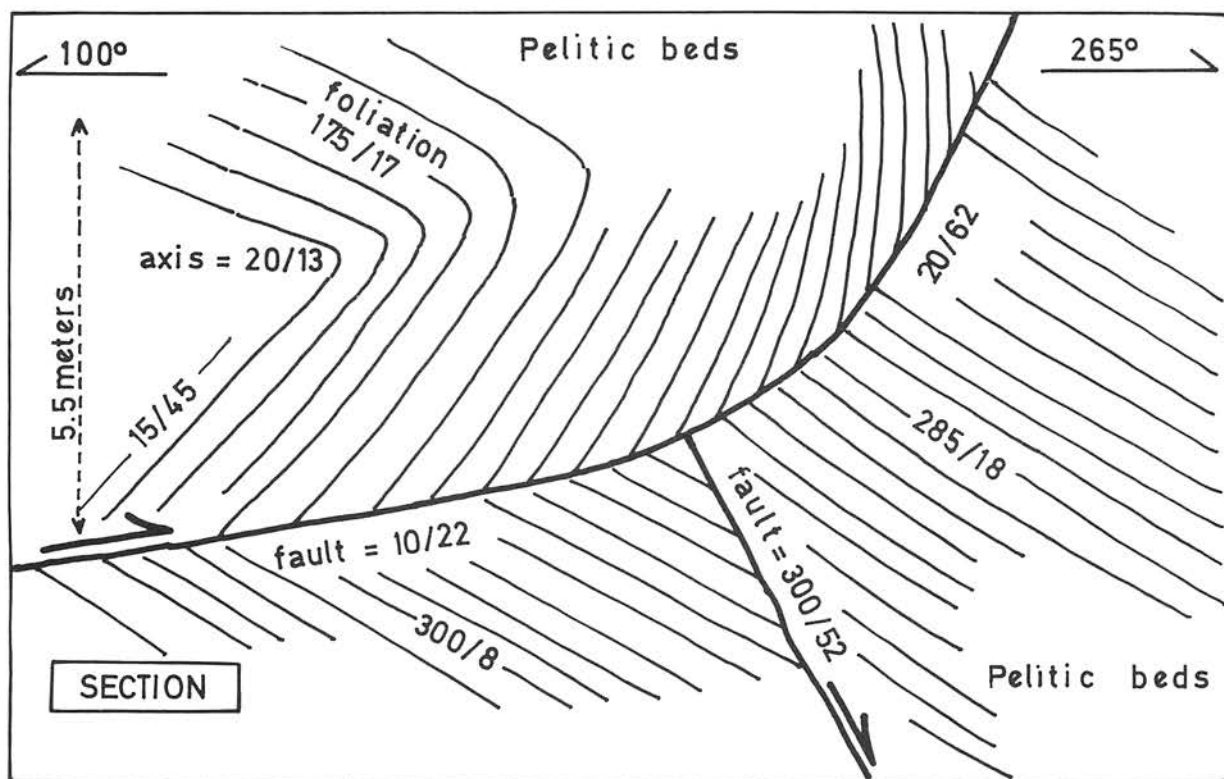


Fig. 3. Medium to large recumbent fold probably developed as drag fold by thrusting westward along the concave fault. Locality 3, November 1982. Note that the quarry face curves slightly towards the observer, as indicated by the compass directions.

Gobbett and Tjia, 1973, p. 315). At both localities the strikes of the recumbent folds are roughly north-south, and the photograph suggests westward transport also. J.C.M. de Coo (personal communication, 1974) made a detailed sedimentological study of the Kodiang limestones and has interpreted the Bukit Kalong structure as a slump fold. The Bukit Keriang folds have not been studied but appear to occur in a restricted zone, thus supporting de Coo's interpretation of nondiastrophic deformation.

On the other hand, the remarkably uniform strikes of the recumbent folds at the three localities and the great 100-km distance between Bukit Merah and Bukit Kalong, seem to suggest tectonic transport. Furthermore, the different ages of the rocks (Sungai Patani Formation and Kodiang Formation) and if these structures were formed together are more consistent with tectonic deformation.

Three hundred kilometres south-southeast of Bukit Merah are recumbent folds in the Kenny Hill Formation (Permo-Carboniferous to Lower Triassic) of the Kuala Lumpur area. These structures have been interpreted as the result of westward tectonic transport (Tjia, 1979).

Do all these structures indicate large-scale thrusting or even nappe-like deformation for the rocks on the west side of the Main Range?

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Manuscript received 12 Jan 1983.

P E R B I N C A N G A N
(D I S C U S S I O N)

AN INTERESTING EXPOSURE OF UNCONSOLIDATED SEDIMENTS IN
THE KUANTAN AREA OF PAHANG, PENINSULAR MALAYSIA -
A DISCUSSION

J.H.A. BOSCH, Geological Survey of Malaysia, Ipoh.

Sir:

Timing is essential when studying unconsolidated deposits in exposures. When the excavation is made some weathering may be helpful to accentuate the stratigraphy but too much weathering will obscure the picture. The fact that deterioration of these exposures limits the period for their study is a reason that outside the alluvial tin mines only limited good descriptions of Quaternary sections have been presented in Peninsular Malaysia. Therefore the recent paper by Raj (1982) is a most welcome contribution in this field. His interpretation of the deposits, however, elicits some comments.

Before coming the discussion proper, I would like to point out a few topographical errors in his introduction. The latitude is $3^{\circ} 51' 25''$ N and not $1^{\circ} 51' 25''$ N, while the base of the cut is at 36.3 m and not at 26.3 m. His description of the coarse sand as containing 'some clay' when more than 25 percent of the sample is under 2 μ m is an understatement; a more appropriate term, I feel, is 'very clayey' sand.

To reconstruct the sedimentary environment three lines of reasoning, separate as well as combined, can be followed.

1. Grain size distribution graphs

The curves of the samples derived from the weathered bedrock and those from the unconsolidated sediments should be combined into one figure. Six curves are redrawn here on probability paper (Fig. 1) in order to trace any sorting-trends. There is a striking similarity between curve 1 (weathered granite) and curve 8 (clayey sand of upper unit); the difference is at most 5%. The same is true for the sand fraction of curve 2 (weathered basalt) and curve 3 (sandy clay of lower unit). Furthermore the distribution within the sand fraction of the 'coarse sand' - layers (see curve 5) is in good agreement with that of the weathered granite (curve 1) after multiplication by a factor of 1.4. In the case of the 'sandy clay' - layer (curve 6) and the weathered basalt (curve 2) a striking similarity also emerges after multiplication by a factor of 3.4. As the sand fractions are enriched consequently the silt and clay fractions are diminished.

Because of the similarity of the grain size curves derived from the weathered bedrock and those of the sediments and secondly because apparently no sorting occurred during transport of the sediment it can be concluded that the sediments have been derived locally from decomposed berock and transported by processes that

were non-selective. To test the hypothesis of the different parent material it is suggested to compare the morphology of the sand grains of the respective bedrock types with those of the sediments.

2. Sedimentology

It is important to note that

- a) the 'coarse sand' layers have a nearly uniform thickness, while some are thinning downslope,
- b) all layers dip at a low angle (about 6° ?), and
- c) no high-angle erosion surfaces are observed in the exposure.

These observations together with the conclusion derived from the grainsize data show that only one of the three processes mentioned by Raj may have formed these deposits i.e. slopewash and/or creep processes. Fluvial as well as littoral processes would have sorted the sediments better and, because an alternation of high and low energy circumstances is necessary to explain the alternation of sand and clay layers some high angle erosion planes should have been visible.

3. The geographical factor

When studying a two-dimensional exposure it is also necessary to know the third dimension which could answer questions such as (a) is the maximal dip of the layers and the surface shown? (b) what is the location of the exposure with respect to the crest of the 'small ridge'? and (c) what is the dip of the slope leading to this crest? This information, however, is not given. Further, it should be realised that invoking fluvial or littoral processes necessitate a river or a coast in an area where other evidences for these processes are lacking.

Conclusion

The data and argument given above indicate that the stratified deposits described by Raj (1982) can best be interpreted as slope deposits. The grainsize characteristics as well as the sedimentological setting are very convincing in this respect whereas the geographical setting makes a fluvial or littoral genesis rather improbable. It is interesting to note that never before such a thick layer of slope deposits was found in Peninsular Malaysia. Presently the vegetation cover would inhibit the formation of similar deposits. So before mass movements could take place a vegetation more open than at present must have existed here indicating climatological conditions clearly different from those in the same area nowadays.

A similar deposit has never been studied before and I agree with Raj that a palynological analysis should be made. However, chances for pollen preservation in slope-deposits are rather poor. It is unlikely that any pollen will be found.

Acknowledgements

I thank my colleagues for their comments and the Director-General of the Geological Survey of Malaysia for his permission to publish this note. The author, however, is solely responsible for the ideas expressed in this note.

Reference

Raj, J.K., 1982. An interesting exposure of unconsolidated sediments in the Kuantan area of Pahang, Peninsular Malaysia. Warta Geologi, vol. 8, 187-192.

2 May 1983

PERHUBUNGAN LAIN (OTHER COMMUNICATIONS)

PENGKALAN DAN PENGURUSAN BAHAN-BAHAN BINAAN*

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Abstrak

Pengeluaran bahan-bahan binaan biasanya adalah sebagai industri pengeluaran besar dimana-mana negara dan kebanyakannya bergantung kepada kaedah lubang terbuka daripada perlombongan. Mungkin seperti bahan-bahan lain (batuan dan mineral) bahan-bahan ini adalah sumber-sumber tak boleh diperbaharui dan tentunya finit jumlahnya, justru itu akan kehabisan dimasa akan datang. Bagi seorang ahli geologi yang terlibat didalam penilaian geologi kejuruteraan suatu projek binaan utama, sebagai contoh, masalah yang selalu ditemui ialah, mungkin masalah mengenai pemilihan bahan-bahan binaan yang paling sesuai yang diperlukan oleh projek tadi. Kertas ini cuba mengenal pasti sumber-sumber bahan-bahan binaan; bagaimana digunakan (terutamanya di Semenanjung Malaysia) dan masalah-masalah yang berkaitan dengan pembangunannya. Masalah-masalah persekitaran yang terjadi daripada eksploitasi (dan pembangunan) ini juga akan dinilai, dan akhirnya usaha-usaha untuk mengekal dan mengurus bahan-bahan binaan akan juga diperiksa dengan kritis agar penggunaan sumber-sumber 'tak boleh diperbaharui' ini adalah secara yang baik (optimum).

Abstract

The extraction of construction materials normally form the largest scale extraction industry in any country and much rely on the open-pit method rather than mining. Perhaps like others (rocks and minerals) these materials are non-renewable resources and definitely are finite in amount and thus depletion in the future is inevitable. For a geologist involved in the engineering geology assessment of a major construction project, for example, the most often encountered problem is perhaps in choosing the most suitable construction materials required. This presentation attempts to identify the sources of construction materials; how they are used (especially in Peninsular Malaysia) and the problems related to their developments. Environmental problems which have resulted from their exploitations (and development) will also be evaluated, and finally efforts to conserve and manage these construction materials will be critically examined such that the utilisation of these 'non-renewable' resources will be made optimum.

1. Pendahuluan

Pembangunan industri yang pesat dan pembinaan projek-projek yang berkaitan telah secara langsung menyebabkan penambahan penggunaan mineral-mineral dan batuan-batuan. Penggunaan batuan (dan mineral) telah juga menyebabkan penekanan yang berlainan dari

*Berdasarkan kepada kertas kerja yang dibentangkan di Simposium Rockcon (Persatuan Geologi Malaysia) pada 30hb Nov-1hb Dis 1982.

logam-logam yang berharga (ternilai) kepada logam-logam bes serta juga penggunaan batuan (mineral) bukan logam untuk keperluan bangunan, binaan dan perusahaan kimia. Dalam keadaan yang serupa, pembangunan dan eksploitasi bahan-bahan geologi, terutamanya mineral dan batuan (serta petroleum) di Malaysia dan juga negara-negara ASEAN yang lain telah begitu menggalakkan di sepuluh tahun kebelakangan ini.

Sumbangan terhadap pembangunan dan eksploitasi galian atau mineral (tidak begitu memberasangkan bagi bahan-bahan binaan) telah menular kearah pembangunan negara dengan pesatnya. Sumbangan ini termasuklah sumbangan terus keatas pekerjaan. Keluaran Kasar Negara (KNK), pendapatan pertukaran asing serta juga menghasilkan kemudahan-kemudahan sampingan seperti perhubungan, sektor-sektor perkhidmatan dan lain-lain lagi. Bahan-bahan binaan mungkin tidak menyumbangkan pendapatan eksport yang utama, tetapi sebagai bahan-bahan mentah yang penting, ianya boleh menarik lebih banyak modal asing dan pakar-pakar dalam menubuhkan industri-industri usaha-sama (joint-venture) tempatan.

