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CATATAN GEOLOGI (GEOLOGICAL NOTES)

A PRELIMINARY NOTE ON THE GEOLOGY OF THE CHINI-6 AREA: A BASE METALS PROSPECT IN THE EASTERN BELT OF THE MALAY PENINSULA

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Abstract

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

Introduction

The Malay Peninsula can be divided into three geological provinces, namely the Western (Tin) Belt, Central (Gold-Base Metals) Belt and Eastern (Tin) Belt. The Chini-6 area is located in the Eastern Belt (Fig. 1), about longitude 103°E and latitude $3^{\circ} 20'\text{N}$. This area is about 20 km north of Bukit Ibam, formerly an iron-mining town.

The Chini-6 area is within the large Prospecting License area that Conzinc Riotinto Malaysia had prospected between June 1977 and December 1979. In the elaborate exploration programme carried out by the company, the area was delineated by regional appraisal using stream sediment sampling, outcrop examination and interpretation of pre-existing aeromagnetic maps. Subsequently, detailed grid soil sampling, pitting, deep augering, geophysical surveys by ground magnetometer and induced polarisation methods and finally diamond-drilling were carried out (Taylor & Toh, 1981).

The purpose of this publication is to describe the geology of the Chini-6 area, based mainly on petrographical studies of the drill-core material.

Surface Geology

The Chini-6 area is covered by sedimentary rocks in the east; metaquartzites in the north-west; volcanics and some weathered skarn rocks in the rest of the area (Fig. 2). The sedimentary rocks consist of unmetamorphosed and unmineralised interbeds of fine sandstone, siltstone and mudstone, which dip gently towards the east. This sequence is the youngest in the area, and probably lies unconformably on the volcanics.

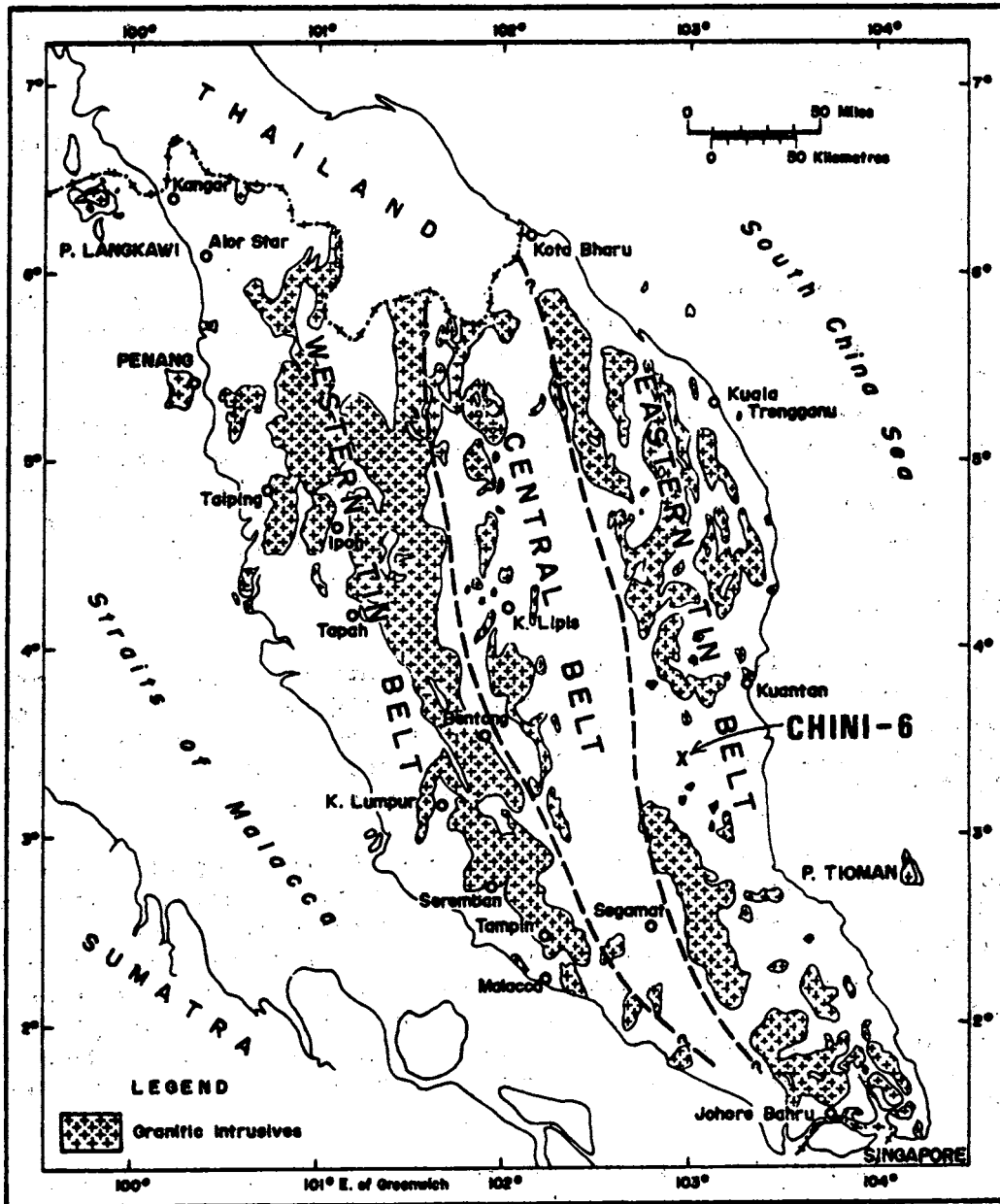


Fig. 1. Location of the Chini-6 area. Boundaries of the geological provinces after Rajah, *et al.* (1977, p. 29).

Its age is uncertain because of the absence of fossils, but it has a lithologic resemblance to the "Younger Sediments" described by Wee and Taylor (1974). These "Younger Sediments" located about 20 km NNE of the Chini-6 area (immediately north of the Pahang River), clearly lie unconformably upon base metals mineralisation, and are correlated with the Jurassic-Cretaceous Tembeling or Gagau groups.

The metaquartzites are unmineralised, massive and recrystallised to a simple mosaic of quartz grains exhibiting a granoblastic polygonal texture. These metasediments are more folded than the volcanics, and hence are the oldest rocks in the area. They belong to part of the Mersing Group which is assigned a Permian age by Cook and Suntharalingam (1970).

Subsurface Geology

Twelve diamond boreholes (Fig. 2) were drilled within the area underlain by the volcanics which showed the best geochemical and geophysical results. The drill-cores revealed that the volcanics are intercalated with thin beds or lenses of skarn rocks; and this pile of rocks is intruded and metamorphosed by a shallow intrusive body (Fig. 3). Base metals mineralisation is associated with the skarns while the intrusives are molybdenum-bearing.

Plotting the results of modal analysis of the intrusives on a quartz-alkali feldspar-plagioclase ternary diagram (Fig. 4) and following the classification by Streckeisen (1975), the mineralogic composition of the intrusives falls within the granite field. These granitic rocks are pink in hand-specimen and porphyritic in thin-section. The phenocrysts occupy 40-60% (average 47%) of the whole rock. Plagioclase accounts for 56% of the phenocrysts, quartz 27%, alkali feldspar 11% and biotite 6%. The plagioclase phenocrysts are glomeroporphyritic of cluster-size about 5 mm and their composition ranges from An₂₄ to An₃₈. The quartz phenocrysts are euhedral with bipyramidal crystal forms and resorption-rounded boundaries. The coarse-grained alkali feldspar phenocrysts usually show perthitic texture and twinning. The biotite phenocrysts are characteristically "bleached" with anomalous birefringence and weakened pleochroism. The phenocrysts are embedded in a fine groundmass which displays equigranular and aplitic textures with clear quartz and cloudy alkali feldspars as the chief constituents, and a minor amount of plagioclase. Spinel is present as a conspicuous accessory mineral, occurring as fine euhedral crystals with an acute rhombic cross-section. Other common accessories include zircon and apatite.

The volcanic rocks exhibit a range of variations in mineralogic composition and rock textures. Though the volcanics range in composition from acidic to basic, and both pyroclastics and flows are present, most of them are acidic pyroclastic rocks. The acid pyroclastics are composed of phenocrysts of quartz, plagioclase and some lithic fragments in a very fine felsic groundmass. The more basic volcanic rocks consist of subhedral clinopyroxene embedded in a fine mass of plagioclase laths. The volcanics have suffered some degree of contact metamorphism during the intrusion of the granite porphyry. In the acid pyroclastics, the coarser quartz grains are recrystallised into polycrystalline porphyroblasts while the plagioclases are sericitised. The very fine groundmass has been recrystallised to a coarser (but still very fine-grained) granoblastic felsic groundmass. Immediately adjacent to the contact

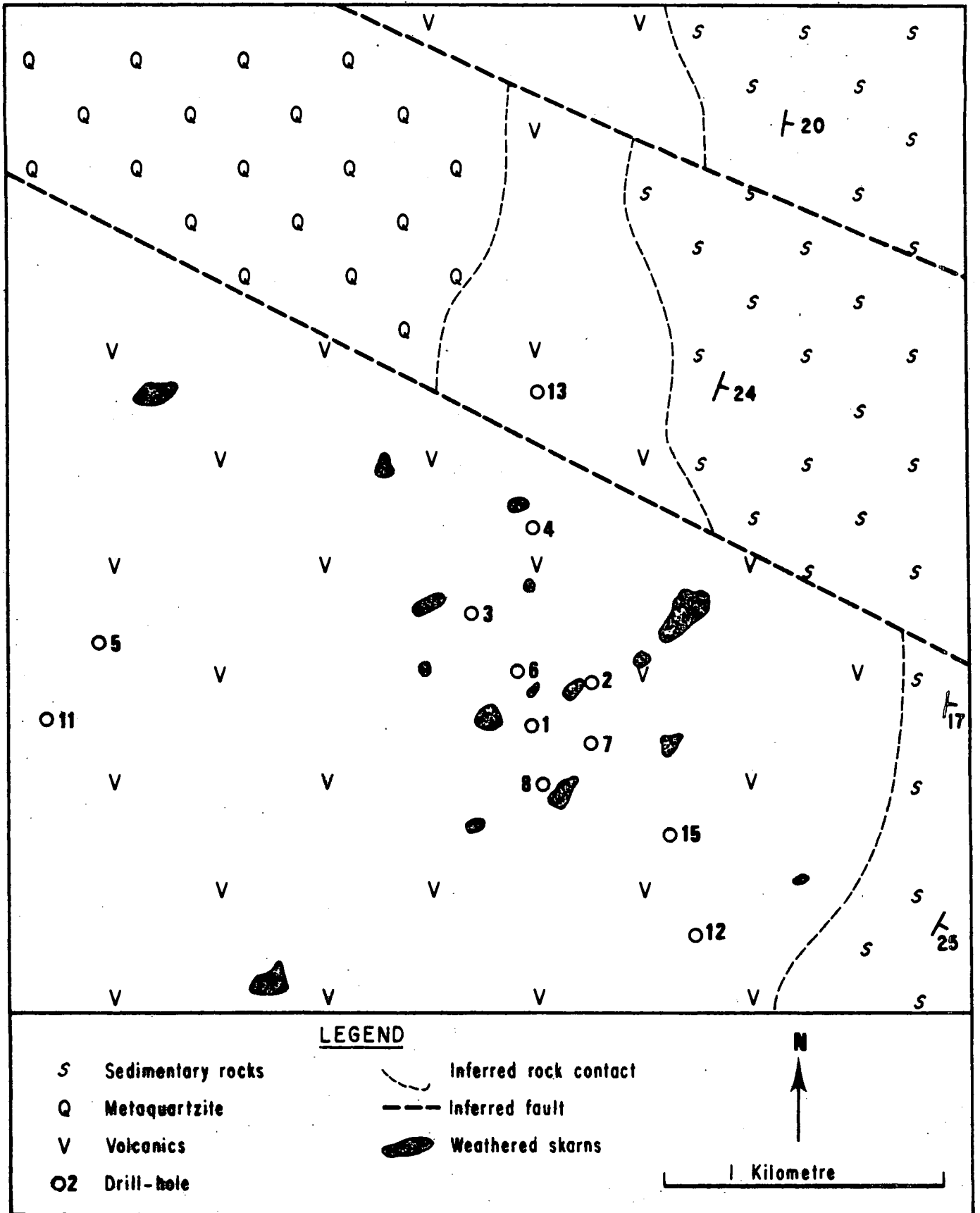
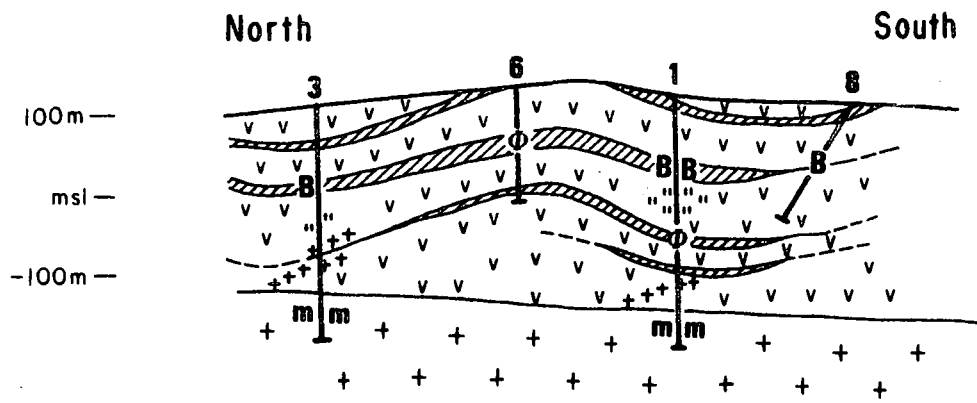
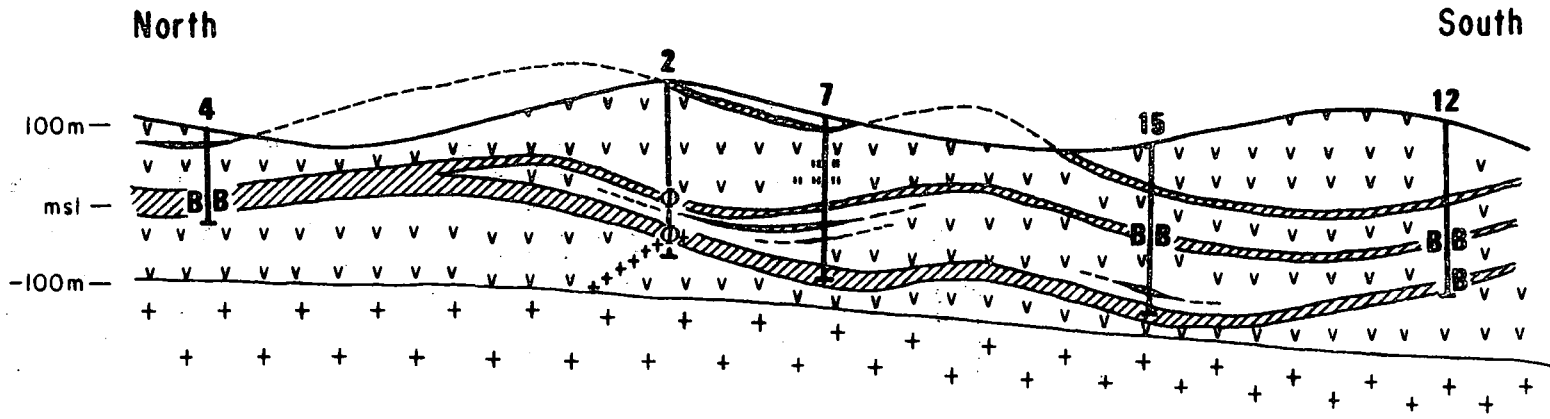


Fig. 2. Geological map of the Chini-6 area and locations of the diamond-drillholes.



