

# Geological Society of Malaysia

PERSATUAN GEOLOGI MALAYSIA

## NEWSLETTER

Number 43

July 1973



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## GEOLOGIC NOTES

Marcasite spherulites from the Ban Seng Lee Mine, near Tronoh, Perak

K.F.G. Hosking & E.B. Yeap, Department of Geology, University of Malaya  
Kuala Lumpur, MALAYSIA

Recently one of us obtained a crude concentrate from the tin shed of the Ban Seng Lee opencast alluvial tin mine in the Tronoh area of Perak.

Polished briquettes of this material, under the microscope, revealed that it contained not only the expected species cassiterite, ilmenite, tourmaline and topaz, but also a variety of fresh hard-rock-derived sulphides including sphalerite and chalcopyrite. However, in addition, beautiful pseudomorphs of hematite after individual pyrite crystals were in evidence, together with a few spherulites of siderite, a circular cluster of pyrite framboids (whose components are generally highly ordered) in a pyrite matrix, and a comparatively small number of marcasite spherulites.

The purpose of this note is first to record the presence of the marcasite spherulites because, as far as the writers are aware, such bodies have not hitherto been recorded from the stanniferous placers of West Malaysia, nor, indeed, from those of the other extra-Malaysian parts of the Southeast Asian Tin Belt. In addition, the note aims at briefly indicating some of the characteristics of these particular spherulites and mentioning a little about their genesis and that of supergene marcasite generally.

At this stage it is pertinent to note that one of us (Hosking, 1972a) has already described, from the West Malaysian placers, marcasite cementing pebbles, etc., of quartz and pyrite; marcasite filling the lumina of plant material; as a 'cement' (sometimes with a radiating texture) for pyrite framboids occupying the 'cores' of sulphidised stems and roots, and marcasite slabs containing pyrite framboids. He has also collected, from a stanniferous placer at Gumba, Belitung (Indonesia), a most interesting sandstone that is cemented by marcasite, and will be the subject of a future note. Thus it may be reasonably concluded that marcasite can hardly be regarded as an extremely rare component of the Southeast Asian stanniferous placers.

### The spherulites as seen in polished section

In polished section the diameters of the spherulites span the range c.  $400\mu$  to c.  $1,000\mu$  microns. Some of these bodies are crudely circular whilst others depart considerably from this shape. The outlines of all, however, are dentate, due to the fact that the outer surface consists of the terminations of marcasite (generally radiating) crystals.

Their internal textures, whilst showing considerable variation, have one common feature; each lacks a nucleus, and in this respect the marcasite spherulites resemble the siderite ones that were described from a West Malaysian placer deposit by one of us (Hosking, 1972b).

The following brief descriptions of a selected few of the spherulites will, it is hoped, provide some idea of variations of the textural theme that are encountered.

In one example the spherulite consists of radiating crystals that originated from a point source and continued to grow in a 'uniform' manner throughout the development of the body.

In a second example a core of 'acicular' radiating crystals is fringed by distinctly coarser radiating ones.

In a third example a marcasite body of imperfect shape consists essentially of a fine granular marcasite mosaic with an imperfectly-developed and discontinuous band of crudely radially orientated crystals that locally constitute the peripheral parts of the 'spherulite'.

Finally, the spherulite may contain sand inclusions. One, which is figured in this note (fig. 1) contains a grain of quartz that, in the section, is wholly within the spherulite, and a grain of maghemite (?) that in part protrudes from the sulphide body.

The centre of origin of the spherulite lies between these two inclusions and the body's development was initiated by the deposition of radiating marcasite needles. These were then invested by an outer palisade of coarser radiating crystals.

During the crystallisation of the marcasite the inclusions were subject to tension of sufficient magnitude to cause them to fracture. The fractures so produced are now infilled with marcasite (figs. 1a and 1b), and perhaps their present widths are in part due to 'push apart' effected by the force of crystallisation of the marcasite upon the fissure walls.