Walaupun usaha-usaha pengurusan telah dijalankan secara sistematik, tetapi masih lagi terdapat kelemahan-kelemahan yang boleh diperbaiki lagi. Kertas ringkas ini cuba menerangkan serta menghuraikan beberapa perkara termasuklah:- (a) mengenal-pasti sumber-sumber bahan-bahan binaan, (b) bagaimana bahan-bahan ini digunakan (terutamanya di Semenanjung Malaysia) (c) Masalah-masalah yang berkaitan dengan pembangunannya (d) Kesan-kesan negatif (buruk) yang dihasilkan oleh pembangunan bahan-bahan, binaan dan akhirnya (e) beberapa cadangan mengenai pengurusan dan usaha-usaha penggekelan supaya penggunaan bahan-bahan 'tak boleh diperbaharui' ini adalah secara yang baik (optimum) dan mungkin dapat mengatasi atau mengurangkan kesan-kesan buruk lagi.

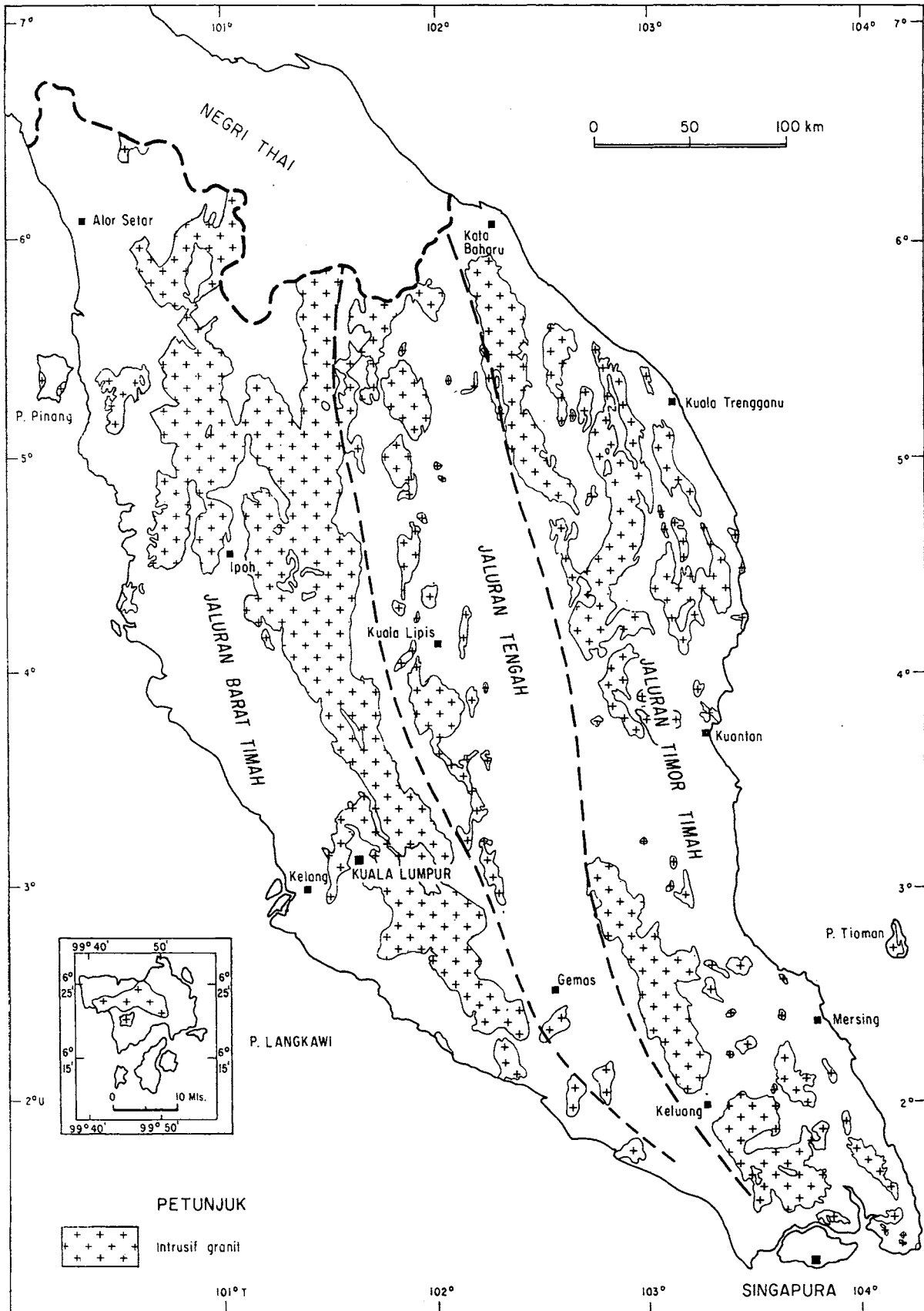
2. Sumber-sumber bahan binaan

Bahan-bahan batuan (rock materials) ditakrifkan oleh Kanun Tanah Negara (1965) Akta 56, bahagian 5 sebagai

'... apa-apa batuan, batu, marmar, kelikir, pasir, tanah, laterit, tanah loan, lempung, tanah, lumpur, tanah rumput, gambut, koral, cengkerang, atau tahi burung didalam atau diatas mana-mana tanah dan termasuk juga bata-bata, kapur, simen atau lain-lain komoditi yang dihasilkan darinya'.

Dari takrif diatas jelaslah bahawa bahan-bahan batuan untuk binaan didatangkan dari berbagai jenis batuan-samada igneus, sedimen, (endapan) atau juga metamorfisma. Sumber-sumber kedapatan dan kedudukan batuan-batuan yang dinyatakan tentunya bergantung kepada geologi sesuatu kawasan. Rajah 1 menunjukkan jaluran-jaluran mineral Semenanjung Malaysia. Kedapatan tiga jaluran, iaitu Timur dan Barat yang mengandungi timah dan jaluran yang mengandungi emas tengah. Peta ini juga menunjukkan taburan batuan igneus (terutamanya granit), yang mana kedapatan lebih daripada 50% kawasan Semenanjung Malaysia dilitupi oleh batuan granit. Memandangkan keluasan ini agak menyeluruh, tidaklah menghairankan batuan granit merupakan sumber utama bahan-bahan binaan di Malaysia. Batuan-batuan lain yang dapat menyokong industri-industri berasaskan batuan adalah seperti batu-kapur termasuk mar-mar, dolomit, pasir dan kelikir serta lain-lain lagi.

Lempung-lempung juga digunakan untuk menghasilkan bata-bata;



Rajah 1 : Jaluran-jaluran mineral Semenanjung Malaysia

agregat kecilan, membuat saluran-saluran paip najis dan membuat tembikar (seramik), Lempung-lempung ini kedapatan dengan mudahnya disekitar lanar (aluvium) seperti ditunjukkan di Rajah 2. Bahan-bahan yang sesuai untuk pembinaan jalanraya dan agregat konkrit boleh didapati dari singkapan-singkapan granit yang berhampiran; bukit-bukit batukapur; sungai, kukup pasir dan kawasan-kawasan bekas lombong.

3. Bagaimana bahan-bahan binaan di gunakan di Semenanjung Malaysia

Perindustrian yang berasaskan batuan boleh dikelaskan kepada (1) industri-industri berasaskan batuan (rock) (2) industri-industri berasaskan batukapur (limestone) (3) industri-industri berasaskan lempung (clay) dan juga (4) industri-industri berasaskan pasir (sand). Pengkelasan ini adalah arbitrari. Rajah 2 menunjukkan taburan dan ke dapatan perusahaan-perusahaan yang menggunakan bahan-bahan geologi yang dinyatakan. Kedudukan industri-industri berkenaan pada umumnya tidaklah jauh dari kawasan-kawasan sumber penting industri berkenaan.

3.1. Industri-industri berasaskan batuan

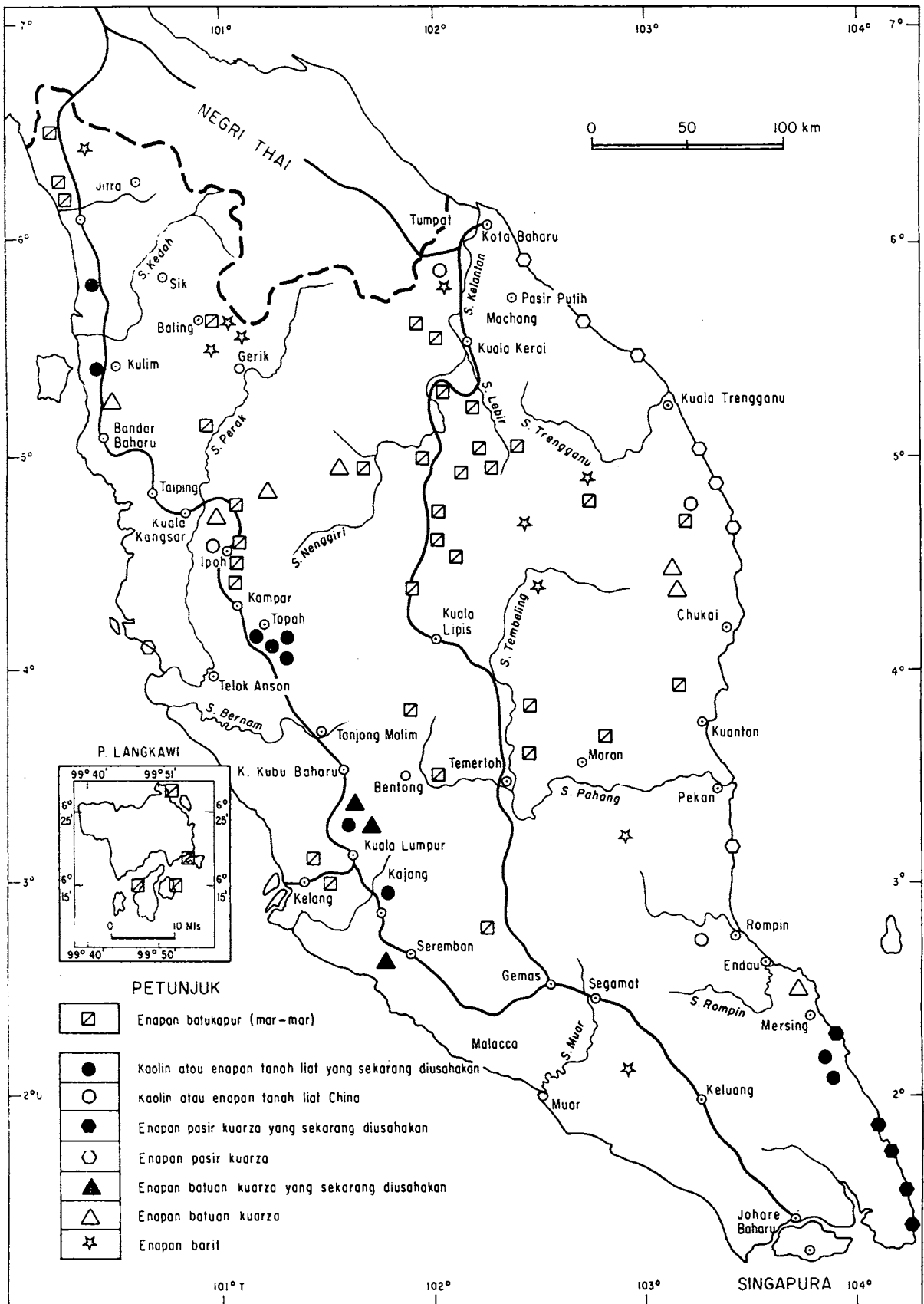
Dalam tahun 1979 terdapat 221 kuari yang diusahakan. Ini adalah lebih enam (6) daripada tahun sebelumnya. Jadual 1 menunjukkan bilangan dan jenis kuari yang ada pada tahun 1979. Pada umumnya dapat disimpulkan bahawa kuari granit (126) adalah lebih banyak dari kuari-kuari jenis lain. Kebanyakan kuari batukapur terdapat dimana kedapatan batukapur, terutamanya di negeri Perak, Selangor dan Wilayah Persekutuan, Kedah dan Perlis. Kebanyakan kuari (terutamanya kuari granit) menghasilkan batu-batuan terbancur untuk agregat dan untuk kegunaan jalanraya. Walaubagaimanapun terdapatnya kuari-kuari batukapur yang menghasilkan batu-batuan terhancur untuk perusahaan simen, kapur, debu dapur dan blok-blok batukapur untuk kepingan-kepingan mar-mar dan terazzo (Aw, 1978). Menurut Aw (1978) juga kebanyakan kuari (40%) menghasilkan kurang daripada 10,000 ela isipadu batu-batu terhancur tiap-tiap tahun.

3.2. Industri-industri berasaskan batukapur

Di samping digunakan untuk membina jalanraya dan agregat konkrit, batukapur juga digunakan dalam industri-industri lain seperti yang ditunjukkan di Jadual 2. Terdapat 6 kilang simen di Semenanjung Malaysia, 5 daripadanya menghasilkan simen Portland (Aw, 1978). Kebanyakan industri-industri yang menggunakan batukapur untuk menghasilkan terazzo dan marmar adalah samada di Wilayah Persekutuan, Selangor atau Perak. Kesemuanya terdapat 126 kilang yang menggunakan di Semenanjung Malaysia pada tahun 1979.