- LEGEND**
- + + Granite porphyry
 - ▨ Skarn rocks
 - v v Volcanics
 - B Base-metal mineralisation
 - "" Disseminated chalcopyrite-pyrite
 - ⊙ Copper-molybdenum mineralisation (skarn)
 - m Molybdenum mineralisation (granite)

Fig. 3. Hypothetical cross-sections of parts of the Chini-6 area from diamond borehole data.

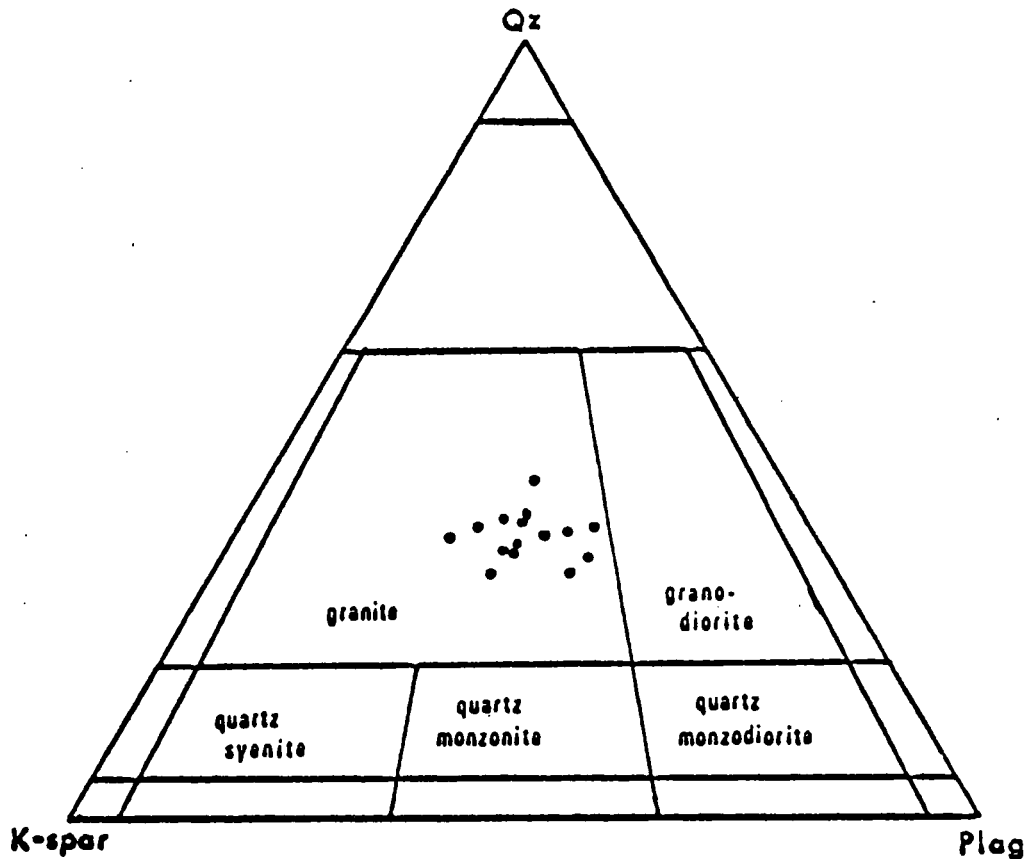


Fig. 4. Plot of the modal analysis results on a quartz-plagioclase-alkali feldspar triangular diagram. Classification after Streckeisen (1975).

with the granite porphyry, the volcanics are hornfelsed into a very fine equigranular, granoblastic mass of quartz, feldspars and clinopyroxene. The volcanics have suffered propylitic hydrothermal alteration during the intrusion of the granite porphyry. But the degree of alteration varies from weak to strong. The lime-bearing minerals present are calcite, epidote and garnets, accompanied by quartz and chlorite. These secondary minerals occurs as veinlets, fracture-fillings or they sometimes interweave with the felsic matrix of the volcanic rocks.

The skarn rocks consist predominantly of andradite garnet with minor amounts of quartz, calcite, clinopyroxene, epidote, wollastonite, chlorite and ore minerals. The garnets are euhedral and medium-grained. They are usually isotropic but commonly display anisotropism. Zoning and twinning characterise the anisotropic garnets. The minor minerals of which quartz and calcite are the most common, are found interstitial to the garnets. These interstitial minerals are usually fine-grained and granoblastic but wollastonite occurs as columnar aggregates or felted masses. The chamositic chlorite occurs in spherulitic form. Fine-to medium-grained granoblastic recrystallised limestone is encountered in one of the drillholes. The skarns are most probably derived from these calcareous rocks into which silicon, iron, magnesium and aluminium have been introduced during the emplacement of the granite

porphyry. Some of the skarns are subjected to alteration where the garnets are replaced by hematite and calcite. Near to the surface, the skarns are highly weathered and leached to produce a brown "gossan-like" rock which is light in hand-specimen. An irregular boxwork of goethite is displayed by the weathered skarns with minor amounts of manganese oxides.

Mineralisation

Mineralisation is encountered in every borehole but the intensity is generally weak. Among the different types of rocks in the area, the skarns are the most strongly mineralised. The types of mineralisation encountered in the skarns are:

- 1) Magnetite-pyrite, with minor amounts of chalcopyrite. Pyrite occurs as euhedral grains and is distinctly anisotropic. Magnetite occurs as anhedral aggregates and is interstitial to the garnets. Chalcopyrite is commonly altered with covellite coronas.
- 2) Hematite in the altered skarn rocks. The hematite occurs as pseudomorphs after garnet.
- 3) Galena-sphalerite, with minor amounts of chalcopyrite and pyrite. Galena and sphalerite occur as large plates filling the interstices of the garnet skarns. Chalcopyrite and pyrite occur as fine to coarse individual euhedral grains. Exsolved chalcopyrite blebs are commonly included in the sphalerite grains.
- 4) Pyrite-chalcopyrite-molybdenite skarns with this type of mineralisation are rather uncommon with the molybdenite occurring as fine to medium curved tabular plates.

The volcanics are poorly mineralised, with pyrite the most abundant ore mineral. It occurs commonly in thin veins and less commonly as fine disseminations. Small amounts of chalcopyrite are associated with the pyrite.

The granite porphyry is also poorly mineralised, with molybdenite the most abundant ore mineral. Platy molybdenite grains are found in thin calcite veins, associated with some pyrite.

The source of the ore deposition is most likely the granite porphyry. Ore-bearing fluids emanated from this high-level granite porphyry intrusion and permeated through the overlying rocks. Skarns resulted from the hydrothermal alteration of the country rocks during the hydrothermal mineralisation episodes.

Concluding remarks

The Chini-6 area could be the first base metals deposit discovered in the Eastern Belt, which is noted for its tin, tungsten and iron deposits. The exploration programme employed by Conzinc Riotinto Malaysia proves to be a feasible method in the location of such base metals deposits. The geological setting for these deposits is a terrain of metamorphosed volcanics with thin-beds or lenses of skarn rocks around epizonal granitic rocks.

Acknowledgements

I would like to express my thanks and gratitude to Conzinc Riotinto Malaysia for the access to the drillcore material and their hospitality during the fieldwork. I am grateful to the staff of the Geology Department, University of Malaya, especially Dr. Yeap Ee Beng for his supervision.

References

- Cook, R.H. & Suntharalingam, T., 1970. Geology and Mineral Resources Potential of Pahang Tenggara (Sectors E and F). Geol. Survey Malaysia Ann. Report 1970, 104-116.
- Rajah, S.S., Chand, F., and Aw, P.C., 1977. Mineral Resources, Peninsular Malaysia. Geol. Survey Malaysia Ann. Report 1977, p. 29.
- Streckeisen, A., 1975. To each plutonic rock its proper name. Earth-Sci. Rev., 12, 1-33.
- Taylor, D., and Toh, E., 1981. Regional mineral exploration in Pahang Tenggara - A case history of a base metal exploration project in the Malay Peninsula. In: Asian Mining '81 (In press).
- Wee, H.T., and Taylor, D., 1974. A major unconformity exposed in Sungei Siput, Pahang. Geol. Soc. Malaysia Bull., 7, 79-88.

A QUATERNARY FAULT IN PENINSULAR MALAYSIA: A NONTECTONIC INTERPRETATION

H.D. TJIA, Jabatan Geologi, Universiti Kebangsaan Malaysia, Kuala Lumpur

Two years ago Raj (1979) wrote a well-documented account on a fault cutting through unconsolidated deposits that overlie weathered schist bedrock. The outcrop is a roadcut along the Karak Highway near Bentong Pahang, and is indicated on an index map by Raj. According to Raj distinct vertical separation of the boundaries of the unconsolidated deposits and bedrock amounts to 1.5 metres. The unconsolidated nature of the sediments suggests a Quaternary age. Hence the fault is very likely also of Quaternary age. The cause of faulting has been interpreted as tectonic movement by Raj. This interpretation has important implications for the geotectonics of the region.

However, very young (Quaternary) tectonic movements have not yet been demonstrated unequivocally for the Sunda Platform to which Peninsular Malaysia belongs. The known geologic history of the platform points to tectonic stabilization by early Tertiary time. Since then only epeirogenic movements appear to have affected the cratonic region (Stauffer, 1973, Gobbett and Tjia, 1973). Normal faulting with throws exceeding 10 m could be ascribed to collapse or subsidence of underlying bedrock. There are no examples of Quaternary anticlines or reverse faults which would require lateral- and therefore possibly tectonic- compression in the Sunda Land area.

In November 1979 I visited the outcrop and sketched the close up shown in Fig. 1. The fault is less than 10 cm wide, contains iron oxide without any fault markings, and forms the eastern limit of the weathered schist. At this outcrop and in the opposite roadcut, I could not see bedrock on the east side of the fault. As Raj reported, vertical separation is approximately 1.5 m and the inclined clasts in the vicinity of the fault indicate downthrowing to the east. On Fig. 2, the upper surface of the gravel bed on the downthrown side shows a slight upward bulge, which is consistent with reverse drag on the downthrown side of a normal fault. Some fifty metres farther to the east is a 10-15 m deep valley, that of Sungai Gojan, a tributary to Sungai Benus according to Raj's index map.

I agree with Raj that the fault is post-gravel and very probably Quaternary, downthrowing to the east. However, the fault forms the eastern limit of the weathered bedrock and could represent an exhumed old fault surface or just a buried topographical surface. Therefore, it is more consistent with the stable tectonic character of Peninsular Malaysia to interpret the fault as a nondiastrophic surface on which slumping towards the tributary valley occurred.

Fault-controlled buried topography of the bedrock and sometimes deposition of the overlying unconsolidated gravel are shown in a few other outcrops along this highway (Figs. 3A and 3B).

References

- Gobbett, D.J. and Tjia, H.D., 1973. Tectonic history. In: Geology of the Malay Peninsula, D.J. Gobbett and C.S. Hutchison (Eds). New York, John Wiley, 305-334.

Raj, J.K., 1979. A Quaternary fault in Peninsular Malaysia. Warta Geologi, vol. 5(1), 3-5.

Stauffer, P.H., 1973. Cenozoic. In: Geology of the Malay Peninsula, D.J. Gobbett and C.S. Hutchison (Eds). New York, John Wiley, 143-176.