It is pertinent to note that the variation in the internal texture of these spherulites serves to remind one that the chemical environment in which these bodies developed may well have varied markedly over very short distances. Whether these new crystalline bodies passed through a gel stage is anybody's guess. Indeed, supergene marcasite and its genesis, are remarkably neglected subjects. As recently as 1968 Love (p. 41) remarked that the "mineral does not appear to have been recognized with certainty from sediments of recent origin"! Love goes on to say that "in experimental precipitation work a degree of acidity appears to encourage the yield of marcasite with or without pyrite, but marcasite has not been precipitated where acid has not been used. .... None (of the syntheses

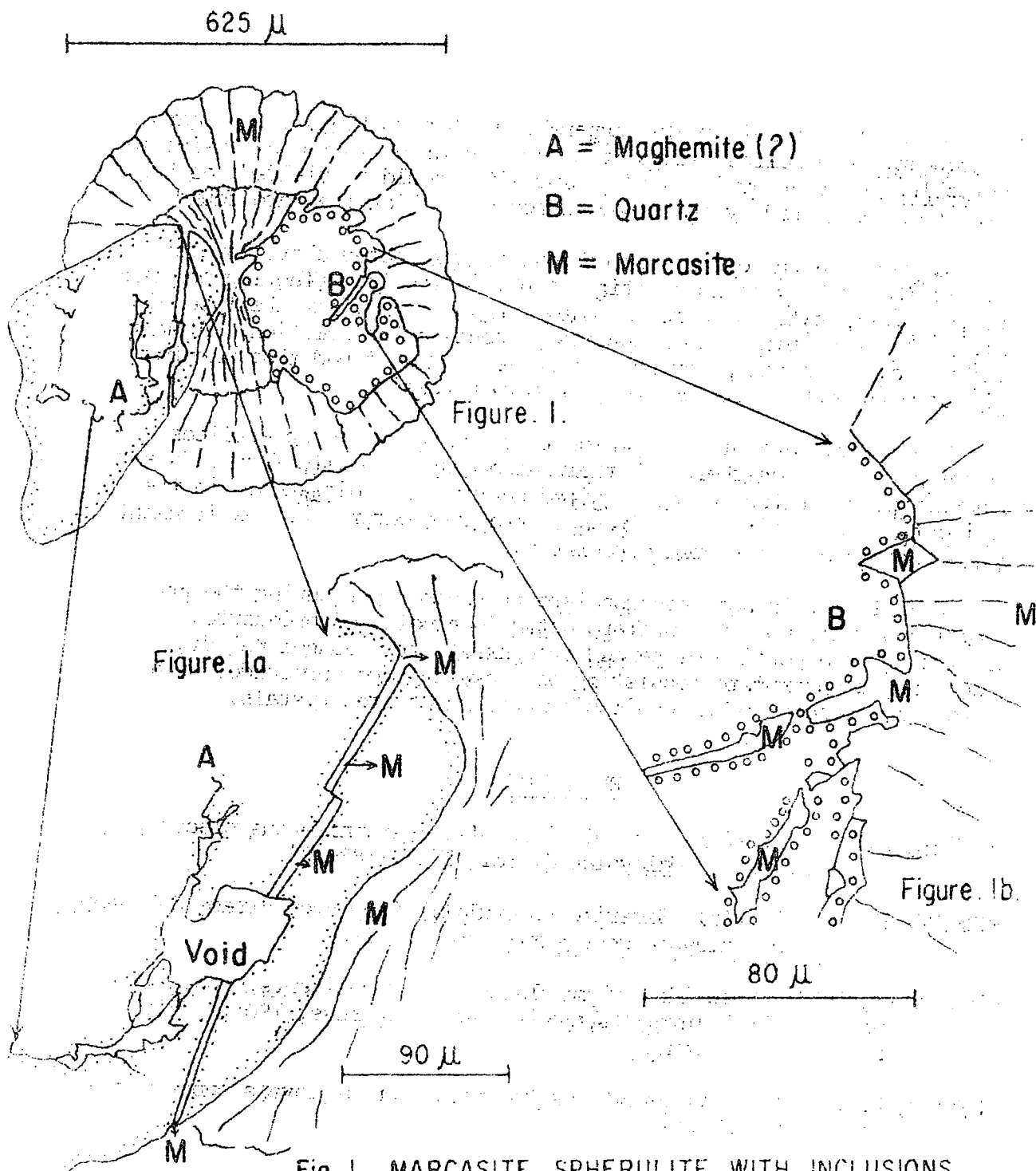


Fig. 1. MARCASITE SPHERULITE, WITH INCLUSIONS, FROM BAN SENG LEE MINE, n/r TRONOH, PERAK.