3.3. Industri berasaskan lempung

Lempung-lempung di Semenanjung Malaysia kebanyakannya di gunakan untuk membuat bata-bata. Dalam tahun 1979 terdapat 248 kilang bata-bata di Semenanjung Malaysia, iaitu 28 lebih daripada tahun sebelumnya (Aw, 1978). Jadual 3 menunjukkan bilangan kilang bata-bata yang terdapat di Semenanjung Malaysia dan pengeluarannya bagi tahun 1974. Kesemua negeri-negeri di Semenanjung Malaysia ada terdapat kilang-kilang bata. Kebanyakan kilang bata-bata terdapat di Kelantan (67), Selangor dan Wilayah Persekutuan (61) dan juga Johore (28), dimana dinegeri-negeri ini terdapat pembangunan yang agak



Rajah 2 : Taburan dan kedapatan Industri-Industri berasaskan bahan geologi di Semenanjung Malaysia.

Jadual 1. Bilangan dan jenis kuari yang diusahakan dalam tahun 1979.

<u>Negeri</u>	<u>Batukapur</u>	<u>Granit</u>	<u>Lain Batuan</u>	<u>Jumlah</u>
Perlis	6	-	1	7
Kedah	9	3	1	13
Penang	-	20	-	20
Perak	41	14	4	59
Selangor dan Wilayah Persekutuan	10	14	4	28
Negri Sembilan	-	10	1	11
Malacca	-	4	-	4
Johore	-	21	8	29
Pahang	8	15	2	25
Trengganu	-	15	-	15
Kelantan	-	10	-	10
Jumlah	74	126	21	221

Jadual 2. Bilangan industri berasaskan Batukapus (1979)

	Simen	Mar-mar	Potongan	'Terrazzo tiles'	Kapur	Debu Batukapur
Perlis	1	?	-	-	-	-
Kedah	-	5	?	3	1	-
Perak	3	15	7	8	16	12
Selangor dan Wilayah Persekutuan	2	2	5	13	17	8
Negri Sembilan	-	-	-	1	-	-
Penang	-	4	-	3	-	-

(?) Bilangan pengeluaran tidak diketahui.

(-) Mungkin tidak kedapatan industri berkenaan.

Jadual 3. Bilangan bata mengikut pengeluaran tahunan 1979.

	A	B	C	D	E	F	G	H	I	J	Jumlah
Perlis	-	-	1	-	-	-	-	-	-	-	1
Kedah	-	-	-	6	1	4	1	1	-	-	13
Penang	-	-	-	-	1	1	2	-	-	3	7
Perak	-	2	1	1	-	3	3	8	2	-	20
Selangor dan Wilayah Per- sekutuan	-	1	4	12	6	10	7	14	4	3	61
Negri Sembilan	-	-	5	4	-	2	-	2	-	-	13
Malacca	-	2	-	2	2	1	-	-	-	-	7
Johore	-	1	-	5	3	4	1	10	2	2	28
Pahang	-	2	3	1	1	7	1	3	-	-	18
Trengganu	1	4	2	3	3	-	-	-	-	-	13
Kelantan	41	16	1	4	2	-	-	-	-	3	67
	42	28	17	38	19	32	15	38	8	11	248

Petunjuk

A	bermakna	pengeluaran	tahunan	kurang daripada 100,000 bata
B	"	"	"	antara 100,000 hingga 500,000 bata
C	"	"	"	" $\frac{1}{2}$ hingga juta bata
D	"	"	"	" 1 " 2 " "
E	"	"	"	" 2 " 3 " "
F	"	"	"	" 3 " 4 " "
G	"	"	"	" 4 " 5 " "
H	"	"	"	" 5 " 10 " "
I	"	"	"	melebihi 10 juta bata
J	"	bata tidak diketahui pengeluarannya		

pesat. Terdapat hanya 8 kilang bata-bata yang pengeluarannya melebihi 10 juta bata setahun, iaitu dinegeri-negeri Selangor & Wilayah Persekutuan, Perak dan Johor.

Selain daripada menghasilkan bata-bata, lempung juga digunakan untuk membuat alatan pembuangan najis, seperti yang terdapat di Kedah (1), Johor (1), Selangor (1) dan Wilayah Persekutuan (1). Di samping itu, lempung digunakan untuk membuat alatan meja dan kaolin (tanah liat) untuk perusahaan-perusahaan tembikar (seramik).

3.4. Industri-industri berasaskan pasir

Dalam tahun 1979 terdapat 562 pengeluar pasir/kelikir di Semenanjung Malaysia. Jumlah ini ialah 5 lebih dari tahun sebelumnya. Jadual 4 menunjukkan bilangan-bilangan pengeluar pasir/kelikir di tiap-tiap negeri di Semenanjung Malaysia. Melainkan Perlis, lain-lain negeri ada pengeluar pasir/kelikir terutamanya di Selangor & Wilayah (101), Kelantan (119) dan Perak (89) dimana di negeri-negeri berkenaan pembangunan pada umumnya agak pesat, dan pasir/kelikir digunakan sebagai bahan-bahan binaan. Pasir/kelikir ini diperolehi dari 'Longgokan pasir' (sandpits), tepian-tepian sungai dan juga di kawasan-kawasan bekas lombong. Kedapatan juga 5 pengeluar pasir silika, semuanya di Johor (Aw, 1978). Pasir silika ini digunakan dalam pembuatan kaca, dan lain-lain. Dengan kekurangan bata-bata lempung, industri-industri binaan sekarang ini menggunakan bata-bata campuran pasir dan simen sebagai suatu alternatif. Terdapat 225 pengeluar-pengeluar hasilan pasir-simen pada 1979, dan kebanyakannya di Johor (92) Selangor & Wilayah Persekutuan (26) dan Kelantan (28) (Jadual 5).

3.5. Lain-lain penggunaan batuan

Lain-lain penggunaan bahan-bahan geologi untuk industri (kegunaan) atau industri pembinaan adalah seperti berikut:

- i) tanah granit terluluhawa - bahan-bahan untuk memenuhi empangan yang dipenuhi tanah, dan lain-lain (earth-filled dam).
- ii) marmar yang digilap atau tidak digilap - Lantai dan dinding bangunan-bangunan (pejabat/bank, dan lain-lain)
- iii) pasir/kelikir dari pantai - agregat binaan (dibasahi dahulu)
- iv) granit - debu, powder kuarza
- v) bahan-bahan tanah yang dikorek/gali - binaan empangan dan permatang.

4. Masalah-masalah pembangunan bahan-bahan binaan

Masalah-masalah yang berkaitan, antara lain adalah:

i. Hal-hal tanah dan perundangan

Tidak keterlaluan jika dikatakan bahawa pembangunan sesuatu sumber alam (termasuk bahan-bahan binaan) perkara yang agak penting untuk dibincangkan ialah (a) siapakah yang mempunyai hak terhadap sumber tersebut, (b) siapakah yang mengawal sumber dan akhirnya, (c) bagaimana kerjaan dapat memberi pengurusan yang baik terhadap sumber tadi. Persoalan mengenai hak empunyai dan kawalan agar sukar dijawab, kerana ianya berbeza-beza dari satu tempat yang lain.

Jadual 4. Bilangan pengeluaran pasir/kelikir dalam tahun 1979 mengikut Negeri

	<u>1978</u>	<u>1979</u>
Perlis	Tiada	Tiada
Kedah	34	32
Penang	10	8
Perak	90	89
Selangor dan Wilayah Persekutuan	103	101
Negri Sembilan	33	29
Malacca	7	1
Pahang	38	40
Trengganu	71	71
Kelantan	<u>96</u>	<u>119</u>
	557	562

Jadual 5. Bilangan hasilan pasir-simen (1979)

Kedah	14
Penang	7
Perak	22
Selangor dan Wilayah Persekutuan	26
Negri Sembilan	2
Malacca	7
Johore	97
Pahang	7
Trengganu	15
Kelantan	<u>28</u>
	225

Di Semenanjung Malaysia, tiap-tiap negeri mempunyai hak terhadap pembangunan tanah masing-masing. Dalam hal ini negeri-negeri tersebut mempunyai perundangan tersendiri. Perundangan yang ada terdapat dua kelemahan (a) sebahagian besar undang-undang yang ada adalah telah usang mengikut zaman dan diadakan pada situasi yang berlainan pada masa sekarang (b) Undang-undang pusat kadangkala tidak boleh di jalankan di negeri-negeri dan sebaliknya.

ii. Konflik kegunaan tanah

Dalam penggunaan sesuatu bidang tanah, tentunya terdapat konflik dan keutamaan yang diperuntukkan. Ini dapat dilihat misalnya antara lain tanah yang mengandungi pasir silika dan kaolin digunakan untuk binaan dan terdapat juga bahan mentah yang baik daripada mar-mar dan batukapur untuk kegunaan industri dan pertanian, digunakan untuk agregat dan batu jalan, seperti industri perlombongan, bahan-bahan binaan mungkin menghadapi persingan hebat terhadap tanah untuk penduduk; ekonomi dan tekanan politik. Mungkin apa yang perlu ialah REZAB PERLOMBONGAN DAN KUARI, seperti TANAH SIMPANAN HUTAN & BINATANG LIAR, dan lain-lain.

iii. Kawasan Pendalaman

Pendalamannya tempat-tempat sumber bahan-bahan binaan mungkin juga satu masalah untuk membangun bahan-bahan binaan. Oleh kerana industri pembinaan ini adalah bergantung kepada berat muatan, berhampiran sumber tersebut tentunya dapat mengurangkan perbelanjaan. Lebih sulit lagi jika kawasan pendalaman ini tidak mempunyai infrastruktur asas seperti jalanraya, pelabuhan atau juga tidak berhampiran dengan kawasan permintaan (pasaran).

iv) Teknologi bersesuaian dan spesifikasi tempatan

Kebanyakan spesifikasi dan piawaian yang digunakan dimasa ini di Malaysia adalah mengikut spesifikasi dari Amerika Syarikat atau Britain. Ada kemungkinan spesifikasi dan piawaian serta teknologi yang digunakan tidak bersesuaian dengan keadaan iklim di rantau ini. Ketiadaan piawaian tempatan dan penggunaan spesifikasi yang bukan sebenarnya, tentu akan menyulitkan serta penambahan kos pembinaan.

v. Tekanan daripada 'Kumpulan Persekitaran'

Memandangkan dimasa sekarang (tidak dapat tiada) pengusaha-pengusaha industri binaan terpaksa mematuhi tekanan-tekanan Kumpulan Persekitaran (Environmental Groups), kos tambahan mestilah tidak 'di-ketepikan' dalam pengurusan industri binaan yang baik. Tekanan-tekanan yang bersangkutan paut dengan perkara ini termasuklah pembiayaan alatan mencegah pencemaran dan lain-lain.

vi. Perkara-perkara lain

Ini termasuklah masalah memastikan adanya pendekatan bersama dan bersepadu di setiap bahagian pemprosesan bahan binaan, dan juga kehendak dasar-dasar terkini kerajaan.

5. Kesan-kesan negatif industri bahan-bahan binaan

Eksplotasi dan pembangunan bahan-bahan binaan selalunya mengakibatkan kesan-kesan buruk persekitaran (Aw, 1982; Kiew, B.H., 1982) seperti berikut:

- a. Batuan-batuan yang dikuarikan daripada bukti-bukti akan mencacatkan pandang darat persekitaran, misalnya Bukit Gambir (Penang), Bukit Gombak (Batu Caves).
- b. Ledakan dan proses hancuran batuan selalunya mendatangkan gegaran, bisingan dan pencemaran debu. Pencemaran dari debu-debu kawasan kuari ini memberi kesan buruk terhadap kawasan-kawasan sekitar, terutamanya kesihatan penduduk (misalnya Kilang Simen Rawang, Kuari Batu Caves, dan lain-lain lagi).
- c. Jatuhan-jatuhan serpihan batuan dan pasir dari lori-lori yang berlebih muatan dan tanpa tutupan, kadangkala akan menyebabkan ketidak senangan pengguna-pengguna jalanraya yang lain.
- d. Di Perak, luncuran tanah pada November 1971 telah membunuh 29 orang dan mencederakan ramai yang lain.
- e. Lebih daripada 20,000 ekar kawasan-kawasan bekas lombong dan tidak dapat digunakan untuk pertanian.
- f. Kuari dan perlombongan juga mendatangkan kesan buruk persekitaran seperti limpahan effluen, tahi-tahi lombong; pengendapan, kelodakan dan hakisan atau gerakan-gerakan massa.
- g. Lain-lain seperti bisingan daripada jentera-jentera berat, tanah luncur dan tanah runtuh serta kehilangan nyawa serta harta-harta (tanpa pengawasan rapi dan pengurusan baik).