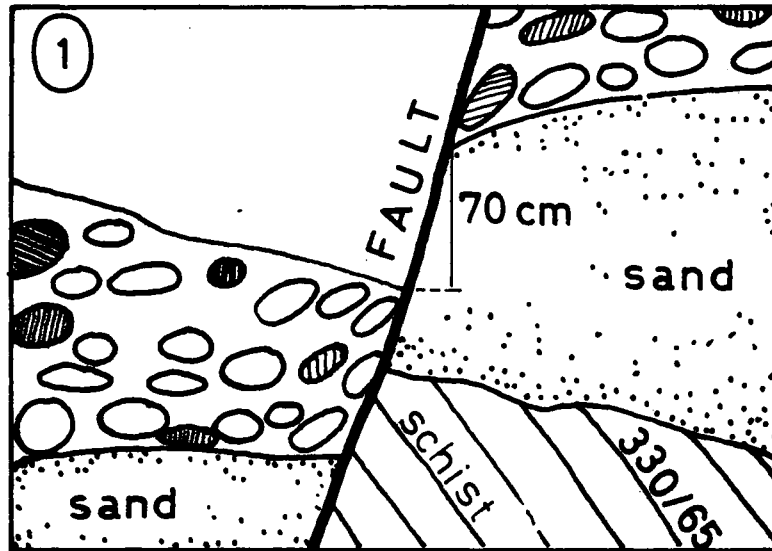


Fig.1. Detail of outcrop featured in Raj's (1979) article. Disruption and offset of lithologic boundaries plus gravel clasts slanting towards left (= east - indicate normal faulting).

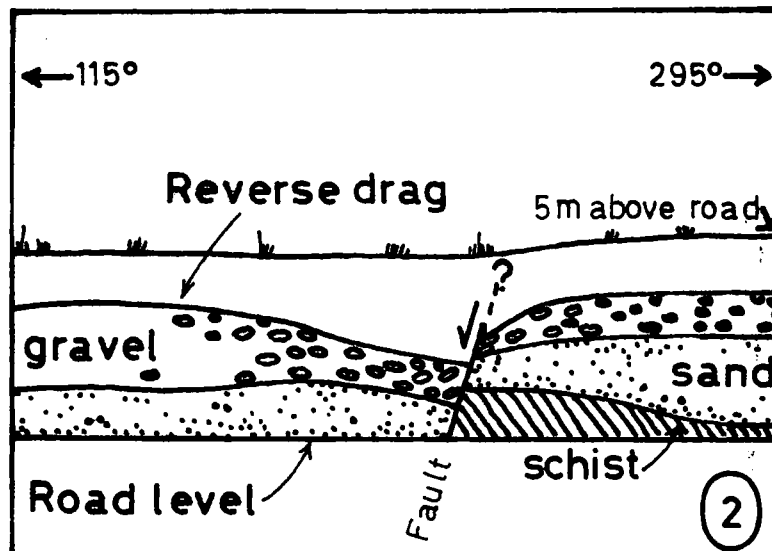


Fig.2. Larger portion of the outcrop sketched in Fig.1. Reverse drag seems to be indicated by the upward bulge of the gravel bed.

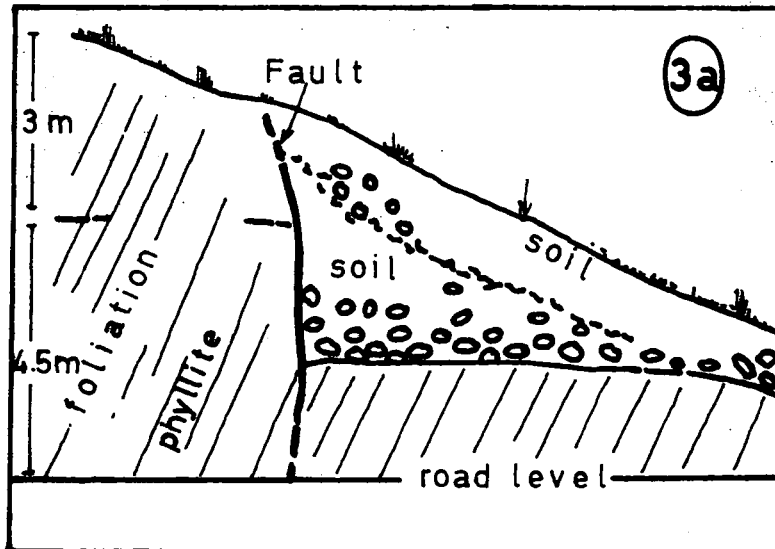


Fig. 3a. South-facing roadcut along the Bentong-Karak trunk road near BM 6.17, Karak town. The fault (attitude 50/almost vertical) cuts through weathered phyllite and formed a topographic wall before the deposition of two gravel beds with their weathered groundmass.

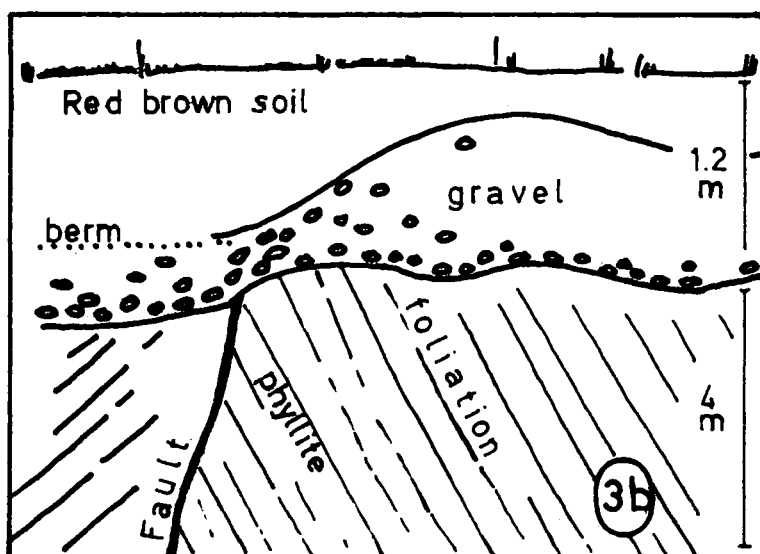


Fig. 3b. Same roadcut but 150 m farther east. The gravel bed thins out exactly over the old fault (attitude 280/83) but is not cut by this fault.

A QUATERNARY FAULT IN PENINSULAR MALAYSIA: A NONTECTONIC INTERPRETATION

Sir,

Tjia's interpretation of the Quaternary fault as being "a non-diastraphic structure on which slumping towards the tributary valley occurred" is a plausible one, though it does not account for the translational displacements of the unconsolidated deposits on both sides of the fault. Slumping (on the scale envisaged) should have led to a backward rotation of the deposits on the eastern side. On this basis, it is better to consider the Quaternary fault as being a genuine one rather than "an exhumed old fault surface or just a buried topographic surface". It should also be pointed out that Tjia's interpretation is based on the concept of tectonic stability of the Peninsula by early Tertiary times; a concept that needs re-evaluation in the light of suggested early to late Tertiary (and Quaternary?) faulting in Peninsular Malaysia (see Holcombe, 1977).

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References

- Holcombe, C.J., 1977. How rigid are the lithosphere plates? Fault and shear rotations in Southeast Asia. J. Geol. Soc. London, v. 173, 325-342.

ON THE SUGGESTED EFFECTS OF POTASSIUM METASOMATISM ON SOME ROCKS IN PENINSULAR MALAYSIA (WARTA GEOLOGI, VOL. 7, NO. 2, 35-38) — SOME COMMENTS

Sir,

The arguments of Dr. Khoo fail to convince because he is apparently unconcerned with the mechanism of metasomatism. He finds it impossible to conceive that an introduction of potassium will cause replacement of feldspar by muscovite during the formation of greisen. Yet if you ask any economic geologist, he will have no hesitation in saying it is an obvious fact that the process of greisenization involves the replacement of all mineral phases, except quartz, by muscovite or some other light-coloured mica. What are we to call the process of greisenization if the word metasomatism is rejected? Dr. Khoo unfortunately has not noted that in the initial stages of greisenization, it is the plagioclase that invariably becomes replaced by sericite, and then as the greisenization proceeds, all the feldspars, including the alkali feldspar, eventually are totally replaced. Admittedly, a replacement of alkali feldspar (16.9 wt % K_2O max.) by muscovite (11.8 wt % K_2O involves a loss of potassium, but not a loss for the whole rock, because biotite (9.0 wt % K_2O max.) and sodic plagioclase (less than 1.0% K_2O max.) are also replaced by muscovite or other light-coloured mica.

In the process of greisenization, we are concerned with the late stage processes of felsic magmatism (for a modern review, see for example Burnham and Ohmoto, 1980). Since greisenization is important in Malaysia, and since Dr. Khoo's article may have misled many readers, I wish to summarize the process.

The evolution of an aqueous phase from any given magma (let us say for example granite which is abundant in Peninsular Malaysia) is controlled principally by the solubility of H_2O in the magma. This solubility is strongly pressure dependent, but only weakly temperature dependent. This inevitably leads to the evolution of a separate H_2O -rich phase from the residual magma on its upward ascent, by a process commonly called second, or retrograde boiling.

The generation of a magmatic aqueous phase by second boiling is accompanied by partitioning of all elements in the system such that the chemical potential or fugacity of each chemical species is the same in all phases at equilibrium.

The volatile element chlorine is strongly partitioned towards the magmatic aqueous phase (Kilinc and Burnham, 1972) because chloride minerals are not stable in felsic magmas, and also because it forms highly stable neutral chloride complexes with hydrogen, alkali metals and alkaline earths in aqueous solutions at magmatic temperatures. Chloride complexes commonly constitute the major portion of the total dissolved solutes.

The major aqueous chloride complexes, in equilibrium with typical granite melts, are NaCl, KCl, and HCl (NaCl and KCl form about 90% of the total). It is important to note that the molal ratio of NaCl and KCl is the same as the molal ratio of sodium and potassium in the magma (Burnham, 1979). Thus a granite magma which inevitably contains potassium and sodium, must always evolve an aqueous solution which contains abundant KCl and NaCl. It is this aqueous solution which can and does cause

metasomatism/alteration of the country rocks and of the already solidified parts of the plutons themselves.

The composition of the aqueous solution changes as muscovite is deposited in the rock by metasomatism/alteration (potassium metasomatism). Muscovite contains both potassium and hydrogen, hence the aqueous solution becomes relatively NaCl-rich, leading to a possibility of sodium metasomatism/alteration.

With falling temperature, transitional magmatic processes give way to hydrothermal processes that are dominated by crystal-volatile equilibrium. Since the aqueous phase which causes the metasomatism/alteration is dominated by KCl, NaCl and HCl, an AKF diagram cannot be used, as Dr. Khoo has done, to show the replacements since only K is involved and Na and H omitted from the diagram. AKF diagrams are traditional for metamorphic facies but they have no useful relevance to magmatic-transitional-hydrothermal metasomatic/alteration reactions, since Al_2O_3 and FeO play no obvious part in the solutions.

In the hydrothermal stage, HCl-rich solutions react with feldspathic wall rocks to produce andalusite or topaz, with or without biotite, at higher temperatures, and muscovite at lower temperatures.

Fluids that equilibrated initially with hornblende-bearing magmas, are enriched in KCl relative to NaCl and HCl, hence their reaction with non-carbonate rocks is largely one of fixing potassium in feldspar and biotite ("Potassic Alteration") by exchange with Na and especially Ca. Dr. Khoo's comment regarding the Benta area is therefore incorrect. There we have a hornblende-rich magmatic suite which should by all known principles evolve a KCl-rich aqueous solution capable of causing "Potassic-Alteration", and it does appear there that plagioclase has been metasomatically replaced by alkali feldspar (Hutchison, 1971).

Such exchange reactions lower the KCl/HCl in the aqueous phase, which leads to entry into the stability field of muscovite. Thereafter, further cooling of the fluid causes KCl/HCl to increase, as potassium-rich feldspar is converted to muscovite and quartz to form greisen.

It is well known that the initial stages of greisenization-alteration are first seen in the plagioclase, which is preferentially attacked relative to the alkali-feldspar. The early stages of hydrothermal alteration-metasomatism appear as sericite flakes in the plagioclase. Only at more advanced stages does the alkali feldspar also convert to muscovite and quartz. Thus at early stages the potassium of the aqueous solutions is taking the place of calcium.

The metasomatic inter-reactions between the chloride-bearing aqueous solutions and the crystallized igneous rock and the country rocks consists of greisenization, potassic, phyllic and argillic alteration (temperature dependent) as well as the formation of skarn in Ca-rich country rocks. The equivalence of such metasomatic-hydrothermal processes which cause greisenization with skarn formation has been amply demonstrated by Shcherba (1970) in his major review of greisenization processes.

We cannot avoid the general conclusion that magmas lose potassium to aqueous solutions that evolve from them, and that these solutions cause metasomatic-alteration of the solidified igneous and country rocks. It is wrong to over-simplify the argument by considering only one crystal phase, since the solutions have an effect on the whole rock system.

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References

- Burnham, C.W., 1979. Magmas and hydrothermal fluids. Barnes, H.L. (ed.). Geochemistry of Hydrothermal Ore Deposits. John Wiley, New York, 71-136
- Burnham, C.W. and Ohmoto, H., 1980. Late-stage processes of felsic magmatism. In: Granitic magmatism and related mineralization, Ishihara, S. and Takenouchi, S. (Eds.). Mining Geology, Spec. Issue 8, 1-11.
- Hutchison, C.S., 1971. The Benta Migmatite Complex: Petrology of two important localities. Geol. Soc. Malaysia, Bull. 4, 49-70.
- Kilinc, I.A. and Burnham, C.W., 1972. Partitioning of chloride between a silicate melt and coexisting aqueous phase from 2 to 8 kilobars. Econ. Geol. 67, 231-235.
- Shcherba, G.N., 1970. Greisens. International Geology Review, 12, 114-150 and 239-255.

PERSATUAN GEOLOGI MALAYSIA
Geological Society Of Malaysia

PETROLEUM GEOLOGY
SEMINAR '81



Hotel Merlin, Kuala Lumpur

7-8th December 1981

(For details - see Pg.128)

PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

MALAM PETROLOGI (PETROLOGY NIGHT)

This is the first in the series of talks where an evening is devoted to a number of papers on a particular theme of interest to members. This inaugural 'malam' on petrology was held on 30th June 1981 at the Dept. of Geology, University of Malaya at 7.30 p.m. Judging from the good turnout of about 36 members, this 'malam' series, to quote the Chairman of the meeting Dr. T.T. Khoo, "appears to be in-thing and more such 'malam' series are being planned".