Figs. 1a AND 1b ARE ENLARGEMENTS OF THE FRACTURED PORTIONS OF THE INCLUSIONS.

made to date) is convincingly comparable with situations in the natural environment, and neither makes it clear whether pH is the exclusive factor controlling whether pyrite and/or marcasite should be yielded, as has often been suggested by the study of rocks in which they are found".

Rickard, in the discussion of Love's paper noted above, states (p. 58) that "there is no question of pH, in itself, affecting whether pyrite or marcasite is formed although the pH may affect the type of metastable or stable sulphur species present in the solution. At more acid pH values elemental sulphur is stable, and we found that warming sulphur with machinawite or greigite gave marcasite".

The writers are of the opinion that the marcasite spherulites described above, together with their accompanying pyrite framboids and spherulitic siderites, were deposited during early diagenesis in the sediments accumulating in a fresh or brackish water swamp environment characterised by restricted circulation.

Finally, it is not inappropriate to record that during the preparation of this note the writers noted in a polished briquette, consisting of a portion of panned concentrate from Sungei Keladi, Trengganu, a spherulite consisting of a pyrite core surrounded by a narrow rim composed of a mosaic of minute marcasite crystals.

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- LOVE, L.G., 1969. Sulphides of metals in recent sediments, pp. 31-56 of Proc. 15th Inter-University Geol. Congress, 1967, Univ. Leicester, England.
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Newly recognized structural and stratigraphic features in the Eastern part of the Langkawi Islands, West Malaysia

P.K. Wong, Fuad Hassan and T.E. Yancey

Detailed geologic mapping during the past few months in the eastern part of the Langkawi Islands has revealed several major structural features not previously recognized. Although mapping work is far from complete in this area, it is apparent now that there are several large faults cutting through the northeastern part of the Langkawi Islands, and that the mapped contact between the Setul and Chuping formation in central eastern Pulau Langkawi will have to be greatly revised, and that the metamorphosed terrigenous strata on the east side of Pulau Tuba and adjacent islands includes both lower and upper Paleozoic formations.

Northeastern and Central Eastern Langkawi (Figure 1)

The westernmost of the major faults in this area lies at the western edge of the carbonate tower karst hills just east of the road north of Kampung Kilim. East of the fault are northeastward dipping or nearly flat lying carbonate strata of the Setul Fm. West of this fault are terrigenous strata with moderately eastward dipping attitudes similar to strata in the adjacent foothills of Gunung Raya, which are probably part of a continuous stratigraphic sequence. All terrigenous strata west of the fault and east of Gunung Raya are probably of Singa Fm., and it is unlikely that there is any Machinchang Fm. present in the area. The available road cuts are deeply weathered, but they are lithologically most similar to the Singa Fm.

Jones (1966) proposed a fault lying southwest of and parallel to the road, based on topographic evidence and his identification of the terrigenous strata near the road as Machinchang Fm. Such a fault may exist, judging from the topographic evidence, and the proximity of the hot springs, but it is not a major fault and does not separate upper Paleozoic strata from lower Paleozoic strata. At only one place on Jones' map is the fault shown as definite, and at this place the supposed fault trace is entirely within the Chuping Fm. (as determined by new mapping).

On the northwest side of Pulau Langgun there is a major fault which separates a western block of upper Setul Fm. and Singa Fm. strata from an eastern block of lower Setul Fm. strata. On the northern end of Pulau Langgun sheer vertical cliffs a few hundred meters high show the fault zone, which is nearly vertical. The fault can be traced across the channel to the main island, and continues due south on Pulau Langkawi





at the place where Langkawi and Langgun are closest to each other. The fault has not yet been traced further south from this point, but it is probable that it continues in a north-south direction.