6. Kesimpulan dan beberapa cadangan

Pada keseluruhannya batuan-batuan sebagai hahan-bahan industri pembinaan agak pesat juga digunakan di Semenanjung Malaysia. Terdapat beberapa masalah terhadap pembangunan sektor ini serta masalah yang berkaitan dengan alam sekitar hasil dari pembangunan sektor industri pembinaan perasaskan bahan-bahan geologi.

Berikut adalah beberapa cadangan untuk memperbaiki sektor ini:

- a. Undang-undang mengenai pembangunan sektor perlombongan dan kuari perlu dikemaskini dan diperbaiki. Penyelarasan antara negeri dan kerajaan pusat perlu dipesatkan agar undang-undang negeri dan kerajaan pusat dapat diimplementasikan dengan lebih berkesan. Pegawai-pegawai penguatkuasa (Inspektor Galian) perlulah diberi latihan perundangan yang mencukupi.
- b. Penilaian Kesan Persekitaran (EIA) hendaklah dimestikan pada setiap kegiatan perlombongan dan kuari.
- c. 'Ingentif' cukai (rebat) hendaklah diberi kepada mana-mana sekali yang telah memasang alat-alat mencegah pencemaran. 'Standard' berkesan mestilah dipastikan seperti pengawalan sisa dan effluen; pengendapan, kelodakan dan lain-lain yang disebabkan oleh kuari dan perlombongan.
- d. Pendedahan dalam pengurusan sumber-sumber alam (seperti undang-undang yang berkaitan dan lain-lain) hendaklah diadakan kepada bakal-bakal siswazah dan juruteknik yang bertugas di sektor yang berkenaan (perlombongan dan kuari).
- e. Kursus-kursus seperti 'Geologi Persekitaran' dan 'Pengurusan Sumber Alam' hendaklah diberikan kepada pelajar-pelajar geologi, Sains Persekitaran dan kejuruteraan Awam. Juga satu Bahagian 'Geologi Persekitaran' hendaklah di tubuhkan di Jabatan Penyiasatan Kajibumi Malaysia, seperti yang terdapat di Indonesia.

- f. Kuari dibukit-bukit yang berhampiran dengan kawasan penduduk mestilah dikurangkan atau ditinggalkan. Perlu diadakan sistem penzonan dalam kawasan-kawasan berkenaan (Aw, 1978).
- g. Penyiasatan-penyiasatan 'awam' seperti apa yang berlaku di Puchong dan Tantulum (Penang) mestilah dimaklumkan kepada umum, secara berleluasa.

Penghargaan

Terima kasih kepada En. Mohd. Zuhudi Hj. Muda kerana sudi membaca dan memberi pandangan kepada deraf kertas ini dan juga Cik Asmaliah Ahmad diatas kerja-kerja menaip.

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Manuskript diterima 22 Feb 1983.

OBITUARY: G.H.R. VON KOENIGSWALD

A major figure in the history of palaeoanthropology and Quaternary geology in Southeast Asia, Professor Dr. Gustav Heinrich Ralph von Koenigswald died at Bad Homburg in Germany on July 10, 1982, at the age of 79. The notes on his life and career that follow are largely based on a memorial by 'SNG' in Natur und Museum, v. 112, no. 9 (1982), p. 306-307.

The son of an ethnologist, Koenigswald was born in Berlin and studied at the university there and elsewhere in Germany. After working briefly in Munich, he joined the Netherlands Geological Service in 1930 and came out to Java. It was there during the next ten years that his most famous studies and discoveries were made. During the Second World War Koenigswald, a Dutch citizen, was interned by the Japanese, but his wife was able to preserve his collection of fossil finds. After the war he was at the American Museum of Natural History in New York until 1948, when he moved to Holland to assume the position of Head of the Paleontology Department at the University of Utrecht. After retiring from Utrecht in 1968, Koenigswald was invited to the Senckenberg Research Institute

and Natural History Museum at Frankfurt am Main, Germany, where he established a research section in palaeoanthropology and an international data center for human evolution. He was also able to work out and publish some of his earlier collections, and continued to make research trips to the Philippines, Thailand, and other areas of the world. He remained active at the Senckenberg Institute until shortly before his death.

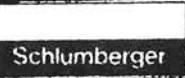
It was Koenigswald who discovered the first relatively complete skull of *Pithecanthropus erectus* (now generally referred to as *Homo erectus*) at Sangiran, Java, in 1937. This definitely established the presence in Java of early man which has been suggested by Dubois' 1891 find of a skull fragment at Trinil. At Sangiran and also at Modjokerto Koenigswald soon found other, even earlier human remains, which he described as *Pithecanthropus modjokertensis* and which are now known to be nearly two million years old. He also discovered and described *Meganthropus palaeojavanicus*, from an oversize hominid jaw fragment, and *Gigantopithecus blacki*, defined from "dragons' teeth" sold in Chinese medicine shops.

In his excavations at Sangiran, Koenigswald came across tektites associated with the remains of primitive men, and these geological curiosities caught his interest. Over the next 40 years he published many papers on tektites and contributed much to our knowledge of these bodies, especially in Java and Southeast Asia. It was in a 1960 paper that Koenigswald pointed out the zonation of Australasian tektites in terms of size and shape from northwest (Indochina) to southeast (Australia) - an observation crucial to later understanding of the origin of these bodies.

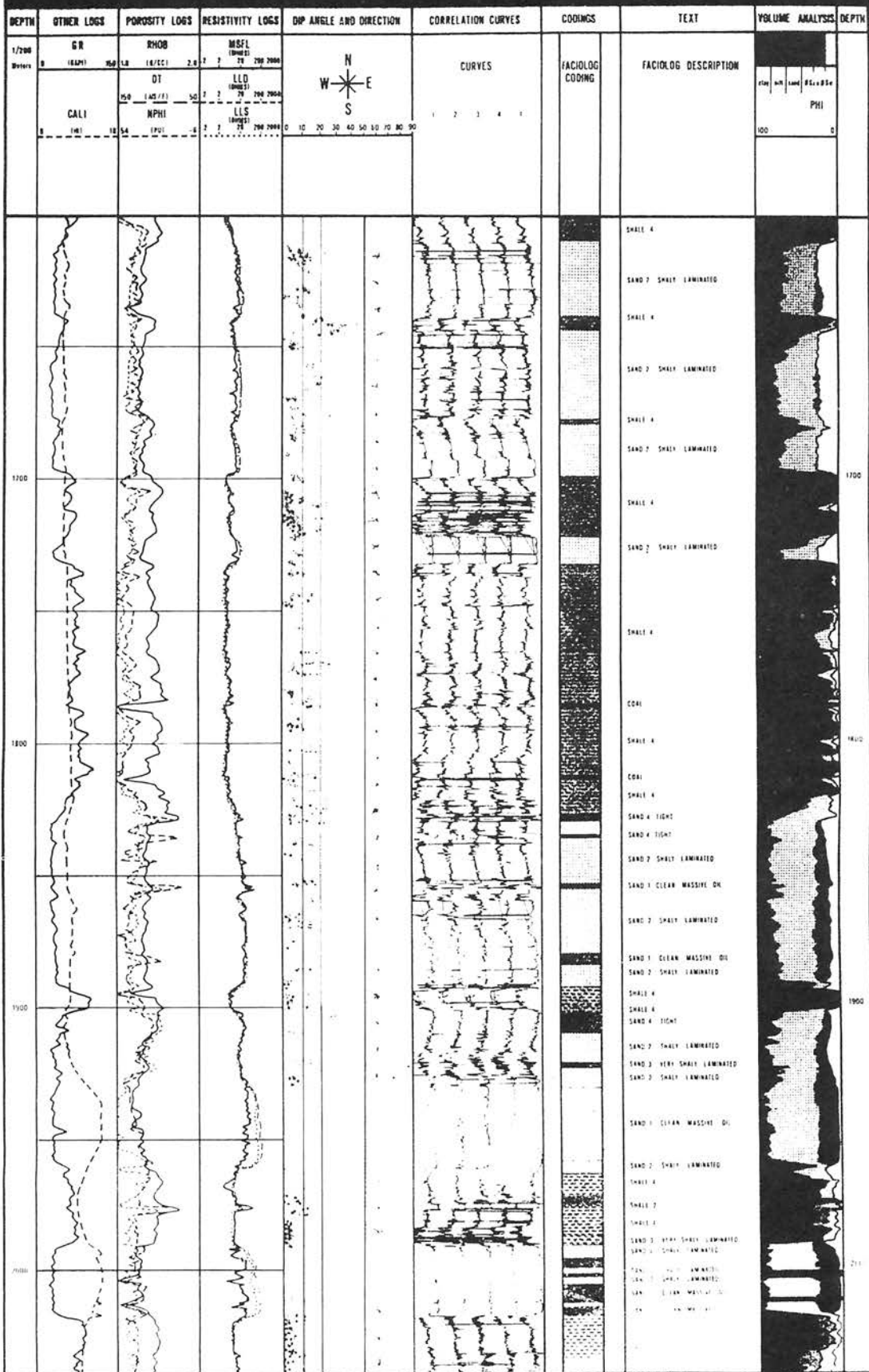
During his career, Prof. Koenigswald authored more than 200 scientific papers and also a number of popular and eloquently written books and articles on science for the layman. He was elected to the Academies of Science of the Netherlands (1950), the United States (1970) and Austria (1975). Among the many other honours and awards the Koenigswald received were the Golden Annandale Medal of the Royal Asiatic Society, Calcutta (1954), Honorary Life Membership in the New York Academy of Sciences (1959), the Darwin Medal of the Academia Leopoldina, Halle (1959), the Thomas Huxley Medal of the Anthropological Society of Great Britain and Ireland (1964), and an Honorary Doctorate from the University of Jogjakarta, Java (1976).

Mar 31 1983.

P.H. Stauffer



FACIOLOG



Wireline logging data is finding wider applications in sedimentology. This began with the study of log curve shapes to identify different depositional sequences. Recent developments have led to the use of logs to identify "electrofacies" — that is, a set of log responses that characterizes a sediment and distinguish it from others. The objective is to associate a certain type of lithofacies defined by core data with a set of log responses so that such a lithofacies can be identified in other wells without core data. This can also be used to guide the choice of interpretation model and in well to well correlations.

BERITA PERSATUAN
(NEWS OF THE SOCIETY)

WE APOLOGIZE FOR THE LATE PUBLICATION
OF THIS ISSUE OF WARTA GEOLOGI.
THE DELAY IS DUE TO UNFORESEEN CIRCUMSTANCES
RELATING TO EDITORIAL PROCEDURES AND GUIDELINES
BEYOND THE CONTROL OF THE EDITOR.

EDITOR

GSM SEMINAR/CONGRESS/WORKSHOP 1983/84

8-10 Sept 1983

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Keynote Papers: Foo Khong Yee (Paleozoic)

Khoo Han Peng (Mesozoic)

T. Suntharalingam (Cenozoic & Quaternary)

Yap Fook Loi (Magmatism)

End Sept 1983

Rock Blasting Technique Training Course II.

Place: University of Malaya.

Organizing Secretary: Zainol Rashid b. Mohd. Darus.

Sponsors: GSM/Tenaga Kimia/Atlas Copco.

Early Dec 1983

Petroleum Geology Seminar 1983.

Chairman: Noordin Ramli.

Late Dec 1983

**Workshop on Earth Science in Schools and Teacher Training
Institutes.**

Chairman: Mohd. Ali Hj. Hasan.

9-13 April 1984

GEOSEA V - Geology, Mineral and Energy Resources of S.E. Asia.
Place: Federal Hotel, Kuala Lumpur.
Chairman: T.T. Khoo.

April 1984 (Special session before GEOSEA V)

Workshop on Urban Geology.
Chairman: John Kuna Raj.

GSM SUBCOMMITTEES

Young Geoscientist Publications Award Committee

Chairman: Syed Sheikh Almashoor
Members: Chen Shick Pei
Ahmad Jantan
Yap Fook Loi
S. Paramanathan

Nominations Committee

Chairman: Andrew Spykerman
Members: B.K. Tan
Ahmad Said.

YOUNG GEOSCIENTIST PUBLICATIONS AWARD - CALL FOR NOMINATIONS & RULES AND REGULATIONS (AMENDED)

Call for nominations. If you think you have read a good paper published in 1982 that was written by one of the younger members of the Society, please do not hesitate to nominate him or her to the Award Nomination Board. You have to make sure that your nominee was thirty years old or younger at the time his paper was published and that he or she should be a resident of Malaysia for at least three years prior to the date of publication.

Rules and regulations. The previous rules and regulations pertaining to the above Award (see Warta Geologi, vol. 5, no. 3) was slightly amended by the present GSM Council. The amended rules and regulations are as given below:

PART I

PRELIMINARIES

- Short Title 1. (1) This award may be cited as the Geological Society of Malaysia Young Geoscientist Publications Award.
- Interpretation 2. (1) Unless the context otherwise requires:
"Society" means the Geological Society of Malaysia;

"Council" means the current Council of the Geological Society of Malaysia comprising a President, Vice-President, Secretary, Assistant Secretary, Treasurer, Editor, Immediate Past-President and eight Councillors;

"Board" means the Award Nominations Board established under section 3(2);

"Chairman" means the elected Chairman of the Award Nomination Board established under section 3(2) (a);

"Members" include all the classes of membership of the Geological Society of Malaysia and are persons who have paid up their subscriptions for the year.