To start the evening off, Dr. Hamzah Mohd., a Lecturer at Universiti Kebangsaan Malaysia, spoke on "Isochemical nature of regional metamorphism: Evidence from quantitative chemical studies of pelitic psammitic rocks from Scotland". Next Dr. Yeap Cheng Hock (Pernas Charter Management), spoke on the interesting "Chemical comparison of Peninsular Malaysia granites". To end the evening with a slightly different flavour, Mr. Chandra Kumar, a Tutor at Universiti Malaya, spoke on "Petrology of some basic intrusive rocks of the Malay Peninsula and their relation to similar rocks of other areas."

Interested members of the audience came forward with numerous questions during the discussion period after each talk. On adjournment, all the speakers and members crossed over to the University of Malaya Academic Staff Centre for a rewarding feast of satay and drinks and possible fanning of the fire for further discussions.

Below are summaries of the three talks prepared by the speakers, at the request of the Editor, for the benefit of all members.

G.H. TEH

HAMZAH MOHAMAD: Isochemical Nature of Regional Metamorphism: Evidence from Quantitative Chemical Studies of Pelitic/Psammitic Rocks from Scotland

For many years, the kind, extent and mechanism of migration of material in the realm of regional metamorphism have been much disputed among geologists. Whether regional metamorphism is isochemical or allochemical has been openly questioned, especially at the beginning of the second half of this century, and is still being discussed.

A vast number of publications on this subject shows the growing support in favour of the isochemical nature of regional metamorphism, at least up to the amphibolite facies. The mobilisation and migration of material are said to be 'limited' in extent except for H₂O and some volatile components. The rocks previously studied were shale, slate (including the carbonaceous variety), phyllite, mica-schist, gneiss, and metamorphosed quartzo-feldspathic sediments (psammites). However, at the stage of anatexis, mobilisation and migration become obvious.

Nevertheless, some of the earlier remarks on the allochemical nature are so convincing as to raise doubts on the presumed isochemical nature of regional metamorphism. The present author tries to minimise the existing controversy by considering clastic sediments, with respect to their composition, as inhomogeneous body. This is attributable to the

GSM

MALAM PETROLOGI

30 June 1981



HAMZAH MOHAMAD



YEAP CHENG HOCK



CHANDRA KUMAR



changes in physical conditions within the basin of deposition.

The rocks studied were formerly argillaceous and shaly arenaceous deposits of the Southern Highland (Upper) Dalradian Group of the Scottish Highlands. They were metamorphosed several times up to the amphibolite facies during Caledonian Orogeny. The rocks exposed comprise an intimate association of pelites, semi-pelites and psammites of the greywacke type.

Eighty rocks were analysed by XRF for 24 major and trace elements. The major chemical variations in the series pelite-psammite in terms of Niggli values are: a negative correlation between si and al-alk; a positive correlation between si and alk; and a negative correlation between si and fm/(fm + alk). These variations also exist in analyses of argillaceous sediments compiled from the literature, and reflect a decreasing proportion of clay minerals, an increasing proportion of feldspar, and a relative increase of feldspar to clay minerals, with increasing quartz content, respectively.

The preservation of these sedimentary trends in the moderately to highly metamorphosed rocks of the study area reveals the limited effects of metamorphism on major element redistribution. Statistical evaluation of the effect of metamorphism on chemical composition indicates small changes but these are illusory and are due to the variable mineralogical composition of the initial sediments.

Even though a number of elements in the higher grade area shows lower amounts (in ppm) than in the lower grade area, it has been proved that the difference is due to the initial low proportion of clay minerals, in which these elements have been enriched, in the high grade rocks. Metamorphism, therefore, was found to be isochemical up to the amphibolite facies, apart from a decrease in H_2O , CO_2 , and probably Fe^{2+}/Fe^{3+} . This idea might be extended to regional metamorphism in general.

The limited extent of metamorphic re-distribution of elements validates the inference on the nature of sediments using chemical data of the metamorphosed equivalent, which might be a contribution to sedimentologists. Due to the possible variation in the composition of the initial sediments, especially its clay mineral content, any quantitative evaluation of trace element concentration with regard to the effect of metamorphism should also consider this factor.

YEAP CHENG HOCK: Chemical Comparison of Peninsular Malaysian Granites

Fresh, and as far as could be discerned, vein-free granites, were collected from 256 sample locations of the main granite plutons in Peninsular Malaysia. These were analysed for Rb, Sr, Ba, Zr, Sn, W and Nb. A selection of 35 representative granites were analysed for major elements as well as for four more trace elements namely, F, Cl, Pb and Zn.

The Malaysian granites, as indicated by their wide range of molecular differentiation indices have undergone a complex evolutionary history over the time span from Palaeozoic to Late Cretaceous. In general, the contents of SiO_2 , K_2O , Rb, Sn and possibly W increase whilst those of CaO, MgO, FeO , MnO , Al_2O_3 , Ba, Sr, Zr, Zn and Pb decrease in the Malaysian granite succession from Palaeozoic to Cretaceous.

Physical separation of Peninsular Malaysia into three linear belts,

namely; West Coast, Central and East Coast Belts, is supported by the differences in chemical compositions of the granites within the belts. It is also further found that granites (from East Coast, Benom and Mount Ophir) inferred to have been emplaced in the epizone are chemically dissimilar from those with indicated mesozonal emplacement (West Coast granites).

The Peninsular Malaysian granites associated with mineralisation are found to differ only slightly in major element compositions compared with non-mineralised granites. Marked contrasts were, however, noted in the trace element compositions of mineralised and non-mineralised granites. The former generally contain more Rb, W, Zn and F and less Sr, Zr, Ba and Cl than the latter.

Statistical techniques such as correlation coefficients and discriminant function analysis etc., were found to be useful in revealing chemical relationships and differentiating between the different groups of granites compared.

S. CHANDRA KUMAR: Petrology of some basic intrusive rocks of the Malay Peninsula and their relation to similar rocks of other areas

Gabbroic stocks occur in the Eastern Belt of the Malaya Peninsula at three localities, namely, Bukit Linden (Johore), Bukit Gombak (Singapore) and Bukit Kemuning (Trengganu). They occur as small marginal bodies around larger granitic batholiths. The gabbroic bodies predate their associated granites and are probably of Permian age.

The Kemuning gabbro is an example of a contaminated gabbroic suite. The source of contamination being abundant hornfelsed xenoliths derived from adjacent metasediments.

The Linden stock consists mainly of olivine eucrite and allivalite which display a cumulate texture. These cumulates are characterised by an unzoned anorthite. The main rock type within the Gombak stock is an apparently non-cumulate medium grained norite. The norite is invariably olivine-free. Both augite and Ca-poor pyroxene are always present the latter being either primary orthopyroxene or inverted pigeonite. Pyroxenes within the Gombak norites often form zoned, radiating clusters comprising several individual grains. This feature may be explained by synneusis and thus indicative of turbulence during crystallisation. Systematic mineralogical and textural variations between the rock types of the Linden and Gombak stocks, coupled with their geographic proximity, indicate a petrogenetic link between these two stocks. Petrochemical considerations further demonstrate that the gabbroic rocks of the Linden and Gombak stocks represent a differentiated series derived from a single parental magma. Allivalite and olivine eucrite of the Linden stock represent the crystal cumulates fractionated from a high alumina basalt parental magma which has subsequently crystallised the non-cumulate Gombak norite. The depth of crystallisation, as estimated by correlation with experimental data, is less than 4 km.

Ca-poor pyroxene of the Linden-Gombak suite demonstrates an important change in texture from ophitic in olivine-bearing Linden cumulates to granular in olivine-free Gombak norite. A similar textural change involving either Ca-rich or Ca-poor pyroxene, on the cessation of olivine crystallisation, is apparently common amongst gabbroic associations in

general. The involvement of clinopyroxene in some intrusions and orthopyroxene in others, must have important petrogenetic significance.

The Linden-Gombak gabbroic association is found to be very similar to many gabbro suites of other orogenic belts. These batholithic gabbros are interpreted as exposed magma chambers representing the roots of paleo calc-alkaline volcanoes by virtue of their similarity to the cognate plutonic xenoliths of calc-alkaline volcanics.

TECHNICAL TALK

R.T. LITTLETON: Geologic investigations for offstream dams site in the Lower Colorado River, USA

Mr. Littleton, a Geologist with the Bureau of Reclamation, U.S. Dept. of Interior, presented a talk on 11th August 1981 on the geologic investigations carried out on some proposed damsites in the Lower Colorado River in Southwest United States. The proposed damsites are offstream storage sites in what is known as the Whipple Mountains of San Bernadino County of California.

Detailed ground investigations revealed that the terrane consists of an upper plate of sedimentary rocks (sandstone, conglomerate, etc.) of Tertiary age overlying a lower plate of gneiss of Lower Paleozoic age, the contact between the two being a major detachment fault. Various other structures such as synclines, breccia zones, faulting and fractures further complicate the picture and also increases the general permeability and leakage potential of the foundation materials. The adverse geologic conditions revealed by site investigations are perhaps part of the reason why the dams were not built in the end, the other factors being the steep canyons and the high cost involved.

Many beautiful and colourful slides showing the rock formations and associated structures were presented and must have thrilled the structural geologists present in particular. Unfortunately since the dams were never built, it was quite a disappointed for those who were waiting to see a view of the dams and the construction or excavation works that went with it.



Tan Boon Kong

R.T. LITTLETON

BERITA PERSATUAN (NEWS OF THE SOCIETY)

GSM COUNCIL NOMINATIONS LIST FOR 1982/83 COUNCIL

The Council's list of nominees for the 1982/83 Council is as follows:

- President : Khoo Teng Tiong, Dept. of Geology, University of Malaya, Kuala Lumpur.
- Vice President : Leong Khee Meng, Carigali-BP Sdn. Bhd., Kuala Lumpur.
- Hon. Secretary : Tan Boon Kong, Dept. of Geology, National University of Malaysia, Kuala Lumpur.
- Hon. Asst. Secretary: Mohd. Ali Hasan, Dept. of Geology, University of Malaya, Kuala Lumpur.
- Treasurer : Chin Lik Suan, Datuk Keramat Smelting, Kuala Lumpur.
- Editor : Teh Guan Hoe, Dept. of Geology, University of Malaya, Kuala Lumpur.
- Councillors (2-year): Abdul Aziz Hussein, Jabatan Kejuruteraan Petroleum, Universiti Teknologi Malaysia, Kuala Lumpur.
 Khoo Kay Khean, Geological Survey Malaysia, Kuala Lumpur.
 Michael Leong Pheng San, Petronas, Kuala Lumpur.
 Lim Teong Hua, Pernas Charter Management, Kuala Lumpur.

- The following 2-year Councillors will continue to serve in the 1982/83 Council :
- Ahmad Said, Petronas, Kuala Lumpur.
 Choo Mun Keong, Pernas Charter Management, Kuala Lumpur.
 Gan Ah Sai, Geological Survey Malaysia, Kuala Lumpur.
 Abdul Malik Abdul Rani, Esso Exploration Malaysia, Kuala Lumpur.

All Corporate Members are invited to propose further nominations on prescribed forms sent out earlier. Nominations should reach the Society by 30 September 1981.

MALAM LANGKAWI (LANGKAWI EVENING)

Malam Langkawi will be held on Friday 6th November 1981 at 5.00 p.m. at Jabatan Geologi, Universiti Malaya, Kuala Lumpur. It will feature 3 talks by the following:

1. Dr. B.K. Tan (Univ. Malaya): Some unsolved problems of the geology of Langkawi.
2. Dr. T.T. Khoo (Univ. Malaya): Northwest extensions of the Patani Metamorphics terrane.
3. Mr. C.P. Lee (Univ. Malaya): Stratigraphy of the Machinchang and Tarutao Formations.

Tea will be served at 4.30 p.m. Following the talks, a Satay Party will be held at 7.30 p.m. at Universiti Malaya Academic Staff Centre (1, Jalan 12/5, P.J.) for the speakers, members and invited guests.

MALAM PERLULUHAWAAN (WEATHERING EVENING) - PRELIMINARY ANNOUNCEMENT

The "Malam Perluluhawaan" is scheduled for late December 1981 and will feature 3 or more talks (anyone else interested?). The possible speakers and their tentative titles are:

1. Dr. S. Paramanathan (Agriculture Dept.): Laterites.
2. Mr. J.K. Raj (Univ. Malaya): Residual soils over granite.
3. Dr. B.K. Tan (Univ. Malaya): Laterites, Malacca.

Members will be further informed in due course.

GSM PETROLEUM GEOLOGY SEMINAR '81 - FIRST CIRCULAR

Seminar Objectives

The Geological Society of Malaysia is planning to hold its Petroleum Geology Seminar '81 on 7-8th December 1981 at the Hotel Merlin in Kuala Lumpur. The Seminar is the fifth such annual event to be organised by the Society.

This Seminar will bring together a large number of geoscientists and explorationists from various oil, consulting and service companies as well as universities, government and local research organizations and will provide a forum for discussions on the various aspects of petroleum geology in this region and new techniques of petroleum exploration in general.

Papers

Many outstanding papers have been presented at the four previous Seminars and the Geological Society of Malaysia would greatly appreciate your contribution of a paper to the Seminar this year. Papers on any topic relevant to the understanding of the petroleum geology of the Southeast Asian region and to petroleum exploration would be most welcomed. Please inform us of your intention to present a paper at this Seminar before 31st October 1981. Abstracts should be submitted by 15th November 1981.