Almost due south of this fault is another large fault which is exposed on the south bank of the Sungei Kisap near its mouth, on the back side of the Kisap Headlands. This has a strike nearly north-south and has a nearly vertical dip. There is a narrow zone of breccia developed on the fault plane, and the fault is quite well exposed for a short distance. This may be the same fault as the one on Pulau Langgun. Its orientation is the same, and it lies along a possible projection of the Langgun fault, and it has a similar narrow zone of deformation and breccia. Intervening stretches of mangrove swamp make this difficult to check.

The most conspicuous of the north-south trending faults is one which cuts along the eastern edge of the Kisap Headlands on Pulau Langkawi, where it is readily identified by steep, light coloured exposures on the fault plane a few hundred meters above sea level. These white patches can be seen from as far away as 10 miles out to sea, and are aligned north-south at a fairly uniform elevation. This fault dips very steeply to the west, and is traceable to the north along the western shore of Pulau Tanjong Dendang up to the narrow neck in the island at Telok China Mati, where the fault cuts across the island and continues south along the eastern side of the northern half of the island. The southern continuation of this fault is not known.

The fault can be traced along Pulau Tanjong Dendang by the occurrence of a narrow to wide tectonically deformed zone consisting of moderate to tight folds in the rocks and some large breccia in the carbonates. On the SW portion of the island (the part closest to Pulau Langgun) the deformed zone can be seen at the back, inner part of several bays, while relatively undeformed strata occur on the headlands separating the bays. At Telok China Mati this fault accounts for the tight folding developed in the lower Detrital Band shales and siltstones, which are part of the structural block east of the fault.

Throughout central eastern Langkawi there is strong evidence to suggest that the Chuping Fm. is much more widespread in occurrence than has been previously been mapped as Setul Fm. The white coloration is not related to intrusions, and is continuous with localities of known Chuping Fm., and has a sharp boundary with dark limestones of the Setul Fm.

The westernmost limestone hills between Kampung Kilim and Bukit Batu Puteh all appear to be formed of Chuping Fm. The hills along the road southeast of Kampung Kilim are all formed of white limestone, which is very fractured and easily crumbles into small pieces. South of the Sungei Kisap there is a large area composed of white carbonates, which extends all the way east to the back of Telok Apau. This shifts the Chuping-Setul contact a mile or more to the east and erases two postulated faults, including part of the trace of the Kisap "Thrust" fault. Faulting may well be present in the area, but the evidence for it is not clear.

#### Pulau Tuba and adjacent islands (Figure 2)

The terrigenous rock units exposed on Pulau Tuba and adjacent islands to the east, previously identified as entirely of Setul Fm. detrital units, have been identified and correlated closely with the standard stratigraphic sequence in the Langkawi Islands. Running across the centre of the island is a thin terrigenous band exposed at Telok Bujur on the north coast and on the west side of Telok Berembang on the south coast. It is everywhere metamorphosed, but at the exposures on Telok Berembang poorly preserved traces of graptolites are present in the rock, and permits correlation with the lower Detrital Band. On Pulau Tuba there is a conformable contact between this unit and carbonate strata to the east at Tanjong Tuba, which are probably Silurian carbonates of the Setul Fm.

East of these exposures is a distinctive band of exposures stretching along Tanjong Peluru and northward to Pulau Pasir and Pulau Tiloi. These strata consist mostly of red or light coloured mudstones and nearly pure light coloured quartzites. They are identical to strata exposed on Pulau Rebak Besar and similar to some of the Singa Fm. strata exposed on Pulau Langgun. The strata at these three localities are part of a very distinctive unit in the stratigraphic sequence which has been dated on Pulau Langgun and Pulau Rebak Besar as Devonian (Jones and others, 1966; Yancey, 1972).