PART II

THE AWARD NOMINATIONS BOARD

- | | |
|---------------------------|--|
| Establishment
of Board | <p>3. (1) For the purpose of the award there shall be established a Board to be called the "Award Nominations Board" which shall comprise of five Members of the Society other than Student and Associate Members.</p> <p>(2) The Board shall consist of the following persons</p> <p style="padding-left: 40px;">(a) A Chairman, who shall be elected from the current Council of the Society,</p> <p style="padding-left: 40px;">(b) Four members of the Society who shall be selected by the Council.</p> <p>(3) No persons shall be made a member of the Board for a continuous period of more than three years and no person who has been a member of the Board for a continuous period of three years shall again appointed before a year has elapsed since he last ceased to be on the Board.</p> <p>(4) If any member of the Board dies, resigns or has his membership revoked, a new member shall as soon as practicable be appointed in his place for the remainder of the term for which his predecessor was appointed.</p> |
| Functions
of Board | <p>4. (1) The Board shall call for nominations each year not later than 1st October, through the Society's publications or circulars.</p> <p>(2) The Board shall submit to the Council by 31st December each year, its recommendation(s) of suitable candidate(s) for the Award whose decision (the Council's) shall be final.</p> <p>(3) The Board shall arrive at its recommendation(s) after consultation with other competent</p> |

sources as to the accuracy, technical data and other details.

- (4) In the event that two or more papers are considered to be of equal merit, the Board may recommend to the Council to divide the Award in any one year.
- (5) If, in the opinion of the Board, no paper of sufficient merit has been published in any one year, no award shall be made.
- (6) The Board shall not be precluded from considering papers which have not been nominated.

PART III

ELIGIBILITY

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| Restrictions on awards | 5. (1) No person shall be considered for the award unless he satisfies the Board; |
| | a) that he is thirty years old or younger at the date of publication of the paper; |
| | b) that he has been a resident of Malaysia for at least three years prior to the publication of the paper; |
| | c) that he belongs to any one of the membership classes of the Society; |
| | d) that the paper has been published in the previous calendar year in any Malaysian or international scientific publication. |

PART IV

THE AWARD

- | | |
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| Award Fund | 6. (1) The award shall be made from the interest of an award fund to be established and placed on fixed deposit. |
| Nature of award | 7. (1) The award shall be given annually and the Board shall view each potential nominee case by case, subject to subsection 4(5). |
| | (2) The award will consist of a certificate and a sum of money not exceeding the annual interest accruing to the Fund or a medal of equivalent value. |
| | (3) The award may be given to the same person more than once provided the material is substantially dissimilar from the previous award-winning publication and that the author still qualifies under subsection 5(1). |

PART V

PROCEDURE

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| Award nominations | 8. (1) Nominations for an award must be made by a member who is not a Student or Associate member. |
| | (2) An author cannot nominate himself for the award. |
| Consent | (3) The written consent of the author is required. |
| Best paper | 9. (1) The award, in the opinion of the Board, shall be made to the author of the best paper in geology about Malaysia or the region and/or should be of general interest to the local community of geoscientists. |
| Joint authorship | (2) Papers with joint authorship may be considered, if a statement as to the relative responsibility of the authors, signed by all the authors, is attached. |
| | (3) In the case of joint authorships, the Board may make the award to one author, or to two or more authors, provided these qualify under subsection 5(1). |

PART VI

GRANTS, AMENDMENTS, ETC.

- | | |
|--------------------------------|---|
| Grants to fund | 10. (1) The Council, may at its discretion, make grants to the fund. |
| Alteration to rules | (2) From time to time, the Council may alter the rules and conditions governing the award. |
| Presentation | (3) During the presentation ceremony, a citation shall be given. |
| Time and place of presentation | (4) The receipt of the award and the presentation ceremony shall be published. The presentation ceremony shall normally take place during the Society's Annual General Meeting. |

Syed S. Almashoor

FIELD GUIDES

A number of members have been approached to prepare field guides for certain areas in Peninsular Malaysia, Sabah and Sarawak which may be useful for use during GEOSEA V.

The persons involved and their respective areas approved by

Council are as follows:

Denis Tan & Victor Hon - Kuching-Semanggong-Bau
 Shell's Geologists (Sarawak) - Bintulu-Miri
 Lim Peng Siong - K. Kinabalu-Sandakan-Tawau
 T.T. Khoo, B.K. Tan & C.P. Lee - Langkawi, & NW Peninsular Malaysia
 E.B. Yeap - Kuala Lumpur area (including Genting Highlands)
 Chow Weng Sum & S. Rajah - Eastern Belt, Peninsular Malaysia.

G.H. Teh

KEAHLIAN (MEMBERSHIP)

The following applications for membership were approved:

Full Members

1. Yoshitoshi Kobayashi, Kiso-Jiban Consultants, 115, Jln. Mega Merdung, Kompleks Bandar, Batu 5, Jln. Klang, K.L.
2. Hj. Noordin Wan Daud, RRIM, P.O. Box 10150, K.L.
3. Percival Allen, Geology Dept., University of Readings, Whiteknights, Reading RG6 2AB, U.K.
4. Idris b. Mohamed, Jabatan Geologi, Universiti Malaya, K.L.
5. Chue Hang Cheong, Jabatan Galian, Ting. 6, Bang. Ukur, Jln. Gurney, K.L.
6. Rosenani Abu Bakar, Jabatan Sains Tanah, UPM, Serdang.

Student Members

1. Lee Fook Wing, 76-1, Jalan Gelang, Off Jln. Sg. Besi, Pudu, K.L.
2. Yap Kian Fah, 95 Jln. Midah Besar, Taman Midah, K.L.
3. Sivagnanam a/l Sivalingam, no. 7, Jln. 21/29, P.J.
4. Visvalingam a/l Dorairaj, 553/5 Jln. Anthony, Brickfields, K.L.
5. Lim Heng Gaul, 151 Barrack Road, Taiping, Perak.
6. Huzaidi Hashim, 13 Lorong Masrai 1, Taman Bungai Raya, Setapak, Kuala Lumpur.

Institutional Members

1. Marathon Petroleum Exploration Ltd., Attn: Mr. D.C. Francis, P.O. Box 227, Tanglin P.O., S'pore 9124.
2. Dept. of Civil Engineering, University of Nottingham, Attn: Dr. L.W. Ackroyd, University Park, Nottingham NG7 2RD, U.K.
3. Elf Aquitaine Malaysia, 17th Floor, Plaza Pekeliling (The Tower Block), No. 2, Jln. Pekeliling, K.L. (Attn: Mr. M. Blinet).

Associate Member

1. Phua Teck Chuan, No. 1, Jln. 14/57, Petaling Jaya.

PERTUKARAN ALAMAT (CHANGE OF ADDRESS)

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

1. Tee Peow Keong, Blok 329, Bilik 614A, Desasiswa Permai, Universiti Sains Malaysia, P. Pinang.
2. Cathy L. Connor, 2660 Fritz Cove Road, Juneau, Ak. 99801, USA.

3. J.H. Bennie, 107 Leslie Avenue, Hamilton, Ontario, Canada L9C 1M4
4. Dale Brunotte, UKM/Sabah, Locked Bag no. 62, Kota Kinabalu, Sabah

PERTAMBAHAN BARU PERPUSTAKAAN (NEW LIBRARY ADDITION)

1. Bull. Science & Technology Malaysia, vol. 2, no. 1 & 2, 1983.
2. Bull. Nanjing Inst. of Geology & Pal. Academia Sinica, nos. 4 & 5, 1982.
3. Commonwealth Geological Liaison Office, special liaison report, nos. 6 & 8.
4. AAPG Explorer, July & Aug. 1983
5. National Library Singapore, adult reference collections, accessions list, May - Sept. 1983.
6. Abstrak Geologi: Jab. Geologi: UKM, Bangi, 1982
7. Journal Geological London, vol. 140, pt. 3, 1983.
8. National Geophysical Research Inst., Annual Report, 1981-82.
9. Bulletin of the National Science Museum, Seris C, vol.9, no. 2, 1983.
10. AGID News, nos. 35 & 36, 1983.
11. Commonwealth Science Council, Newsletter no. 4, 1983.
12. Mineralogia Polonica, vol. 12, no. 2, 1981.

BERITA - BERITA LAIN (OTHER NEWS)

THE GEOLOGIST'S HAMMER IS MIGHTIER THAN THE PEN

British geologist E.H. Cunningham Craig developed a reputation for success during exploration for oil in Trinidad, Burma, Persia and Venezuela from 1903 to 1912.

His instruments were simple, but apparently effective - a large leather map-case, an ivory protractor and a stout walking stick with a crooked handle. He opposed the 'wasteful' and 'cumbersome' practice of carting plane-tables on geological expeditions.

In his 1914 book 'Oil-Finding', Cunningham Craig insisted that simplicity was imperative in geologic reports.

Despite the passage of 69 years and the emergence of several profoundly new geological theories, his advice still rings true - for both young initiates and seasoned veterans.

The following excerpts from 'Oil-Finding' depict Cunningham Craig's views on report-writing.

'It should be the geologist's endeavour to try how short a report he can write, provided all essential matters are covered, and not how long he can make it, in the report on a new area, brevity is the first essential. The geologist should write out his report three times, each time making it shorter by cutting

out all that does not seem absolutely necessary. Looked at from this point of view it is wonderful how much 'padding' can be detected in even a workman-like and concise report. Perhaps one of the most fruitful sources of 'padding' is in alluding to, discussing or criticizing previous work done by others in the same area or district. This is very seldom necessary except in the briefest possible fashion; it is wearisome to the reader, and it is occasionally dangerous. The last report must be the best, if the observer be competent, as he begins where his predecessors left off, with many of the essential facts already marshalled for him.

"Clearness is no less essential. Technical geological terms should be eschewed as far as possible, as it is probable that of those who read a report few will have more than a smattering of geological knowledge.

"It is not difficult to explain in simple language all that can be conveyed by sesquipedalian scientific phraseology. Again it is not enough that the writer is clear in his own mind upon a point; he must set it down so that the reader cannot fail to be clear in his mind as to what is meant to be conveyed. This is not such a simple matter as it appears at first sight. In correspondence with reference to a report or the ground with which it deals, the geologist's statements will be paraphrased and unintentionally misquoted, and some day a statement which the writer considered impossible to misconstrue will come back to him distorted out of all recognition and labelled as his opinion. Therefore short crisp sentences, without conditional clauses, should be the rule.

"Graces of style and the neat turning of phrases are to be avoided: it is possible to give a literary flavor to scientific work, as many of the greatest geologists from Hugh Miller onwards, have taught us but it is not literature that is required from the field geologist, but facts, if in reading over the draft of a report one comes upon any sentence with which one is particularly pleased, the wisest course is to cut it out at once. Be literal rather than literary.

"The point most essential of all is to stick to facts. Opinions must not be given on any points of importance in the geology of the area examined. It is, of course, impossible to avoid giving an opinion upon such a question as whether an area is sufficiently promising to warrant development work being undertaken or not, but in dealing with questions of structure, lateral variation, thickness of oil-bearing strata, depth to be drilled, etc., no mere opinion will suffice. If the certified facts cannot be given, the geologist may say so clearly. 'To the best of my belief', 'as far as I could ascertain', 'in my opinion', 'it seems to me', and the numberless similar phrases should be tabooed. Indeed, the geologist will do well to shun the use of the first personal pronoun as much as possible, and to write his report in the third person. The report will read better and will appeal more forcibly to both scientific and commercial readers if the writer does not intrude his personality, but allows the facts as ascertained by him and set forth in map, section and report to speak for themselves.

"The ideal report must be partly descriptive: it must explain the map to those who may not be able to read geological maps. It must call attention to the points of greatest importance in the structure, etc., but is quite unnecessary to describe and explain

the map in detail..... The map and sections should be sufficient with a few sentences of explanation. Enough must be written concerning the methods of mapping employed and the nature of the strata examined to show the care with which the survey has been conducted.

"Evidence of the presence of petroleum should be treated separately and at greater length, for much, and in some cases perhaps undue importance will be attached to such evidence by those for whom the report is written, it is always necessary to prove as conclusively as possible the petroliferous nature of the series that has been studied geologically, and the conditions under which surface shows of petroleum occur afford very valuable hints to the expert or technical adviser and the field manager.

"Boring records and hearsay evidence... must not be blindly relied upon. Not that the geologist will be intentionally misled by the practical workers in an oilfield... but the mind untrained in scientific work may not be able to convey or express information in such a form that it can be grasped accurately. From a report heresay evidence should be rigidly excluded, it is better to leave a point unsettled than to rely, however, slightly upon second-hand information.

"It will frequently happen that the geologist in the course of his field work will establish or obtain evidence about, some point of general scientific interest, and he will naturally be tempted to enlarge upon it in his report. In such cases the best procedure is to consider whether the scientific point in question is of practical importance in the commercial development of any particular field, and whether other members of a scientific staff working in the same interests will be helped in their investigations by the new knowledge acquired.