To date, the following papers have been tentatively offered for presentation:

1. Geophysical and geological aspects of the exploration of Carbonate Buildups in Central Luconia, Sarawak (Sarawak Shell Berhad).
2. Palaeofacies development of Neogene deposits, Offshore Sarawak (Sarawak Shell Berhad).
3. Origin and distribution of pores in Cenozoic volcanic rocks for potential hydrocarbon reservoirs (Teikoku Oil Company, Japan).
4. 3-D Marine seismic data recording and processing (Prakla Seismos GMBH, Federal Republic of Germany).
5. Structural and stratigraphic interpretation of marine 3-D data (GSI, Singapore).
6. Use of the Lithology Density Tool (LDT) to improve lithology identification and gas detection (Schlumberger Overseas, SA Malaysia).

Registration

All intending participants are advised to register early for the Seminar as a large turnout will again be expected this year. Advance registration for the Seminar will be accepted until 30th November 1981. Late registration will be accepted at the Registration Desk in Hotel Merlin.

	<u>Advance Registration Fees</u>	<u>Late Registration Fees</u>
Full Members	MR 20.00	MR 30.00
Non Members	MR 60.00	MR 80.00
Student Members	Free	Free
Student Non Members	MR 4.00	MR 5.00

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

Please send registration fees to:

The Treasurer
Geological Society of Malaysia
c/o Department of Geology
University of Malaya
Kuala Lumpur 22-11, Malaysia,

to reach us before 30th November 1981.

Accommodation

Accommodation will be at the participants' own expenses but reservations can be arranged upon request on a first-come-first-served basis at the Hotel Merlin, Kuala Lumpur at the following discounted rates:

Single : MR 70.00 nett (approx. US\$33.00)
Twin : MR 80.00 nett (approx. US\$37.00)

The rates are inclusive of a 10% Service Charge and 5% Government Tax.

Please indicate when registering if arrangements for accommodation at the Hotel Merlin will be required.

For further information, write to:

Mr. Michael Leong
Organising Chairman
Petroleum Geology Seminar '81
Geological Society of Malaysia
c/o Department of Geology
University of Malaya
Kuala Lumpur 22-11, Malaysia.

M. Leong

KEAHLIAN (MEMBERSHIP)

The following persons have joined the Society:

Full Membership: Lim Cheong In, PWD House Nos. 607 & 608, Jalan Swetteham, Lake Gardens, Kuala Lumpur.
Lim Keng Kay, 27C Jalan Bandar Raya, Ipoh, Perak.
Robert A. Harrison, 40/41 Pall Mall, London SW1Y 5JG, England.

Ong Wee Seck, Geological Survey, Kuantan, Pahang.
 Wong Ah Choi, P.O. Box 211, Kota Kinabalu, Sabah.
 I.S. Carter, P.O. Box 857, Kuala Lumpur.
 David Liau, P.O. Box 211, Kota Kinabalu, Sabah.
 David Skevington, 8 Lorong 16/9A, Petaling Jaya.

Student Membership: Tay Kok Chin, 012S, Block 334, Desa 'Bakti', Universiti Sains Malaysia, Penang.

Associate Membership: Wong Kim Yuen, 15 Jalan Setiapuspa, Damansara Heights, Kuala Lumpur.

Institutional Membership: Kiso-Jiban Consultants Co. Ltd., 1st Floor, Tan Jin Chwee Industrial Bldg., 60 Kallang Pudding Road, Singapore 1334.
 Institute Teknologi Mara, Shah Alam, Selangor.
 Torsco Sdn. Bhd., Lot 11004, 4 $\frac{1}{2}$ Miles, Lahat Road, Lahat, Perak.

PENUKARAN ALAMAT (CHANGE OF ADDRESS)

The following have informed the Society of their new addresses:

1. John Chronic, 502, South Post Oak Lane, No. 209, Houston, Texas 77056, USA.
2. Lye Yue Choong, c/o Esso Production (M) Inc., P.O. Box 857, Kuala Lumpur.
3. Mohd. Zaidi b. Mohd. Hasan, Geological Survey Malaysia, P.O. Box 1015, Ipoh, Perak.
4. K. Hiller, c/o Petrobangla, P.O. Box 849, Dacca-2, Bangladesh.
5. Guo Yeang Yang, c/o Geosains Sdn. Bhd., P.O. Box 2366, Kuala Lumpur.
6. Andrew H.G. Mitchell, c/o UNDP Manila, P.O. Box 7285 ADC, Mia Road, Pasay City, Metro Manila, Philippines.
7. A.W. Allen, Raintree Cottage, Romalckirk, Barnard Castle, Co., Durham, England.
8. Low Keng Lok, Permas Charter Management, Batu Caves Laboratory, P.O. Box 12, Batu Caves, Selangor.
9. Wilson S. Fontanelli, Mineracao Oriente Novo S.A., Rua Eugenio de Medeiros, 242 - 5^o andar, CEP 05425 - Pinheiros - Sao Paulo - Brasil.
10. Jagathasparan Ponniah, South Asutrialian Oil & Gas Corp. Pty. Ltd., P.O. Box 470, North Adelaide, South Australia 5006.
11. Gunter Matheis, TU Berlin / SFB 69, Sekr. ACK 201, Ackerstrasse 71-76, D-1000 Berlin 65, Federal Republic of Germany.
12. Javed Azam, Private Box 165, ITC, P.O. Box 6, 7500 AA Enschede, The Netherlands.
13. T.R. Sweatman, Rex Sweatman Consultants Pte. Ltd., 707C Bauhinia Terrace, Pandan Valley, Singapore 2159.
14. Dale F. Wetherbee, c/o Oceanic Exploration Co., 3912-B S. Atchison Way, Denver, Colorado 80014, USA.
15. Alan R. Lloyd, Getty Oil International (Indonesia) Inc., 6th Floor, S. Widjojo Centre, Jln. Jen. Sudirman 57, S mayan Jakarta Selatan, Indonesia.
16. R.B. Tate, c/o New House Farm, Hatton, Warrington, Cheshire, U.K.
17. W.F. Hooper, International Pennzoil Place, P.O. Box 2067, Houston, Texas 77001, USA.

PENAMBAHAN BARU PERPUSTAKAAN (NEW LIBRARY ADDITIONS)

The following publications were added to the Library:

1. Report on oil shale resources at Ban Huai Kalob, Mae Sot District, Thailand, 1981.
2. Ophiolites and initialites of Northemborder of the Bohemian Massif, 1981.
3. Veröffentlichungen des Zentralinstitutes für Physik der Erde, nos. 58 (1980), 61 (1979), 65 (1980).
4. Contributions from the Institute of Geology & Paleontology, Tohoku Univ. nos. 82 & 83, 1981.
5. The Science Reports of the Tohoku University, Sendai, Japan, Second Series (Geology), v. 51, nos.1-2, 1981.
6. National Library Singapore, Adult Reference Collections: Accessions list, July 1981.
7. AAPG Explorer, July 1981.
8. IMM Bulletin 887, 1980, & 894, 1981.
9. Commonwealth Geological Liaison Office, June & July 1980 and March, April & Aug 1981.
10. AGID: The First Six Years, 1980.
11. Bulletin of the National Science Museum, Series C (Geology & Palaeontology), v. 7, no. 2, 1981.
12. SEATRAD Bulletin, vol. 11, no. 2, 1981.
13. Scripta Geologica, nos. 55 (1980) & 59 (1981).
14. Bulletin of Institute of Mineral Engineering, Malaysia, No. 3.
15. Berliner Geowissenschaftliche Abhandlungen, Reihe A, Band 25-31, & 33, 1980.
16. Acquisition list, SEATRAD Library, (April-June 1981).
17. Oklahoma Geology Notes, vol. 40, nos. 5-6, 1980.
18. Oklahoma Geology Survey Bulletin 130, 1980.
19. International Symposium on the Hellenic arc and trench (H.E.A.T.) Abstracts, 1981.
20. An international symposium on metallogeny of mafic and ultramafic complexes: The Eastern Mediterranean - Western Asia area, and its comparison with similar metallogenic environments in the world: Abstracts, 1980.
21. Journal Geological Society, v. 138, pt. 2 & 5, 1981.
22. Science Reports of the Institute of Geoscience, University of Tsukuba, Section B: Geological Sciences, v. 2, 1981.
23. SEATRAD Library: Periodical list & Acquisition list, Jan-March 1981.
24. Acta Palaeontologica Sinica, v. 20, nos. 1 & 2, 1981.
25. Acta Palaeontologica Sinica, v. 19, no. 6, 1980.
26. Mem. of Nanjing Inst. of Geol. & Pal. Academia Sinica, nos. 14 & 16, 1980.
27. Jour. of Stratigraphy, vol. 4, no. 4, 1980 and v. 5, no. 1, 1981.
28. Symposium on petroleum potential in island arcs, small ocean basins, submerged margins and related areas, 1980.
29. Staringia, no. 6, 1981.
30. Grondboor & hamer, no. 6 (1980), nos. 1 & 2 (1981).
31. International subcommission on stratigraphic classification of IUGS Commission on stratigraphy, circular no. 61, 1981.
32. Scripta Geologica, nos. 54, 56 & 58, 1980.
33. Bulletin of the National Science Museum, vol. 7, no. 1, 1981.
34. Bulletin of Nanjing Institute of Geol. & Pal., Academia Sinica, no. 1, 1980.
35. Records of the Geological Survey of NSW, vol. 20, pt. 1 and 7 plates.

36. Palynostratigraphy of the Australian Early and Middle Cretaceous by Roger Morgan, 1980.
37. Stratigraphy and palaeontology of Upper Permian coal-bearing formation in Western Guizhou and Eastern Yunnan, China, by the Nanking Inst. of Geology and Palaeontology, Academia Sinica, 1980.
38. The selected papers from symposium of the Chinese Science Institute of geology for iron mineralisation (1977), 1979.
39. Carbonate biostratigraphy of the southwest region (of China), 1979.
40. List of selected Chinese books published in Singapore, 1980.
41. Meiji and older (about 1912) literatures of Earth Sciences of Japan in foreign languages in addition to some of those of related sciences and adjacent areas of Eastern Asia. 1978.
42. Three new species of Permian trilobites from W. Japan by T. Kobayashi & T. Hamada. Proceedings of the Japan Academy, v. 56, ser. B, no. 3, 1980.
43. A new Permian species of Pseudophillipsia (Trilobita) with spatulate genal spines by T. Kobayashi & T. Hamada. Proc. Japan Academy, v. 56, ser. B, no. 4, 1980.
44. Magnesium and strontium in the test of foraminifera: indicators of paleo-salinity by Nigeru el-Din Yusuf. N.Jb. Geol. Palaeont. Mh. H. 6, 373-384, 1980.
45. Feinstrukturen und verwandtschaftsbeziehungen der graptolithen by Dietmar Andres. Palaont. Z. 54, 1/2, 129-170, 1980.
46. Geological literature of USSR. Bibliographical yearbook for 1974 year, vols. 1 & II, 1979.
47. Eustasy in the Australian early and middle Cretaceous by Roger Morgan, 1980.
48. The upper Cretaceous - Tertiary formations of Northern Libya: a synthesis by M.F. Megerisi & V.D. Mangain, 1980.
49. Stratigraphic lexicon of Libya by Syamadas Banerjee, 1980.
50. Mineralogia polonica, vol. 10, no. 1, 1979.
51. Geology and Palaeontology of Southeast Asia, v. 22, 1981.
52. Bulletins of the Geological Survey of India, nos. 43 & 46, 1979.
53. Bulletin du Bureau de Recherches geologiques et Minieres, sect. IV, no. 1, 1980/81.

BERITA - BERITA LAIN (OTHER NEWS)

ULASAN BUKU (BOOK REVIEW)

Shunso Ishihara & Sukune Takenouchi (Eds.), 1980. GRANITIC MAGMATISM AND RELATED MINERALIZATION. Mining Geology Special Issue No. 8, 247 pages (hard covers). Obtainable from: The Society of Mining Geologists of Japan, Nihon Kogyo-Kaikan Building, Ginza 8-5-4, Chou-Ku, Tokyo, Japan. Price. Yen 8,000.

This is a special issue which should interest a wide readership in Southeast Asia because it is concerned with the fundamental principles of mineralization, especially tin, tungsten and porphyry copper and molybdenum. The book is divided into three parts.

Part I is on GENERAL TOPICS. The first paper is on *Late-stage processes of felsic magmatism* by C.W. Burnham and H. Ohmoto. It discusses some fundamental features of hydrothermal processes which lead to vein, skarn and porphyry mineralization. The second paper is *Magnetite-series/ilmenite-series vs. I-type/S-type granitoids* by M. Takahashi, S. Aramaki and S. Ishihara. This is an extremely important paper which concludes that ilmenite-series is equivalent to S-type and magnetite-series to I-type, but the classifications are not exactly comparable. They describe the characteristics of East and Southeast Asian granitoids. The third paper by L.K. Wang, B. Zhao, W.F. Zhu, Y.J. Cai and T.J. Li gives the *Characteristics and melting experiments of granites in southern China*. This is a welcome paper for those of us who do not have access to Chinese literature. The fourth paper by M. Nedachi is on *Chlorine and Fluorine contents of rock-forming minerals of the Neogene granitic rocks in Kyushu, Japan*. The fifth paper by Y. Matsuhisa, T. Imaoka and N. Murakami is on *Hydrothermal activity indicated by oxygen and hydrogen isotopes of rocks and minerals from a Paleogene cauldron, Southwest Japan*. Cauldrons are of interest because they are thought to be the venue for Kuroko and porphyry-type mineralization. The sixth paper by M. Utada is on *Hydrothermal alterations related to igneous activity in Cretaceous and Neogene formations of Japan*. The seventh paper by R.H. Sillitoe is on *Cauldron subsidence as a possible inhibitor of porphyry copper formation*.