Southeast of this unit on Pulau Tuba lies a band of dark siltstones and sandstones, apparently conformable with the previous unit, that can be correlated with the typical Singa Fm. in the southwest Langkawi Islands. On Pulau Tuba it forms a thick sequence that is dark coloured, with thin to medium bedding, consisting mostly of poorly sorted siltstones with thin sandstone beds, and contains a few scattered pebbles in siltstones (these were seen on the south shore of the south island of Pulau Nyior Setali, and are stretched and sheared). These rocks are exposed on Pulau Enggang, Pulau Nyior

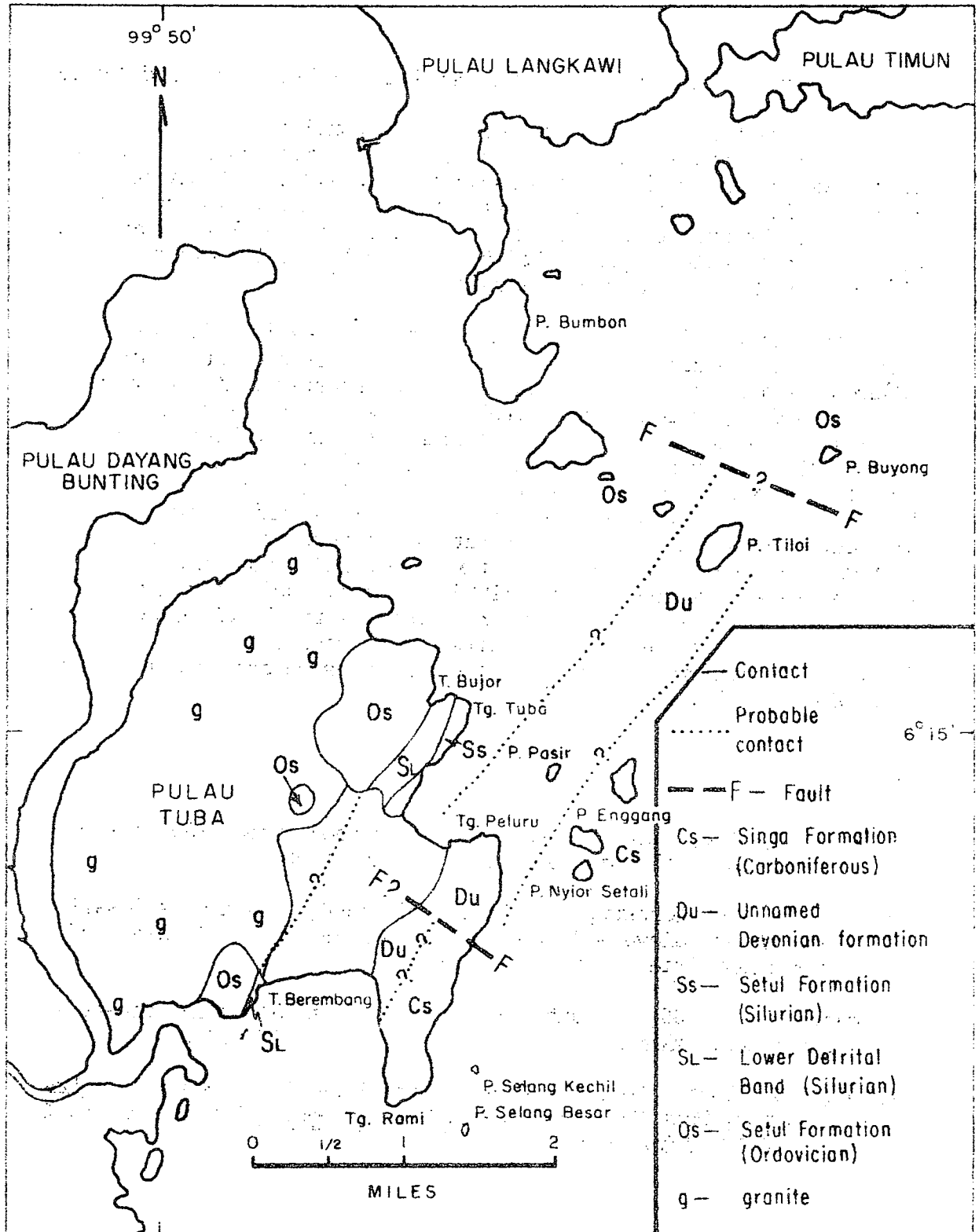


Fig.2 — Southeastern Langkawi

Setali, Tanjong Rami on Pulau Tuba, and Pulau Selang Besar and Kechil.