"If so, the evidence should be described briefly and the conclusion stated. Otherwise it is better not to overload a report with matters however interesting and important from the scientific point of view, that have no direct bearing upon the practical finding and producing of petroleum. Appendices can always be written to a report to contain such results of the geologist's investigations as are of greater scientific than practical importance.

"Reports are always subject to criticism, and as a matter of course always receive it practical or academic, pertinent or impertinent, fair or unfair, and occasionally merely ignorant. Any criticism is stimulating or should be so, to the practical geologist and in the majority of cases must be beneficial howsoever unfair it may be. The answer to it is in work rather than controversy.

"Theories may be promulgated, tested by the facts, and fall; fallacies often die very hard and may even be brought to life again unexpectedly but the search for truth goes on, and the dealer in facts has in the end the victory over the critic steeped in theory who has not the advantage of first-hand acquaintance with all the evidence. Therefore the field-student in his writing should eschew theory and stick to facts, not resent the spur of criticism however clumsily applied.

(by Ellen Sue Blakey, AAPG Explorer, April 1983)

T.W. Koh

GEOWARE

GEOWARE is the worldwide contact between geoscientists producing earth science related microcomputer programs, and microcomputer owners who need geoscience software. Proprietary and public domain software are included.

More than 1200 oil and gas, mining, geological, and geophysical organizations and agencies are being asked to announce this service to their members and staff.

Geoprogrammers can contact Rob Turley, (303) 741-5720. Or write to: GEOWARE; 7173 So St Paul; Littleton, Colorado, USA 80122.

Lists, or a catalog, of available geoscience software can be obtained from GEOWARE after the 1st of January 1984.

APCOM '84 - EIGHTEENTH INTERNATIONAL SYMPOSIUM ON COMPUTER APPLICATIONS IN THE MINERAL INDUSTRIES

London 26-30 March 1984.

The Institution of Mining and Metallurgy will hold the Eighteenth International Symposium on Computer Applications in the Mineral Industries (APCOM) from 26-30 March 1984 at the Royal School of Mines, Imperial College, London.

Theme

The symposium, in line with previous conferences, will cover a wide range of computer applications in the mining industry, emphasizing techniques of interest to the practising engineer. The special theme of the meeting will be the comparison of actual operating experience with original models, forecasts and feasibility estimates.

Since the APCOM series of conferences was begun in 1961 many examples must have accumulated of techniques having been put into practice and plans having been implemented. It is therefore timely to review the successes and failures of computer applications since computers became available as a management tool. Case studies of this general theme under any of the subject headings given below are particularly welcome.

Papers

The Organizing Committee intends to invite a number of authors to present papers, but will welcome additional submissions on the following principal topics:

Exploration: Modelling mineral deposition processes
Regional comparisons for target selection
Computer-aided selection of target areas
Experience with computer analysis of geophysical
and geochemical data.

Geostatistics and ore-reserve estimation:
Techniques of estimation
Comparison of grade and tonnage estimates with
production
Computer graphic applications

Financial evaluation and planning:

- Techniques for making early estimates of capital and operating costs
- Comparison of feasibility estimates with final costs and performance

Mine design and operations"

- System modelling and evaluation
- Rock mechanics in design applications
- Materials-handling studies
- Interactive graphics

Mineral processing and metals extraction:

- Modelling applications for plant management, design and control
- Comparison of designed and actual performance

Market analysis and prediction:

- Simulation of commodity markets
- Supply, demand and price studies
- Comparison of predictions with actual outturns

International climate for the mineral industries.

Further Information

Enquiries about the symposium should be addressed to the Conference Officer, The Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, England (telephone: 01-580 3802; telex: 261410).

RECENT ADVANCES IN MINERAL SCIENCE AND TECHNOLOGY - MINTEK 50, Johannesburg, South Africa, March 26-30 1984

The South African Council for Mineral Technology, formerly the National Institute for Metallurgy, will be celebrating 50 years of growth in 1984 and is organizing an international conference MINTEK 50 to mark the occasion of its golden jubilee.

The following areas of interest will be covered in a series of technical sessions and excursions:

- | | |
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| * Pyrometallurgy | * Mineralogy |
| * Hydrometallurgy | * Ore-dressing |
| * Mineral and process chemistry | * Physical metallurgy |
| * Analytical chemistry in mineral processing | * Control of mineral-processing plants |

A number of international authorities in mineral science and engineering will be contributing to the conference.

The proceedings of the conference will be issued as a special publication.

For additional information please write to: The Conference Secretary, Mintek, Private Bag X3015, Randburg, 2125 South Africa.

PETRO - PC '84 - MICROCOMPUTERS IN PETROLEUM EXPLORATION AND PRODUCTION

April 17, 18 & 19, 1984. Northpark Inn, Dallas, Texas.

Technical sessions: Twenty four papers addressing various microcomputer applications which include The Micro PC - Overview, Evaluating hardware and software, Network development, Data base management, Micros and on line data, Geology, Graphics, Contouring, Office Systems, Economic analysis, Geophysics, Accounting, Engineering, Log analysis, Land records.

Introduction to microcomputers: An all day course providing the first time user with the terminology and basic use of microcomputers as well as an initial approach to hardware and software selection.

Exhibits: The exhibits will include displays which will feature hardware and software packages as well as many services applicable to petroleum exploration and production.

Further information: ISEM, P.O. Box 274, Dallas, Texas 75275, USA or call (214) 692-3488.

INDONESIAN PETROLEUM ASSOCIATION THIRTEENTH ANNUAL CONVENTION, May 29-30 1984, Jakarta, Indonesia

The Thirteenth Annual Convention of the Indonesian Petroleum Association will be held in Jakarta on May 29-30, 1984.

A wide mix of papers in all aspects of the oil and gas industry including Geology/Geophysics/Geochemistry, Formation Evaluation, Geothermal Activities, Petroleum Engineering/Drilling, Oil/Gas Field Studies, Facilities Design, Energy Related Topics and other related areas of the petroleum industry, will be presented.

Further information: Indonesian Petroleum Association, Attn: Andrew L. Vagvolgyi, Lecture Committee Chairman, Jl. Menteng Raya 3, Jakarta, Indonesia. Telephone: 350235 (IPA) or 711211 (Mobil Oil Indonesia). Telex: 47431 (Mobil Oil Indonesia).

SCHOLARSHIPS GUIDE FOR COMMONWEALTH POSTGRADUATE STUDENTS 1983-85.

Nearly twelve hundred separate award schemes are listed in the new edition of this guide which is the only publication bringing together this kind of information on a Commonwealth-wide basis.

Thoroughly revised, the 330-page book, price: £7.90 post free (by surface overseas), describes sources of financial aid for graduates of Commonwealth universities who wish to undertake postgraduate (including postdoctoral) study or research at a Commonwealth university outside their own country, e.g. awards tenable in *Britain or Australia* by Canadian or Malaysian graduates.

KURSUS-KURSUS LATIHAN (TRAINING COURSES)

A bracketed date (Mar-Apr 1983) denotes entry in that issue carried additional information.

January 1984-March 1984

Remote sensing application and digital image processing (Enschede, The Netherlands). Certificate courses on techniques for national resources surveys, organized annually by the International Institute of Aerial Surveys and Earth Sciences (ITC). Sponsored by Unesco, English. For information: ITC Student Affairs Office, P.O. Box 6, 7500 AA Enschede, The Netherlands.

January 16-July 13, 1984

Post-experience courses on water resources technology in developing countries (Birmingham, U.K.). For information: Dr. N.T. Kettegoda, Dept. Civil Engineering, University of Birmingham, Box 363, Birmingham, U.K. B15 2TT.

February 1984 - March 1984

Geochemical prospecting techniques (Tervuren, Belgium). Annual course sponsored by the Royal Museum of Central Africa and UNDP. French. For information: Musée royal de l'Afrique centrale, Steenveg op Leuven, 13, B-1980 Tervuren, Belgium.

February 1984 - November 1984

Photointerpretation applied to geology and geotechnics (Bogota, Colombia). Course organized by the Interamerican Centre of Photointerpretation (CIAF) in cooperation with ITC and Unesco. Spanish. For information: Academic Secretariat of the CIAF, Apartado Aereo 53754, Bogota 2, Colombia.

February 15 1984 - December 15 1984

Geothermics (Pisa, Italy). Certificate course organized annually by the Istituto Internazionale per le Ricerche Geotermiche and sponsored by Unesco, UNDP and Italy. English. For information: Dr. Mario Fanelli, Istituto Internazionale per le Ricerche Geotermiche, Via Buongusto 1, 56100 Pisa, Italy. Telephone (050) 41503 or 46069.

March 5 - 30 1984

Geological and hydrological hazards (Denver, Colorado, USA). Training course for foreign scientists organized by the U.S. Geological Survey. English. For information: Training Section, Office of International Geology, U.S. Geological Survey, National Center, M/S 917, Reston, VA 22092, USA.

March 1984 - April 1984

Mineral exploration (Paris, France). Short course based on a simulation method organized annually by the Ecole Nationale Supérieure des Mines and sponsored by Unesco. French. For information: Prof. H. Pelissonnier, Ecole des Mines, 60 Bd Saint Michel, 75272 Paris, Cedex 06, France.

April 23 - May 25 1984

Applications in geologic and hydrologic exploration and planning (Sioux Falls, South Dakota, USA). International Workshop. For information: Chief, Training and Assistance, U.S. Geological Survey, EROS Data Center, Sioux Falls, SD57198, USA. Telephone: (605) 594-6114.

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Scholarships, grants, loans, assistanships, demonstratorships etc are listed. All subjects of study or research are covered in which the universities offer facilities. Substantial appendices contain information about (a) awards tenable at some major non-university institutions in the Commonwealth and (b) awards open only to graduates of universities in the Commonwealth country of tenure. There is an index.

Like its companion volumes (Awards for Commonwealth University Academic Staff, Grants for Study Visits by University Administrators and Financial Aid for First Degree Study) Scholarships Guide has been prepared by the Awards Information Service of the ACU.

INTERNATIONAL REMOTE SENSING WORKSHOPS EROS DATA CENTER, SIOUX FALLS, SOUTH DAKOTA, May and September 1984

In response to continuing interest in the use of remote sensing technology for Earth resources inventory and assessment, the U.S. Geological Survey offers a program of remote sensing workshops for non-U.S. scientists, engineers, and resource managers. These workshops are held at the EROS Date Center (EDC), Sioux Falls, South Dakota, during May and September each year, demand and schedule permitting. Since 1973, more than 550 scientists representing over 80 countries have participated in the workshops. In 1984, the emphasis will be on in-depth discipline-specific analysis techniques.

The dates for the 1984 Workshops are:

Twenty-second International Workshop: Applications in geologic and hydrologic exploration and planning, April 23-May 25 1984

Twenty-third International Workshop: Applications in vegetation assessment and land-use planning, August 27-September 28, 1984.

Workshop objectives and program

The workshops are designed to familiarize the participant with the data characteristics, advantages and limitations, and applications to the subject disciplines of a variety of remote sensing systems, as well as to provide experience in analyzing and interpreting remotely sensed data to produce information useful in resource management and planning. Emphasis is placed on the analysis of Landsat data, although attention is also given to the interpretation of aerial photographs. Each workshop will concentrate on a particular discipline application (the May workshop on geologic and hydrologic applications, and the September workshop on vegetation assessment and land-use planning), and will include both manual and digital data analysis. The workshop program consists of a combination of classroom lectures, workshop exercises, homework, and field work. Limited demonstrations will be given on computer-driven analysis equipment.

It will be assumed that participants have a knowledge of the basic fundamentals of remote sensing. For those who have previously attended an introductory workshop at the EROS Data Center, these intensive workshops will provide in-depth and detailed training in a specific discipline. For those with little previous experience in remote sensing, the intensive workshop, including the first-

week introduction, should provide valuable discipline-specific training. The workshop is viewed as providing a foundation upon which the participant can build, and hopefully will allow him to proceed in the use of remote sensing with a thorough understanding of techniques, uses and possible difficulties that he may encounter.

The first week consists of a general introduction to the fundamentals of remote sensing and is intended to provide all participants, regardless of previous experience, with a solid general background. The second week is devoted to in-depth discussions of the fundamentals as they refer specifically to the application discipline (May: geology/hydrology; September: vegetation/land-use), instruction in manual analysis and interpretation techniques, integration of various data sources, and a review of the various uses of remote sensing as applied to the discipline of interest. The third week is spent on an introduction to the uses of digital analysis, practice in data analysis and interpretation, and the use of data from various sources in the preparation of useful interpretation products. During the fourth week, a field trip to many of the places studied in the third week incorporates the concept of ground verification and field familiarization in the interpretation process. The bulk of the fifth week is spent on the interpretation of Landsat imagery by the attendee, usually of an area in his own country or in a region with which he is familiar and in which he has particular interest. The attendee is asked to define a specific interpretation problem, analyze and interpret the imagery, and report results.