Part II is on the theme of ISLAND ARCS. The first paper by D. Taylor of Conzinc Riotinto Malaysia and T. van Leeuwen reviews *Porphyry-type deposits in Southeast Asia*. This is an interesting review of distribution and nature of Cu and Mo porphyries with their tectonic settings. The second paper by N. Asami and R.M. Britten describes *The porphyry copper deposits at the Frieda River Prospect, Papua New Guinea*. The third paper by S. Takenouchi gives *Preliminary studies on fluid inclusions of the Santo Tomas II (Philex) and Tapan (Marcopper) porphyry copper deposits of the Philippines*. The fourth paper by J.N. Grant, C. Halls, S.M.F. Sheppard and W. Avila gives further details of the *Evolution of the porphyry tin deposits of Bolivia*. Surely this paper is misplaced in the Island Arc Section for Bolivian tin deposits are on a cordilleran margin, not an Island Arc system. The paper is well illustrated, including three coloured photographs of the famous Chorolque deposit. They summarize the paper by giving an acceptable genetic model for porphyry tin deposits, which are unknown to Southeast Asia, but significant in Bolivia and Mexico. The fifth paper is by N. Sato and Y. Akiyama on the *Structural Control of the Akenobe tin-polymetallic deposits, Southwest Japan*.

Part III is on CONTINENTAL REGIONS. Paper one by K.C. Tu, Z.G. Wang and X.Y. Yu describes the *Genesis of granitic rocks in South China and related mineralization*. Paper two by M.Z. Yan and K. Hu describes the *Geological characteristics of the Dexing porphyry copper deposits of Jiangxi, China*. Paper three by R.H. Sillitoe gives *Evidence for porphyry-type mineralization in Southern Korea*. Paper four by M.Z. Yan, Y.L. Wu and C.Y. Li on the *Metallogenic systems of tungsten in Southeast China and their mineralization characteristics*. This proves to be a fascinating paper because it describes reversed vertical zoning in the vein wolframite deposits which will interest readers who have seen the wolframite deposits of Malaysia and Thailand. The fifth paper by S. Ishihara, H. Sawata, K. Shibata, S. Terashima, S. Arrykul, and K. Sato gives heretofore unavailable details on the *Granites and Sn-W deposits of Peninsular Thailand*. The paper fills a needed vacancy. The authors

show that S. Thailand is generally of S-type or ilmenite-series granites and represents a northwards continuation of the Peninsular Malaysia Main Range batholith. Phuket is of course distinct, but also predominantly of ilmenite-series. Localized magnetite-series granites lie between the two belts.

This collection of papers, given at a special symposium held in Tokyo in January 1979, is a significant contribution to our knowledge of granitoids and associated mineralization in this region. For me, it filled in some blanks for South Thailand and China. Readers interested in the regional mineralization patterns will surely wish to consult this book. The price Yen 8000 (Approx Malaysian \$80) is reasonable in these days of rapidly inflating book prices. The book comes with excellent printing quality on high quality glossy paper bound with hard covers.

C.S. Hutchison

PENGULAS BUKU (BOOK REVIEWER)

Prof. C.S. Hutchison is Professor of Applied Geology and Head of Department of Geology, University of Malaya, Kuala Lumpur, Malaysia.

GROUNDWATER '81 - A REPORT

The six-day International Conference and Exhibition on Soil Investigation and Groundwater for Developing Nations (hereto referred as GROUNDWATER 81) was held from 8th to 13th June 1981 at Hilton Hotel, Kuala Lumpur, Malaysia. GROUNDWATER 81, organised by the National Water Well Association of Australia has five major objectives: (i) to bring together senior people involved in site and investigational drilling and from water authorities of Developing Nations; (ii) to summarise their needs in terms of technology, equipment, training and education; (iii) to attract world experts with practical experience in the chosen subject topics; (iv) to provide a forum for open discussion on how the needs of Developing Nations may be most practically fulfilled; and (v) to display a range of equipment and services of the highest comparable world standard.

The Conference was attended by 520 participants from 43 countries. Official opening of the GROUNDWATER 81 was made by the Minister of Land and Regional Development, Malaysia, the Honourable Dato' Seri Shariff Ahmad; while Mr. Robert G. Thomas, a senior officer (Water Resources) of United Nations and Agricultural Organisation delivered a keynote address.

A total of 35 papers were presented and discussed at the Conference which was divided into 3 streams. Hopefully the National Water Well Association of Australia will be publishing the Conference proceedings in the near future.

Some of the papers presented are as follows:

A. GROUNDWATER STREAM

1. Groundwater Planning and Development in Malaysia by Pang Leong Hoon (Drainage and Irrigation Department, Malaysia).
2. Groundwater Development in Ethiopia by Indur Mirchandani (Chief of Water Supply, UNICEF, Ethiopia).
3. Groundwater Development in Nigeria in the Eighties by B.N.C. Uzuchukwu (Director Civil Engineering, Federal Ministry of Works, Lagos, Nigeria).

4. Groundwater Development in Tanzania by K.H. Mwebwa (Senior Executive Engineer, Ministry of Works, Tanzania).
5. Groundwater Development in Zambia by Kolman (Department of Water Affairs, Zambia).
6. Groundwater in Zimbabwe - Development Aims for the 1980's by P. Wurzel (Hydrological Branch, Ministry of Natural Resources & Water Development, Zimbabwe).
7. Mozambique's future Groundwater Development Programme - A General Comment by Joseph Christmas (UNICEF Water Supply Consultant, Mozambique).
8. UNICEF action in the field of drinking water supply and sanitation in Pakistan by Michel C. Nowacki (Co-ordinator, Water & Environmental Sanitation Service, Pakistan).
9. Nepal - A Shallow Tubewell programme for the Terai by Colin Glennie (UNICEF, Katmandu, Nepal).
10. Groundwater Resources Development in Thailand by Charon Piancharoen (Director, Groundwater Division, Department of Mineral Resources, Thailand).
11. Groundwater Development in Papua New Guinea by E.S. Webber (Public Health, Dept. of Works & Supply, Papua New Guinea).
12. Groundwater Activities in Fiji by N. Prasad (Public Works Department, Fiji).
13. Drilling and Equipment Management Problems in the Philippines by Mario P. Sandoval (Consulting Hydrogeologist, the Philippines).
14. Hydrogeology in Malaysia - Education, Practice and State of Affairs by Tan Boon Kong (Department of Geology, National University of Malaysia, Kuala Lumpur).
15. Radio Isotopes in Groundwater Hydrology in Zimbabwe by P. Wurzel (Zimbabwe).
16. Case Histories, Malaysia by Rabinder Singh (Malaysia).
17. Groundwater Development in Madiun and Upper Solo Watersheds, Java, Indonesia by Carlo Tealdi (Italy).
18. Well Point Systems for Water Supply and Water Level Control by R. McCallum (Australia).
19. Well Development and Efficiency by M. Bell (Australia).
20. Standards and Realities in Pump Design and Selection by H. Nelson (Australia).
21. Institutional and Legislative Framework by S. Hancock (Australia).
22. An Approach to Groundwater Resources Management in Industrial Areas by A. Jeyaram & R. Sreedhar (India).
23. Target 3100 Village Water Supplies for Central Burma by J. Gildea (Australia).

B. SOILS INVESTIGATION STREAM

1. Unconsolidated Formation sampling by Rotary Drilling by H.R. Berlitt (USA).
2. Soils Investigation for Cement Factories, Safety Factors and Margins in Design by G. Ranjan and O.S. Srivastava (India).
3. Cone Penetrometer - A major advance - Portable, Electrical, Friction - Sleeve, Cone, Penetrometer by John MacGregor (Australia).
4. Materials problems in Developing Countries by Ting Wen Hui (Malaysia).
5. Pressuremeter Testing for Foundation Investigations by M.C. Ervin and Burman, B.C. (Australia).
6. Techniques of Terrain Analysis and their Application to Soils and Foundation Investigations by J.A. Woodburn and G.J. Renfrey (Australia).

C. TRAINING AND EDUCATION STREAM

1. Objectives in Training by John R. Mills (Australia).
2. Motivational influences by T. Bain (Australia).
3. Identification of Training Needs by H.F. Eggington (Australia).
4. Practical Training for University Students by S.B. Deolankar (India).
5. Apprenticeship Training for Water Well Drillers by M. Lewis (Canada).
6. The Australian Approach to Driller Training by H.F. Eggington (Australia).

At the end of the Conference, a call for a ban on the disposal of toxic wastes in areas where water is present was made. The Conference also proposed the development of groundwater as the alternative water resource, particularly in a developing country like Malaysia.

Mohamad Ali Hasan

SEMINAR ON EXPLORATION AND EVALUATION OF TIN DEPOSITS IN SOUTHEAST ASIA - A REPORT

The Seminar on "Exploration and Evaluation of Tin Deposits in Southeast Asia" from July 20 - 25 at the AIT Centre, Bangkok, was initiated by the Carl Duisberg Gesellschaft e.v. on behalf of the Federal Ministry of Economic Co-operation, Federal Republic of Germany.

The 40 participants included top level experts and executives representing the tin industry, governmental, geological and mining departments and universities in Southeast Asia, Germany and UN Organisations. 15 papers were presented and discussed. These include:

1. Tin - a core mineral in ASEAN- EEC trade - W. Gocht (Germany).
2. Some geochemical aspects of prospecting for placer tin deposits - W. Gocht (Germany).
3. Some geochemical aspects of prospecting for tin/tantalum pegmatites - W. Gocht (Germany).
4. Offshore exploration for tin deposits in Malaysia - Y.S. Chiam (Malaysia).
5. Exploration of primary tin deposits in Indonesia - S. Sujitno (Indonesia).
6. Beneficiation of complex tin ores - H. Hoberg (Germany).
7. Special problems of tin ore dressing - H. Hoberg (Germany).
8. Environmental impact study of tin mines - A. Manguwidjaya (Indonesia).
9. Ecological and social aspects of large-scale tin mining in Bangka - R.B. Dramoh (Indonesia).
10. The 6th International Tin Agreement - A producer's appraisal - S. Widiatmo (Indonesia).
11. Variation of energy costs in gravel pump tin mines - E. Volz (Germany).
12. Production costs in tin mining related to ore types - F. von Bismarck (Germany).
13. Offshore geology of SW Thailand - P. Aranyakanon (Thailand).
14. Activities of the Mines Organization - S. Bunjitvadulya (Thailand).
15. Problems of offshore tin mining in SW Thailand - S. Kulvanich (Thailand).

Time was also allocated for reports of the activities of the

activities of the following organisations:

ESCAP Natural Resources, RMRDC, SEATRAD Centre, CCOP and CCOPEA.

A post seminar fieldtrip was conducted at Phuket (from 26-28 July) which included visiting a gravel pump mine, an amang dressing plant and a modern sea dredge.

G.H. TEH

25TH ANNIVERSARY OPEN DAY, DEPT. OF GEOLOGY, UNIVERSITY OF MALAYA

Date: Saturday, 7th November 1981.

To mark this auspicious occasion the Geology Department, University of Malaya will be opened to the public from 9.00 a.m. to 5.00 p.m. Special displays are planned in the various laboratories and museum.

Also, to commemorate this 25th Anniversary of the Department, a special brochure is being prepared.

FIFTH WORLD CONFERENCE ON TIN - PROGRAMME, PAPERS

The Fifth World Conference on Tin, which is being organised jointly by the International Tin Council and the Ministry of Primary Industries of the Government of Malaysia, will be held in Kuala Lumpur from 19-23 October 1981. The venue for the Conference is the Hotel Equatorial.

Little has been said in the four previous Conferences on tin about the financial and economic aspects of the tin producing and consuming industries. The broad aim of the Fifth World Conference on Tin is to review new production resources and consumption potential not simply in the light of the technological means required for their exploitation or development, but also from the financial and economic viewpoints, with particular emphasis being placed on what is called for by way of the investment needed to realise that potential.

The papers to be presented have been prepared with the intention of covering the medium-term outlook both of the tin producing as well as the tin consuming industries and will fall under the four main headings of Production (new discoveries) and new production technology, Consumption potential, Marketing - aspects and outlook, and Investment. The Conference will conclude with a Panel on investment selected from among appropriate participants, to answer questions on investment raised during the course of discussions.

The Conference fee will be M\$300 or £60 sterling, to include pre-prints of papers and subsequent issue of a bound volume of the full proceedings and discussions.

PAPERS AND AUTHORS

FIRST SECTION

Production (new discoveries) and new production technology

1. The world tin economy and new trends:

A. La Spada, International Tin Council.

2. Tin production and investment:
 - B. C. Engel, International Tin Council.
3. New discoveries of significant interest which are expected to come on stream over the next 5 to 10 years:
 - (i) Investment in Australia's future tin resources:
 - D.P. McIntyre and S.M. Richards, Aberfoyle Ltd., Australia.
 - (ii) Brazilian tin deposits and potential:
 - J.R.M. Franco, National Department of Mineral Production, Ministry of Mines and Energy, J.S. Bettencourt, E.C. Damasceno, W.S. Fontanelli and N.M. Pereira, Empresas Brumadinho, Brazil.
 - (iii) Review of discoveries of new tin deposits in Indonesia:
 - S. Sujitno and M. Simatupang, P.T. Tambang Timah (Persero), Indonesia.
 - (iv) The discovery of tin occurrences, which include some of economic importance, in Malaysia during 1974-79:
 - S. Senathi Rajah and D. Santokh Singh, Geological Survey Department, Malaysia.
 - (v) Possible future tin mining activities and possible new mines in Nigeria:
 - I. Gombe, Department of Mineral Resources, Nigeria.
 - (vi) Offshore exploration for tin in Thailand:
 - Sermakdi Kulvanich, Economic Geology Division, Department of Mineral Resources, Thailand.
 - (vii) Tin in Zaire and its prospects for the future:
 - Department of Mines, Zaire.
4. New Production technology:
 - (i) The Kuala Langat tin field:
 - Yeap Cheng Hock, Pernas Charter Management, Malaysia.
 - (ii) An alternative method for mining deep alluvial ore deposits:
 - J.M. Dankers, Mining and Transport Engineering BV, Netherlands.
 - (iii) A review of 16 years' development of the underwater bucket wheel excavator and its current application to alluvial tin mining:
 - A.W.K. McDowell, Ellicott Machine Corporation International, USA.
 - (iv) Tin dredging operations at Berjantai Tin Dredging Bhd., Selangor, West Malaysia:
 - Lim Che Wan, Pernas Charter Management, Malaysia.
 - (v) Investment in, and operation of, a gravel pump mine in typical dredged-out land today:
 - Hew See Tong, All-Malaya Chinese Mining Association, Malaysia.
5. Production research:
 - (i) A regional approach to research on tin production:
 - Abdullah Hasbi Hassan, Southeast Asia Tin Research and Development Centre, Malaysia.
 - (ii) Development of moulded rubber plates for use in trommel screens:
 - W.P. Cross, Pernas Charter Management, Malaysia.