The contact between the typical Singa Fm. and the light to red coloured mudstones and quartzites occurs on the east coast of Pulau Tuba between Tanjong Peluru and Tanjong Rami, and is a fault contact. There is also a probable fault north of Pulau Tiloi. The outcrop trends are abruptly terminated at this point, and Setul Fm. carbonates are exposed on Pulau Buyong. Neither the scale nor the orientation of this proposed fault has been determined.

These correlations permit us to say that there is a fairly good stratigraphic sequence exposed east of the granites on Pulau Tuba. Adjacent to the granite are exposures of carbonates that are probably the Ordovician portion of the Setul Fm. East of that are Silurian graptolitic shales and probable Silurian carbonates of the Setul Fm. East of that horizon are mudstones and quartzites of a unit that is probably Devonian, and east of that are terrigenous rocks typical of the Singa Fm. of Carboniferous age. All of these units have been disturbed and are slightly to moderately metamorphosed. Folding is prevalent as small scale folds, but no large folds have been identified. This is the area which Koopmans (1965) studied, basing his discussions of orogeny on the theory that the rock units were all of lower Paleozoic age. However, some of the rock units can be correlated with upper Paleozoic formations, but most of the exposures he examined in detail are probably Singa Fm.

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- Jones, C.R., 1966, Pulau Langkawi (geologic map), Sheet 150, new series, Malaysia; Malaysia Geological Survey, 1 sheet.
- Jones, C.R., D.J. Gobbett, & T. Kobayashi, 1966, Summary of fossil record in Malaya and Singapore 1900-1965; Geol. & Paleo. of Southeast Asia, v. 2, p. 301-359.
- Koopmans, B.N., 1965, Structural evidence for a Paleozoic orogeny in northwest Malaya; Geol. Magazine, 102, p. 501-520.
- Yancey, T.E., 1972, Devonian fossils from Pulau Rebak Besar, Langkawi Islands, West Malaysia; Geol. Soc. Malaysia, Newsletter, n. 37, p. 10-12, July 1972.

NEWS OF THE SOCIETY

Meeting of 6th July 1973 - L.R. Beddoes

A meeting of the Society was held at 8 p.m. on the evening of 6th July 1973 in the Department of Geology, University of Malaya. The speaker was Mr L.R. Beddoes, author of the book, Oil and Gas Field of Australia, Papua, New Guinea and New Zealand, who spoke on "The Changing exploration scene in Australia". A summary of his talk is not given here as it is expected that Mr Beddoes would write a short note on this topic for the next issue of the Newsletter.

Programme, Forthcoming seminar on Mineral Exploration and Evaluation - 4th August 1973

Date: 4th August 1973

Time: 9.00 a.m. to 1.00 p.m.

Venue: Lecture Theatre, Block B (ground floor),  
Universiti Kebangsaan  
Jalan Pantai Baru, Kuala Lumpur

Session I (9.00 - 10.45)

Session Chairman: S.H. Chan  
(Jabatan Geologi, Universiti Malaya)

1. Choo Mun Keong (Associated Mines (M) Sdn. Bhd.):  
"Some aspects of volume recoveries and drag ore phenomena in Banka drilling"
2. Lee Whye Kwong (Associated Mines (M) Sdn. Bhd.):  
"Evaluation of alluvial tin deposits by homogeneous blocks"
3. Yeap Cheng Hock (Jabatan Geologi, Universiti Malaya):  
"The estimation of free tin content in bore hole concentrates"

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Coffee break (10.45 - 11.00)

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Session II (11.00 - 12.45)

Session Chairman: K.F.G. Hosking (Jabatan Geologi, Universiti  
Malaya)

4. Tan Teong Hing (Jabatan Kajibumi, Universiti Kebangsaan):  
"Biogeochemical method of exploration"
5. Toh Swee Cheng (Conzinc Riotinto, Malaysia Sdn. Bhd.):  
"A computer program for the evaluation of placer drilling data"
6. Chan Siew Hung (Jabatan Geologi, Universiti Malaya):  
"A theoretical study of gravity anomalies caused by buried  
limestone pinnacles"

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Membership

3 new full members, and 11 new student members were elected to the Society.