Because the workshops are intensive, and to ensure adequate instructor-attendee interaction, enrollments will be limited to approximately 25 persons. Application deadlines must be met to allow time for ordering needed imagery and materials and for planning workshop details. As all lectures and discussions will be in English, attendees must be able to understand, speak, and read this language.

Cost

The total workshop fee is \$2,500, which includes the cost of instruction, training materials, and workshop bus travel. Payment of the workshop fee must be made prior to the start of the workshop.

An advance deposit of \$500, which is not refundable, is part of the total fee and is required within six weeks after notification of acceptance. This deposit includes the cost of representative Landsat imagery of the attendee's study area. This imagery is produced by EDC prior to the start of the workshop. If the accepted candidate does not attend the workshop, the imagery will be sent to the address cited on the application.

For further information: Training Section, Office of International Geology, U.S. Geological Survey, National Center (917), Reston, Virginia 22092, USA.

KURSUS-KURSUS LATIHAN (TRAINING COURSES)

A bracketed date (Mar-Apr 1983) denotes entry in that issue carried additional information.

January 1984-March 1984

Remote sensing application and digital image processing (Enschede, The Netherlands). Certificate courses on techniques for national resources surveys, organized annually by the International Institute of Aerial Surveys and Earth Sciences (ITC). Sponsored by Unesco, English. For information: ITC Student Affairs Office, P.O. Box 6, 7500 AA Enschede, The Netherlands.

January 16-July 13, 1984

Post-experience courses on water resources technology in developing countries (Birmingham, U.K.). For information: Dr. N.T. Kettegoda, Dept. Civil Engineering, University of Birmingham, Box 363, Birmingham, U.K. B15 2TT.

February 1984 - March 1984

Geochemical prospecting techniques (Tervuren, Belgium). Annual course sponsored by the Royal Museum of Central Africa and UNDP. French. For information: Musée royal de l'Afrique centrale, Steenveg op Leuven, 13, B-1980 Tervuren, Belgium.

February 1984 - November 1984

Photointerpretation applied to geology and geotechnics (Bogota, Colombia). Course organized by the Interamerican Centre of Photointerpretation (CIAF) in cooperation with ITC and Unesco. Spanish. For information: Academic Secretariat of the CIAF, Apartado Aereo 53754, Bogota 2, Colombia.

February 15 1984 - December 15 1984

Geothermics (Pisa, Italy). Certificate course organized annually by the Istituto Internazionale per le Ricerche Geotermiche and sponsored by Unesco, UNDP and Italy. English. For information: Dr. Mario Fanelli, Istituto Internazionale per le Ricerche Geotermiche, Via Buongusto 1, 56100 Pisa, Italy. Telephone (050) 41503 or 46069.

March 5 - 30 1984

Geological and hydrological hazards (Denver, Colorado, USA). Training course for foreign scientists organized by the U.S. Geological Survey. English. For information: Training Section, Office of International Geology, U.S. Geological Survey, National Center, M/S 917, Reston, VA 22092, USA.

March 1984 - April 1984

Mineral exploration (Paris, France). Short course based on a simulation method organized annually by the Ecole Nationale Supérieure des Mines and sponsored by Unesco. French. For information: Prof. H. Pelissonnier, Ecole des Mines, 60 Bd Saint Michel, 75272 Paris, Cedex 06, France.

April 23 - May 25 1984

Applications in geologic and hydrologic exploration and planning (Sioux Falls, South Dakota, USA). International Workshop. For information: Chief, Training and Assistance, U.S. Geological Survey, EROS Data Center, Sioux Falls, SD57198, USA. Telephone: (605) 594-6114.

May 28 - June 29 1984

Remote sensing: geologic applications (Flagstaff, Arizona, USA). Advanced training program for foreign scientists organized by U.S. Geological Survey. English. For information: U.S. Geological Survey Training Center, 917 National Center, Reston, Virginia 22092, USA.

July 1984

Regional geochemical exploration in tropics (Recife, Brazil). 3-week workshop. For information: Prof. Arao Horowitz, Coordenador do Programa de Mestrado em Quimica, Univ. Federal de Pernambuco, Cidade Universitaria, 50000 Recife, Brazil.

July 1984 - August 1984

Summer course on earth sciences: Crystallography, Mineralogy, Metallogeny (Madrid, Spain). Annual course organized by the Department of Geology and Geochemistry of the Universidad Autonoma de Madrid and sponsored by Unesco. Spanish. For information: Prof. T. Monseur, Departamento de Geologia y Geoquimica, Facultad de Ciencias, Universidad Autonoma de Madrid, Canto Blanco, Madrid 34, Spain.

September 1984 - November 1984

Geothermal energy (Kyushu, Japan). Annual short course organized by the Government of Japan and sponsored by Unesco. English. For information: Japan International Cooperation Agency (2nd Training Division, Training Affairs Department), P.O. Box 216, Shinjuku Mitsui Building, 2-1 Nishi-shinjuku, Shinkuku-ku, Tokyo 160, Japan.

September 1984 - November 1984

Mining exploration and exploration geophysics (Delft, The Netherlands). Annual diploma courses organized by the International Institute for Aerial Survey and Earth Sciences and sponsored by Unesco. English. For information: ITC (ME), 3 Kanaalweg, 2628 Delft, The Netherlands.

October 1984 - November 1984

Tectonics, seismology and seismic risk assessments (Potsdam, G.D.R.). One month training course organized annually by East German Academy of Sciences in collaboration with Unesco. English. For information: Prof. Dr. H. Kautzleben, Director, Central Earth's Physics Institute, Academy of Sciences of the German Democratic Republic, Telegraphenberg, DDR 1500 Potsdam, G.D.R.

October 1 - November 2, 1984

Remote sensing: Geologic applications (Flagstaff, Arizona, USA). Advanced training program for foreign scientists organized by U.S. Geological Survey. English. For information: U.S. Geological Survey Training Center, 917 National Center, Reston, Virginia 22092, USA.

October 1984 - September 1985

Fundamental and Applied Quaternary Geology (Brussels, Belgium). Annually organized training course leading to a Master's degree on Quaternary Geology by the Vrije Universiteit Brussel (IFAQ) and sponsored by Unesco. English and French. For information: Prof. Dr. R.

Paepe, Director of IFAQ, Kwartairgeologie, Vrije Universiteit
Brussel, Pleinlaan 2, B-1050, Brussels, Belgium.

KALENDAR (CALENDAR)

A bracketed date (Mar-Apr 1983) denotes entry in that issue
carried additional information.

1984

- March 18 - 25 : Land subsidence (3rd International Symposium),
Venice, Italy. Sponsored by IAH. (A. Ivan Johnson,
3rd International Symposium on Land Subsidence,
Woodward-Clyde Consultants, 7600 East Orchard
Road, Englewood, Co. 80111, USA).
- March 19 - 23 : Offshore Mineral Resources (2nd International Semi-
nar), Brest, France, Languages: French and English
(Mr. Louis Galtier, Association Germinal, B.P.
6009, 45060 Orleans, Cedex, France).
- March 25 - 29 : Soil salinity under irrigation - processes and
management (International Meeting), Bet Dagan,
Israel. Sponsored by ISSS and Israel Society of
Soil Science. (Dr. B. Yaron, P.O. Box 3054, Tel-
Aviv 61030, Israel).
- March 26 - 30 : Computer applications in the mineral industries
(18th International Symposium), London, U.K.
Organized by the Institution of Mining and Metallurgy.
(The Conference Office, Institution of Mining and
Metallurgy, 44 Portland Place, London W1N 4BR, UK).
- March 26 - 30 : Recent advances in mineral science and technology
(International Conference), Johannesburg, South
Africa. Sponsored by the South African Council
for Mineral Technology. (The Conference Secretary
(C.25), Mintek, Private Bag X3015, Randburg, 2125
South Africa) (May-Jun 1983).
- March 27 - 31 : Landplan II - Geoscience applied to urban problems
in SE Asia (Workshop), Kuala Lumpur. (Organizing
Secretary, Landplan II, Dept. of Geology, Univer-
sity of Malaya, Kuala Lumpur 22-11, Malaysia).
- April 9 - 13 : Geology, Mineral and Energy Resources of Southeast
Asia (GEOSEA V), Kuala Lumpur, Malaysia. Sponsored
by Geological Society of Malaysia. (T.T. Khoo,
Dept. of Geology, University of Malaya, Kuala Lum-
pur 22-11, Malaysia).
- April 12 - 13 : Diagenesis and low-temperature metamorphism (Meeting),
Bristol, U.K. (D. Robinson, Department of Geology,
The University, Queen's Building, University Walks,
Bristol BS8 1TR, U.K.).
- May 10 - 12 : Mineralisation in volcanic processes (Geological
Society and Volcanic Studies Group Joint Meeting),
Aberystwyth, Wales, U.K. (Geological Society,
Burlington House, Piccadilly, London W1V 0JU, UK).

- May 14 - 18 : Geomechanics (4th Australia-New Zealand Conference), Perth, Western Australia. (The Conference Manager, 4th A.N.Z. Geomechanics Conference, The Institution of Engineers, Australia, 11 National Circuit, Barton, ACT 2600, Australia).
- May 20 - 23 : Industrial minerals (6th International Congress), Toronto, Canada. (B.M. Coope - Editor, Industrial Minerals, 45/46 Lower Marsh, London SE1, UK).
- May 21 - 23 : Aggregates (International Symposium), Nice, France. Sponsored by IAEG. Languages: English and French. (M. Louis Prime), L.C.P.C., 58 boulevard Lefebvre, 75732 Paris Cedex 15, France).
- May 21 - 23 : Climate: Present, past and future (Symposium), New York, N.Y., USA. Sponsored by Columbia University in honour of Rhodes W. Fairbridge. (John E. Sanders, Dept. of Geology, Columbia University, 606 West 120 Street, New York, NY 10027, USA).
- May 21 - 23 : Groundwater resource utilization and contaminant Hydrogeology (International Symposium), Montreal, Quebec, Canada. Sponsored by Canadian National Chapter of IAH and CWWA. Languages: English and French. (Mr. H. Sommelet, Geomines Ltd., 1010 Sherbrooke St. W., Suite 2202, Montreal, Quebec, Canada H3A 2R7).
- June 5 - 11 : Geology of the Himalayas (International Symposium), Chengdu, China. Field excursion to Tibet. Languages: Chinese and English. (Mr. Li Tingdong, Secretary-General of the Organizing Committee, c/o Chinese Academy of Geological Sciences, Baiwanzhuan, Beijing, P.R. China).
- June 6 - 9 : Interpraevent (Interdisciplinary Symposium on mountain rivers, torrents, snow avalanches, slope stability, etc.) Villach, Austria. (Interpraevent 1984, Postfach 134, A-9501, Villach, Austria).
- June 15 - 17 : Sedimentology of nearshore and shelf sands and sandstones (Research Symposium), Calgary, Canada. (R. John Knight, Petro-Canada, P.O. Box 2844, Calgary, Alberta, Canada T2P 3E3).
- June 18 - 23 : 7th International Peat Congress, Dublin, Ireland. Study tours and post-congress tours. (International Peat Congress, c/o Bordna Mona, Lower Baggot Street, Dublin 2, Ireland).
- June 20 - 23 : Geomembranes (International Conference), Denver, Colorado, USA. Conference to precede the Impermeable Barriers for Soil and Rock Symposium. (A. Ivan Johnson, Woodward-Clyde Consultants, P.O. Box 4036, Denver, Co. 20204, USA).
- June 23 - 26 : Practical applications of groundwater geochemistry (Workshop), Banff, Alberta, Canada. (Dr. E.I. Wallick, Alberta Research Council, 5th Floor, Terrace Plaza, 4445 Calgary Trail South, Edmonton, Alberta, Canada T6H 5R7).