SECOND SECTION**Consumption potential**

6. World tin consumption - Present position and medium-term forecast:
Umar Yahya and N.C.P. Hollands, International Tin Council.
7. Consumption potential: Industrialised countries:
 - (i) Tinsplate:
D. Grether, Chambre Syndicale des Producteurs de Fer Blanc et de Fer Noir, France.
 - (ii) Tin conservation in the canning industry:
K. Tosaka, Toyo Seikan Kaisha Ltd., Japan.
 - (iii) Solder:
R.B. Loeb, Les Alliages d'Etain et Derives, France.
8. Consumption potential: Third World countries:
 - (i) Canning:
(Author to be advised).
 - (ii) Tinsplate can consumption potential in ASEAN:
M.G. Alderson, Metal Box Malaysia Bhd., Malaysia.
9. Material substitution and the demand for tin:
J.E. Tilton, Pennsylvania State University, USA.
10. Tin consumption meets the challenge from technological change:
D.A. Robins, International Tin Research Institute, UK.
11. Recycling of tinsplate and ferrous municipal scrap:
R.S. Weatherley, Vulcan Materials Co., USA.
12. Consumption research benefits the tin industry:
B.T.K. Barry and C.J. Thwaites, International Tin Research Institute, UK.

THIRD SECTION**Marketing, aspects and outlook**

13. International tin trading and marketing:
J.C. Bowi, Malaysia Mining Corporation, Malaysia.
14. Market quotes and marketing practices:
Abdul Rachman Ramly, P.T. Tambang Timah (Persero), Indonesia.
15. Establishment of a tin exchange in Malaysia:
Ismail Ahmad, Kuala Lumpur Commodity Exchange, Malaysia.
16. The use of the London Metal Exchange for hedging purposes:
D. Williamson, Hargreaves & Williamson, UK.
17. The rôle of tin within the US National Defence Stockpile:
R. Markon, Federal Property Resources Services, US General Services Administration, USA.

FOURTH SECTION**Investment**

18. Production investment:
 - (i) Problems affecting the financing of long-term development projects:
J.H. Forsyth, Morgan Grenfell, UK.
 - (ii) Considerations related to investments in tin mining:
Billiton International Metals BV, Netherlands.
 - (iii) A tin economy model for decision-making about investment in production capacity:
H. Hashimoto, Commodities & Export Projections Division, World Bank.
 - (iv) Some problems anticipated in developing a deep-seated alluvial tin deposit in Malaysia.
Mustapha Kamal Shahrom, Lwee Tien Kee and Thong Kean Sin, Pernas Charter Management, Malaysia.

19. Consumption investment:

- (i) Consumption investment in Japan:
K. Tanaka, Kawasaki Steel Corporation, Japan.
- (ii) The tinplate industry in the European Economic Community- Aspects of its future development:
C. Freiling, Rasselstein AG, Germany, F.R.

FIFTH SECTION

Panel on investment

A Panel will be selected from among appropriate participants in the Conference to answer questions on investment raised during the course of discussions.

CONFERENCE PROGRAMME

Sunday, 18 October

1400 - 1700 Registration of participants

Monday, 19 October

0830 - 1030 Registration of participants
1030 - 1200 Official opening of Conference
1230 - 1400 Late registration of participants
1400 - 1700 FIRST SESSION: Papers 1, 2, 3(i) and (ii)
2000 Reception by the Honourable the Minister of Primary Industries of the Government of Malaysia

Tuesday, 20 October

0830 - 0900 Late registration of participants
0900 - 1230 SECOND SESSION: Papers 3(iii) to (vii)
1400 - 1700 THIRD SESSION: Papers 4(i) to (iv)
2000 Reception by Malaysia Mining Corporation

Wednesday, 21 October

0900 - 1230 FOURTH SESSION: Papers (v), 5(i) and (ii), 6 and 7(i)
1400 - 1700 FIFTH SESSION: Papers 7(ii) and (iii), 8(i) and (ii)
2000 Reception by Kumpulan Perangsang Selangor

Thursday, 22 October

0900 - 1230 SIXTH SESSION: Papers 9, 10, 11, 12 and 13
1400 - 1700 SEVENTH SESSION: Papers 14, 15, 16 and 17

Friday, 23 October

0900 - 1230 EIGHTH SESSION: Papers 18(i) to (iv), 19(i) and (ii)
1400 - 1600 Panel on investment
1615 - 1700 Closing of Conference
2000 Reception by the mining industry of Malaysia

Saturday, 24 October

0800 - 1700 Field trips:
either Mines in the vicinity of Kuala Lumpur
or Oil palm complex

Sunday, 25 October

From 0800 Participants depart for Post-Conference excursions

WORKSHOP ON PALAEOMAGNETIC RESEARCH IN SOUTHEAST AND EAST ASIA

A workshop on palaeomagnetic research in Southeast and East Asia is proposed to be held on 1 to 5 March 1982, at the University of Malaya, Kuala Lumpur. The Workshop will be part of the SEATAR programme, and sponsored by CCOP jointly with the University of Malaya. The Workshop will consist of short presentations of papers on the theme of the conference, followed by discussions.

The main aims of the workshop will be:

- 1) Compilation and dissemination of results of palaeomagnetic research in the region.
- 2) Delineation of possible new applications of palaeomagnetism, particularly in fields relevant to the petroleum and mineral industries.
- 3) Setting up co-operative research programmes between laboratories and institutions within and beyond the region.

Working Group

In view of the active, but so far preliminary and uncoordinated, palaeomagnetic research being done in the region, and its potential value both for basic research and as applied to economic objectives, the CCOP-IOC Working Group on SEATAR plans to convene a Working Group on palaeomagnetic research in the University of Malaya, Kuala Lumpur, Malaysia on 1-5 March 1982. The objectives are to review and synthesize work already done, to consider how future work could be applied to the objectives of CCOP, in particular to knowledge of the genesis of, and correlation with, offshore hydrocarbon basins, and to the study of mineralized belts and placer deposits.

Tentative time-table and agenda

1. Abstracts to be sent to the CCOP Project Office by 1 August 1981.
2. Completed papers and discussion papers, to be issued as preprints, to be sent to the CCOP Project Office by 15 December 1981.
3. 28 February 1982: Participants arrive.
 - 1 March 1982 : Registration, opening of workshop. Adoption of agenda. Keynote address & discussion on principles, scope, limits and applications of the palaeomagnetic method.
 - 2 March : Review of results obtained so far in the region (i.e. SE and E Asia).
 - 3 March : Application to understanding tectonic history and palaeogeography of the region with emphasis on
 - a) Formation of off-shore sedimentary basins
 - b) History of formation and possible disruption of mineralised belts.
 - 4 March : Application to stratigraphy: possible use of palaeomagnetic reversals and vector directions in correlation of oilfield strata as exposed in outcrops and cores. Use in Quaternary geology.
 - 5 March : Recommended future work, in particular:
 - a) Designation of target formations that would provide the most valuable information.
 - b) Problems in oil-basin correlation and Quaternary placer deposits which palaeomagnetic techniques might help to solve.

Identification of possible pilot projects.

- c) Standardized formats for presenting palaeo-magnetic results, and arrangements for exchange of information, co-operative research and training.

6 March : Adoption of recommendations. Closing ceremony.

7 March : Field excursion in west central Malaysia.

4. Final revised papers to be received by 31 May 1982. It is hoped to print the proceedings by August 1982.

Prospective participants are invited to write to A. Johannas, Project Manager/Co-ordinator, CCOP Project Office, c/o The White Inn, 41 Sukhumvit Soi 4 Bangkok, Thailand.

FIELD TRIP WITH AN EXORCIST

If you are contemplating including an exorcist in your field party it will be instructive to read the accounts below of the experience of someone who brought one along to Gunong Benom.

"..... I engaged therefore 32 coolies, all were Malays and but one or two were foreign Malays - Kelantan and Trengganu men. As they assured me that the mountain was infested with peculiarly vicious 'hantu' I engaged a 'pawang' one Wan Putih. He was recommended to me as a powerful exorcist who feared no 'hantu' whatever. In fact he was I was told perhaps a little too rough in the way he dealt with them. The 'pawang' whom Che Musa had taken with him had proved a hopeless failure.

..... Occasionally the 'pawang' thought fit to give us a taste of his quality and usually at inconvenient times. At the camp at the foot of the Gunong we heard every night a continuous shrill yelping as of baskets of puppies deserted by their mothers. It was, I think, made by birds though the Malays could give me no name for them. When I asked the 'pawang' he looked mysterious and suggested that the subject should be changed. One night this yelping was very persistent several 'riang-riang' were screeching in the trees, a wind having sprung up the jungle seemed full of noises. I fell asleep but was awakened near midnight by a loud harangue from the 'pawang' to the "hantu" of the Gunong. He began mildly by asking why they made such a disturbance; had they forgotten the propitiatory service he had paid before the first tree was felled? Was it fair to go back on him like this? For a while the noise died down and I heard the men expressing their sense of the 'pawang's' power over the spirits. Soon after however it began again and the pawang after more unavailing discourse lost his temper and scolded the hantu in very unmeasured language indeed. This frightened the men and they kept up a chorus of "Biar-lah," "Jangan-lah" "Nanti dia marah" until finally the pawang was reluctantly pacified and left the hantu alone".

T.T. Khoo

From: Barnes, W.D. (1903). Notes on a trip to Gunong Benom in Pahang. Jour. Straits Br. R. Asiatic Soc., 39, 1-18.

FIRST INTERNATIONAL SYMPOSIUM ON SOIL, GEOLOGY AND LANDFORMS - IMPACT ON LAND USE PLANNING IN DEVELOPING COUNTRIES

Place and Date

Bangkok, Thailand, April 1-3, 1982.

Purpose

- I. This symposium will explore the most effective methods of integrating the well being of people with the natural constraints of the land itself - its climate, soil, geology and landforms.
- II. Promote cooperation in research and development of natural resources for the benefit of land use planners in developing countries.
- III. Explore the most efficient methods of collating economic, social, political, and especially physical data for land use studies.
- IV. Attempt to bring together experts from the fields of soil science, geography, geology and natural resource development so that they can interact with planners and decision makers in the planning process.

Call for Papers

Original papers are invited. Instructions on the preparation of manuscripts will be sent to the authors on request. Final manuscripts of not more than 6,000 word equivalents must reach the Symposium Secretary not later than February 1, 1982.

The Proceedings will be distributed before the Symposium.

The official language of the symposium will be English.

Field Trips

A number of field trips are planned to consider the urban geology and environmental geology of Bangkok including studies of its subsidence, flooding, water supply and sewerage problems. Two to seven day post symposium field trips will be organized to study environmental problems relating to soils, geology, and landform in Thailand, especially those concerning geologic hazards, land use, soil engineering, Quaternary geology and water resources development.

Further Information

Further information on the Symposium can be obtained from:

Symposium Secretary, LANDPLAN 1
Division of Geotechnical & Transportation Engineering
Asian Institute of Technology
P.O. Box 2754
Bangkok, Thailand.



ASSOCIATION OF GEOSCIENTISTS FOR INTERNATIONAL DEVELOPMENT

PUBLICATION LIST, MAY 1981

REPORT SERIES - *The Geosciences in International Development*

- # 1 - **GEOSCIENTISTS AND THE THIRD WORLD: A COLLECTIVE CRITIQUE OF EXISTING AID PROGRAMS.** A.R. Berger (Editor), Published as Geological Survey of Canada, Paper 74-57, 32 pages, 1975. Available from Geol. Surv. Canada, 601 Booth Street, Ottawa, Canada, K1A 0E8.
- # 2 - **HIDDEN WATERS IN ARID LANDS:** Report of a workshop on groundwater research needs in arid and semi-arid zones - L.A. Heindl (Editor), published by International Development Research Center, Ottawa, as IDRC-057e: 19 pages + 1 microfiche, 1975. Limited number of copies available upon request.
- # 3 - **NEW DIRECTIONS IN MINERAL DEVELOPMENT POLICIES:** Proceedings of an international workshop, held at Bagauda, Nigeria, 1975 - D.J.C. Laming and D.E. Ajakaiye (Editors), 224 pages, 1977. US\$15.00 (\$10 to developing countries).
- # 4 **PRELIMINARY BIBLIOGRAPHY ON GROUNDWATER IN DEVELOPING COUNTRIES, 1970 to 1976.** By D.A.V. Stow, J. Skidmore and A.R. Berger, 305 pages 1976. Out of print.
- # 5 - **GEOSCIENCE EDUCATION IN DEVELOPING COUNTRIES:** Proceedings of an international symposium, held at Sydney, Australia, 1976 - P.G. Cooray (Editor), 56 pages, 1977. US\$5.00.
- # 6 - **MINERAL RESOURCE MANAGEMENT IN DEVELOPING COUNTRIES: STATE PARTICIPATION, PRIVATE ENTERPRISE, OR BOGH?** - Proceedings of an international symposium, held at Sydney, Australia, 1976 - M.E. Woakes (Editor), 28 pages, 1978. US\$6.00.