- June 23 - 30 : Melanges of the Appalachian Orogen (Penrose Conference), Newfoundland. (B. Lorenz, Department of Earth Sciences, Memorial University, St. Johns, Newfoundland, Canada A1B 3X5)
- June 24 - 27 : Codata (9th International Conference), Jerusalem, Israel. (The Secretariat, 9th International CODATA Conference, 122 Hayarkon Street, P.O. Box 3054, 61030 Tel Aviv, Israel)
- June 26 - 28 : Deep structure of the continental crust (International Symposium), Ithaca, N.Y., USA. (Muawia Barazangi, Department of Geological Sciences, Cornell University, Ithaca, NY 14853, USA).
- July : Volcanic Soils (International Panel) Tenerife, Canary Islands. (M.E. Fernandez Caldas, Dpto, de Edafologia, Univ. de la Laguna, Tenerife, Islas Canarias, Spain)
- August : Mapping of the soil-water balance (Meeting), Budapest, Hungary. (Dr. W.G. Sombroek, ISSS, International Soil Museum, 9 Duivendaal, POB 353, 6700 A.J. Wageningen, The Netherlands)
- Aug 4 - 14 : 27th International Geological Congress, Moscow, USSR. (N.A. Bogdanov, General Secretary, Organizing Committee of the 27th IGC, Staromonetny per. 22, Moscow 109180, USSR)
- Aug 9 - 18 : Crystallography, (13th General Assembly and International Congress), Hamburg, F.R.G. (E.E. Snider, American Crystallographic Association, 335 East 45th Street, New York, NY 10017, USA).
- Aug 24 - 30 : 6th International Palynological Conference, Calgary, Canada. Sponsored by ICP, CAP, CSPG, the University of Calgary, and Arctic Institute of North America. Pre- and post-Conference excursions. (L. Kokoski, Conference Office, Faculty of Continuing Education, Education Tower Room 102, Calgary, Alberta, Canada T2N 1N4)
- Aug 27 - 31 : Water movement in heavy clay soils (Meeting), Wageningen, Netherlands. (Dr. W.G. Sombroek, ISSS, International Soil Museum, 9 Duivendaal, POB 353, 6700 A.J. Wageningen, The Netherlands)
- Sept 3 - 8 : Caledonide Orogen, (IGCP Project 27, Working Group Meeting), Edinburgh, Scotland. Pre-Meeting excursions in Ireland, Scotland, England and Wales. (A.L. Harris, The University of Liverpool, Jame Herdman Laboratories of Geology, Brownlow Street, P.O. Box 147, Liverpool L69 3BX, UK)
- Sept 10 - 14 : Titanium (5th International Conference), Munich, F.R.G. (Deutsche Gesellschaft fur Metallkunde EV, Adenauerallee 21, D-6370 Oberursel 1, F.R.G.)
- Sept 16 - 22 : Landslides (4th International Symposium), Toronto, Canada. Sponsored in part by IAEG (Mr. J.L. Seychuk, Chairman, Organizing Committee, ISL/84, P.O. Box 370, Station A, Rexdale, Ont., Canada M9W 5L3)

- Oct 1 - 5 : Remote sensing of environment (18th International Symposium), Paris, France. (Environmental Research Institute of Michigan, P.O. Box 8618, Ann Arbor, MI 48107, USA)
- Oct 14 - 20 : Mineral processing and extractive metallurgy. (International Conference), Kunming, P.R. China. (The Secretary, Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, UK)
- Oct 31 - Nov 7 : Seismology and physics of the earth's interior (Regional Assembly of the International Association) Hyderabad, India. (Organizing Committee, IASPEI Regional Assembly, National Geophysical Research Institute, Hyderabad 500 007, India)
- Nov/Dec : Land evaluation for soil erosion hazard assessment (Meeting), Enschede, Netherlands. (Dr. W.G. Sombroek, ISSS, International Soil Museum, 9 Duivendaal, POB 353, 6700 A.J. Wageningen, The Netherlands)
- Nov 5 - 8 : Geological Society of America (Annual Meeting), Reno, USA. (S.S. Beggs, Geological Society of America, P.O. Box 9140, 330 Penrose Place, Boulder, Co. 80301, USA)
- Nov 19 - 22 : 12th World Mining Congress, New Delhi, India (Organizing Committee, Institute of Engineers, 8 Gokhale Road, Calcutta 700 020, India)
- Nov 20 - Dec 5 : Late Quaternary Sea-Level Changes (International Symposium and Field Meeting), Argentina and Chile. IGCP - 200 and INAUA Commission on Quaternary Shorelines. (Prof. Dr. Enrique Schnack, Centro de Geologia de Costas, C.C. 722, Correo Central, ARG-7600, Mar del Plata, Argentina)
- Dec 2 - 5 : Future petroleum provinces of the world (AAPG W.E. Pratt Memorial Conference), Phoenix, Ariz., USA. (AAPG, P.O. Box 979, Tulsa, OK 74101, USA)
- Dec 2 - 6 : Society of Exploration Geophysicists, (54th Annual Meeting), Atlanta, Georgia, USA. (J. Hyden, SEG, Box 3098, Tulsa, Oklahoma 74101, USA)

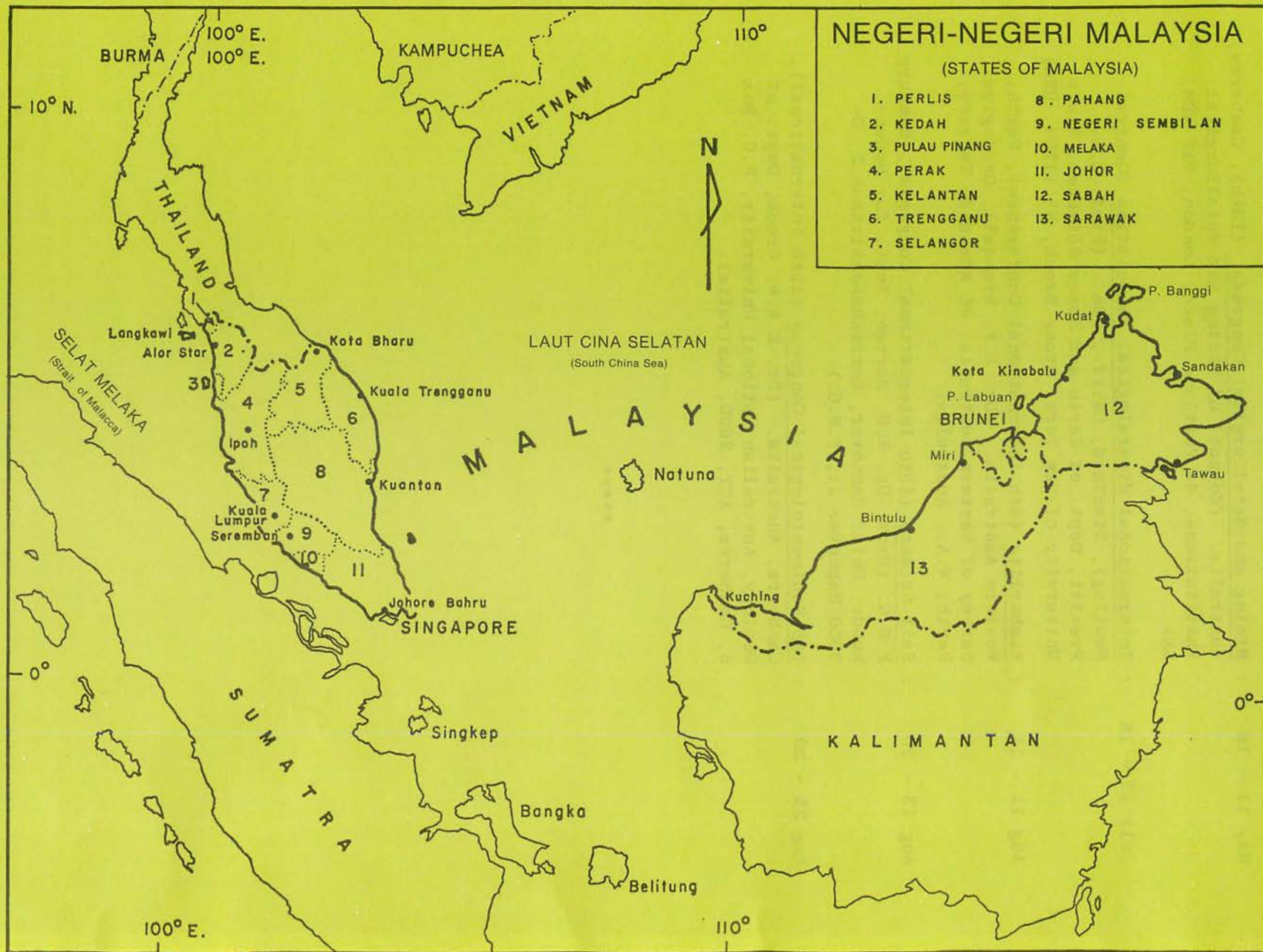
1985

- January : International Association of Hydrogeologists (International Congress), Tucson, Arizona, USA. Sponsored by IAH and AGU. (Eugene S. Simpson, Dept. of Hydrology and Water Resources, College of Earth Sciences, The University of Arizona, Tucson, AZ 85721, USA)
- January : Acid-Sulphate Soils (meeting), Dakar, Senegal. (Dr. W.G. Sombroek, ISSS, International Soil Museum, 9 Duivendaal, POB 353, 6700 A.J. Wageningen, The Netherlands)
- Feb 11 - 14 : Asian Mining '85 (2nd Conference), Manila, Philippines. (Meeting Secretary, The Institute of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, UK)

- April 10 - 12 : Forum on the Geology of Industrial Minerals, ann. mtg. Tucson, Arizona. (H. Wesley Peirce, Arizona Bureau of Geology & Mineral Technology, 845 N. Park Ave. Tucson 85719. Phone 602/621-7906)
- June : Tunnelling (4th International Symposium), Brighton, UK. (The Secretary, Institute of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, UK)
- June 9 - 15 : Water Resources (5th World Congress), Brussels, Belgium. (Dr. L.W. Debacker, c/o Brussels International Conference Centre, Parc des Expositions, Place de Belgique, B-1020 Brussels, Belgium)
- July 28 - Aug 2 : 8th International Clay Conference, Denver, Colorado. Sponsored by AIPEA. (Dr. A.J. Herbillon, Groupe de Physico-Chimie Minerale et de Catalyse, Univ. Catholique de Louvain, Place Croix du Sud 1, B-1348 Louvain-la-Neuve, Belgium)
- Aug 19 - 23 : Sixth Gondwana Symposium. Columbus, Ohio, USA. Sponsored by IUGS and Geological Society of America. (D. Elliott, Inst. of Polar Studies, Ohio State University, 103 Mendenhall, 125 South Oval Mall, Columbus, Oh 43210, USA)
- Sep 8 - 13 : Hydrogeology in the service of man (18th IAH Congress - International Symposium), Cambridge, UK. (J. Day, Hydrogeology Unit, Maclean Building, Crowmarsh Gifford, Wallingford, OX10 8BB, UK)
- Sept 9 - 13 : Fossil and living brachiopods (Meeting), Brest, France. (Congres Brachiopodes, Univ. Bretagne occidentale, Laboratoire du Paleozoique - 6, av. Le Gorgen 29283 Brest Cedex, France)
- Sept 15 - 21 : Geomorphology, resources, environment and the developing world (International Conference), Manchester, UK. (Prof. Ian Douglas, School of Geography, University of Manchester, Manchester M13 9PL, UK)
- Sept 22 - 28 : Chemrawn IV: Chemistry and resources of the global Ocean (Meeting), Woods Hole, Mass., USA. (Prof. G. Ourisson, Centre de Neurochimie, Universite Louis Pasteur, 5 rue Blaise Pascal, F-67084 Strasbourg, France)
- Sept 22 - 26 : High heat production granites, hydrothermal circulation and ore genesis, mtg. St. Austell, Cornwall. (Institution of Mining & Metallurgy, 44 Portland Place, London W1N 4BR. Phone: 01-580 3802. Tel-ex. 261410)

1986

- May 11 - 16 : Mining and Metallurgical Congress (13th), Canberra, Australia. (Council of Mining and Metallurgical Institutions, 44 Portland Place, London, W1N 4BR, UK)
- July 13 - 18 : International Mineralogical Association (General Meeting), Stanford, Calif., USA. (Prof. C.T. Prewitt, Dept. of Earth and Space Sciences, State University of New York, Stony Brook, NY 11794, USA)
- Aug 11 - 15 : Kimberlite (4th International Conference), Perth, Western Australia. (Dr. A.F. brendall, Geological Survey of Western Australia, 66 Adelaide Terrace, Perth, W.A., Australia)
- Aug 13 - 20 : Soil Science (13th International Congress), Hamburg, F.R.G. (Prof. Dr. K.H. Hartge, Inst. fur Bodenkunde, Univ. Hannover, Herrenhaserstrasse 2, D-3000 Hannover 21, F.R.G.)
- Aug 25 - 29 : IAS Sedimentological Congress (12th International), Canberra, Australia. (Dr. K.A.W. Crook, Dept. of Geology, Australian National University, P.O. Box 5, Canberra, ACT, 2600, Australia).



NEGERI-NEGERI MALAYSIA

(STATES OF MALAYSIA)

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|-----------------|--------------------|
| 1. PERLIS | 8. PAHANG |
| 2. KEDAH | 9. NEGERI SEMBILAN |
| 3. PULAU PINANG | 10. MELAKA |
| 4. PERAK | 11. JOHOR |
| 5. KELANTAN | 12. SABAH |
| 6. TRENGGANU | 13. SARAWAK |
| 7. SELANGOR | |

BURMA

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110°

VIETNAM

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THAILAND

SELAT MELAKA
(Strait of Malacca)

Langkawi
Alor Star

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Kota Bharu

LAUT CINA SELATAN
(South China Sea)

Kuala Trengganu

M A L A Y S I A

Natuna

Kuantan

Kota Kinabalu

P. Banggi

Kudat

Sandakan

P. Labuan

BRUNEI

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12

Tawau

Miri

Bintulu

13

Kuching

Johore Bahru

SINGAPORE

0°

S U M A T R A

Singkep

Bangka

Belitung

KALIMANTAN

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