Other Issues in Preparation:

- MINERAL EXPLORATION IN TROPICAL RAIN FORESTS
- GUIDE TO MINERAL RESOURCES DEVELOPMENT FOR DEVELOPING COUNTRIES
- STRATEGIES FOR SMALL SCALE MINING AND MINERAL INDUSTRIES
- COURSE NOTES ON ENGINEERING GEOLOGY IN DEVELOPING COUNTRIES

NEWSLETTERS

- **AGID NEWS.** The official newsletter of the Association. Quarterly, in English. Articles, newsitems, conference reports, book reviews, job vacancies, forthcoming meetings and courses. Free to members of AGID. Subscription US\$30.00 per calendar year. Also available on exchange basis.
- **WEST AFRICAN GEOSCIENCE NEWSLETTER/BULLETIN des GEOSCIENCES en AFRIQUE DE L'OUEST,** a quarterly in French and English. Available from AGID Africa Office, Depts. of Physics and Geology, Ahmadu Bello University, Box 393, Zaria, Nigeria.
- **AGUAS SUBTERRANEAS,** bi-monthly, in Spanish, on groundwater. Available from AGID Latin American Office, Apartado 3672, Carmelitas, Caracas 1010A, Venezuela.
- SECUENCIA,** quarterly, in Spanish, on mineral resources. Available from AGID Latin American Office, Apartado 3672, Carmelitas, Caracas 1010A, Venezuela.

DIRECTORES

- **AGID MEMBERSHIP DIRECTORY.** To December 31, 1979 with supplement to June, 1980.
- DIRECTORY OF GEOSCIENCE DEPARTMENTS IN UNIVERSITIES IN DEVELOPING COUNTRIES UNIVERSITIES,** Ed. V. Ricaldi, 2nd Edition, 1980. 28 pages. US\$8.00.

MISCELLANEOUS

- **AGID THE FIRST SIX YEARS,** By D.R. de Vletter and A.R. Berger, 1980, 88 pages, Limited copies available upon request to AGID Headquarters.

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KALENDAR (CALENDAR)

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

1981

- Sep 21 - 23 : 5th International Tin Conference, Kuala Lumpur. Organised by the International Tin Council & Ministry of Primary Industries, Malaysia. Contact: Ketua Setia-usaha, Kementerian Perusahaan Utama, Tingkat 8-10, Wisma Keramat, Jalan Gurney, Kuala Lumpur 15-01.
- Oct 7 - 9 : ASCOPE '81, ASEAN Council on Petroleum (Meeting), Manila, Philippines. (ASCOPE '81 Organizing Secretariat), Philippine National Oil Co., 7901 Makati Ave., Makati Metro Manila, Philippines, Telex: 63667 PNOG PM).
- Oct 19 - 23 : Extraction Metallurgy '81 London. Contact: Meetings Secretary, Institution of Mining & Metallurgy, 44 Portland Place, London W1N 4BR. (May-Apr 1981).
- Nov 17 : Workshop on Role of Geoscience Educational Institutes in Natural Resources Development in Southeast Asia. Organised by AGID in cooperation with Regional Network for Geosciences in Southeast Asia. Contact: Dr. B.K. Tan, Convenor AGID Geoscience Education Workshop, Dept. of Geology, University of Malaya, Kuala Lumpur, Malaysia. (May-Jun 1981).
- Nov 18 - 23 : GEOSEA IV - Geology, Mineral and Energy Resources of Southeast Asia: Philippines International Convention Center, Manila, Philippines. The Secretary, Geological Society of the Philippines, Bureau of Mines Bldg., Pedro Gil St., Malate, Manila, Philippines. (Jul - Aug 1980 & Jan-Feb 1981).
- Sep - Oct : International Conference on Industrial Minerals and Rocks and the role they play in a developing country, Kingston. Contact: Neville Mc-Farlane, Head, Mineral Resources Division, Science Research Council, P.O. Box 350, Kingston, 6, Jamaica.
- Nov 23 - 26 : Asian Mining '81, Singapore. The Secretary, IMM, 44 Portland Place, London W1N 4BR, England. (May-Jun 1980).
- Dec 7 - 11 : Ore deposits, ann. workshop, Toronto. (E.T.C. Spooner, Dept. of Geology, University of Toronto, M5S 1A1).
- Dec 14 - 18 : Short Course and Symposium on geotechnical aspects of offshore structures, Bangkok. Guest Lectures, Country Reports, and short presentations. Contact: Prof. A.S. Balasubramaniam, Div. of Geotechnical & Transportation Engineering, AIT, P.O. Box 2754, Bangkok, Thailand. (May-June 1981).
- Dec 18 - 19 : Ophiolites & Actualism. A meeting held by the Working Group on Mediterranean Ophiolites, Florence, 18-19 December. Contact: Travel Agency CTU VIAGGI, via S. Gallo, 12/v., 50100 Florence. (May-June 1981).

1982

- Feb 2 - 12 : Offshore Southeast Asia (OSEA) Conference & Exhibition, Singapore. Contact: Dr. Glenn L. Shepherd, OSEA Program Chairman, P.O. Box 423, Tanglin Post Office, Singapore 9124.
- Mar 1 - 5 : Workshop on Palaeomagnetic Research in Southeast and East Asia. University of Malaya, Kuala Lumpur. Abstracts by 1 August. Full Papers by 15 December. Contact A. Johannas. Project Manager, Coordinator CCOP, Bangkok, Thailand. (Jul-Aug 1981).
- Apr 1 - 3 : First international symposium on Soil, Geology and Landforms - impact on land use planning in developing countries, Bangkok. Contact: Dr. Prinya Nutalaya, Symposium Secretary, LANDPLAN 1, Div. of Geotechnical & Transportation Eng. AIT., P.O. Box 2754, Bangkok, Thailand. (Jul-Aug 1981).
- May 12 - 14 : 9th International Geochemical Exploration Symposium, Saskatoon, Canada. (L.A. Clark, Saskatchewan Mining Development Corp., 122 3rd Ave. North, Saskatoon, Sask., Canada S7K 2HG).
- Aug 20 - 23 : IV International Symposium on the Ordovician System, Oslo, Norway. One pre-meeting excursion in Norway and three post-meeting excursions in Sweden. (D.L. Bruton, Paleontologisk Museum, Sars gate 1, Oslo, 5, Norway).
- Aug 22 - 28 : Circum Pacific Energy and Mineral Resources Conference, Honolulu, Hawaii, USA. (M.T. Halbouty, 5100 Westheimer Road, Houston, Texas 77056, USA).
- Aug 22 - 28 : Eleventh International Congress on Sedimentology, Hamilton, Ontario, Canada, IAS Congress 1982, Dept. of Geology, McMaster University, Hamilton, Ontario L8S 4M1, Canada. (Nov-Dec 1980).
- Sep 6 - 12 : VI IAGOD Symposium. Tbilisi. Contact: A.C. Tvacchrelidze, Caucasian Institute of Mineral Resources, 85 Paliashvili St., 380030 Tbilisi, USSR.
- Dec 1 - 6 : 4th International Congress of Engineering Geology, New Delhi. Contact: G. Pant, Geological Survey of India, 47-48 Pragati Bhawan. Nehru Place, New Delhi 110019, India.

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- Bulletin 1** (1968). 79 p. Studies in Malaysian Geology, edited by P.H. Stauffer. A collection of papers presented at a meeting of the Geological Society of Malaysia on 31st January 1967. M\$3.00 (US\$1.50).
- Bulletin 2** (1968). 152 p. Bibliography and Index of the Geology of West Malaysia and Singapore by D.J. Gobbett. Price: M\$10.00 (US\$5.00)---softcover: M\$15.00 (US\$7.50) hardcover.
- Bulletin 3** (1970). 146 p. Papers in Gemorphology and Stratigraphy (with Bibliography supplement), edited by P.H. Stauffer. Price: M\$10.00 (US\$5.00)
- Bulletin 4** (1971). 100 p. Papers in Petrology. Structure and Economic Geology edited by P.H. Stauffer. Price: M\$10.00 (US\$5.00).
- Bulletin 5** (1973). 70 p. The Search for Tungsten Deposits by K.F.G. Hosking. Price: M\$10.00 (US\$5.00).
- Bulletin 6** (1973). 334 p. Proceedings. Regional Conference on the Geology of Southeast Asia. A Collection of papers. Kuala Lumpur. March 1972. Edited by B.K. Tan. Price: M\$22.00 (US\$11.00)—hardcover only.
- Bulletin 7** (1974). 138 p. Edited by B.K. Tan. Price: M\$12.00 (US\$6.00).
- Bulletin 8** (1977). 158 p. Edited by T.T. Khoo. Price: M\$12.00 (US\$6.00).
- Bulletin 9** (1977). 277 p. The relations between granitoids and associated ore deposits of the Circum-Pacific region. A collection of papers presented at the IGCP Circum-Pacific Plutonism Project Fifth Meeting. 12-13 November 1975. Kuala Lumpur edited by J.A. Roddick & T.T. Khoo. Price: M\$25.00 (US\$12.50).
- Bulletin 10** (1978). 95 p. A collection of papers on the geology of the Asean region. Edited by C.H. Yeap. Price: M\$10.00 (US\$5.00).
- Bulletin 11** (1979). 393 p. Geology of Tin Deposits. A collection of papers presented at the International Symposium on 'Geology of Tin Deposits'. 23-25 March 1978. Kuala Lumpur. Edited by C.H. Yeap. Price: M\$50.00 (US\$25.00).
- Geological Map of the Malay Peninsula** (1:1,000,000 coloured) compiled by D.J. Gobbett. 1972. Price: M\$4.00 (US\$2.00) — folded flat.
- Field Guide** for a 7-day, one thousand mile, geological excursion in Central and South Malaya (West Malaysia and Singapore) (1973). 40 p. by C.S. Hutchison. Price: M\$5.00 (US\$2.50).
- Abstracts of papers.** Regional Conference on the Geology of Southeast Asia. Kuala Lumpur (1972). 64 p. 8 figs., 3 tables, many extended abstracts. Edited by N.S. Haile. Price: M\$6.00 (US\$3.00).
- Warta Geologi** (Newsletter of the Geological Society of Malaysia). Price: M\$2.00 (US\$1.00) (for non-members) per bimonthly issue from July 1966.

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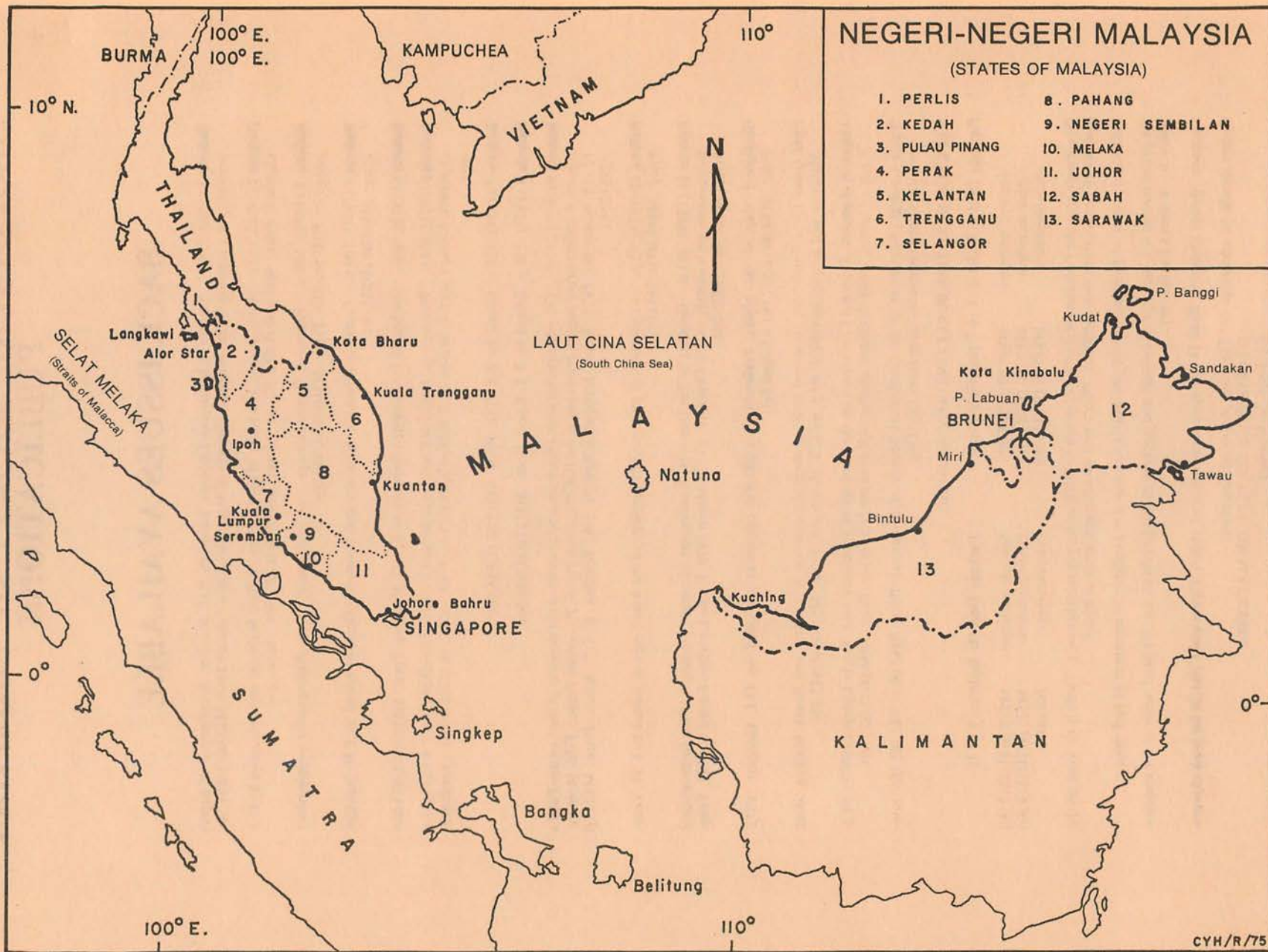
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10° N.

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