Full Members

Loh Chiok Hoong  
14 Jalan 41  
Petaling Jaya

Miss Gillian L. Tidey  
23 Nassim Road  
Singapore 10.

William C. Penttila  
Atlantic Richfield Co.  
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Los Angeles, California 90071  
U.S.A.

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Petaling Jaya

Abdul Rahim bin Samsudin  
Makmal Kajibumi  
Universiti Kebangsaan, Kuala Lumpur

Ho Bing Yim, Charles  
No. 401 Centre Terrace  
Sai Wan Chuen  
Kennedy Town, HONG KONG

Nasiman bin S'apan  
Makmal Kejibumi  
Universiti Kebangsaan  
Kuala Lumpur

Zainol bin Mohd. Eusof  
 Jabatan Geologi  
 Universiti Malaya  
 Kuala Lumpur

Abdul Rashid b. Abdul Mohd.  
 Jabatan Kajibumi  
 Universiti Kebangsaan  
 Kuala Lumpur

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 Department of Geology  
 Universiti of Malaya  
 Kuala Lumpur

Lim Tee Peng  
 295/297 Jalan Pokok Assam  
 Taiping, Perak.

The resignation of Mr E.H. Olofin, c/o Cpl. J. Ajayi, 18 Ohorunmbe Street, Akure, WIS, Nigeria, a student member, was noted.

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#### NEWS FROM MALAYSIAN UNIVERSITIES

##### Universiti Kebangsaan Malaysia

Geology graduates: The first batch of four students of the Universiti Kebangsaan Malaysia earned pass degrees in science (geology) and will continue to read geology in their fourth year of study.

Sains Malaysiana: Under this name the Universiti Kebangsaan Malaysian publishes a multi-disciplinary journal of natural sciences and mathematics. The first issue (August 1972) has been on sale (M\$5/=) and a limited number can still be obtained from the Business Manager, Sains Malaysiana, P.O. Box 1124, Kuala Lumpur. It may be of interest to know that a fair number (7 out of 11) of articles are on geology. The second issue is in the press (3 papers on geology) and is expected to be on sale in July.

Papers are invited (in Bahasa Malaysia or English) and should be sent to the Chief Editor, Sains Malaysiana, c/o Jabatan Kajibumi, Universiti Kebangsaan Malaysia. Notes on format and editorial policy are available upon request.

H.D. Tjia

## Universiti Sains Malaysia - Development in Geophysics

At present, we have three staff members in the Geophysics group in the School of Physics and Mathematics, Universiti Sains Malaysia:

G.L. Vandervort - Senior Lecturer (Astronomy, Theoretical Geophysics). B.S. (Chemistry, Univ. Wisconsin); M.S. (Physics, Univ. Wisconsin); Ph.D. (Astronomy, Univ. Virginia).

M.J. Valencia - Lecturer (Geological Oceanography). B.Sc. (Geology, Univ. Mass.); M.A. (Geology, Univ. Texas); Ph.D. (Oceanography, Univ. Hawaii).

C.L. Samz - Lecturer (Exploration Geophysics). B.Sc. (Electrical Engineering, Univ. Wisconsin); 30 years' experience in petroleum exploration geophysics in Southeast Asia.

In addition, Leong Lap Sau, B.S. (Geology, Univ. Malaya); M.Sc. (Geophysics, Univ. Malaya), is currently studying for his Ph.D. in Seismology at Uppsala University, Sweden, on an Academic Staff Training Scheme (A.S.T.S.) Fellowship.

A physical oceanographer, Professor Gordon W. Groves of the University of Hawaii (A.B. (Mathematics, Physics, Univ. Calif.); M.S., Ph.D. (Oceanography, Univ. Calif. Scripps Institution of Oceanography)) will be joining the staff in January.

We still have three staff vacancies in the Geophysics Section.

We have introduced a curriculum in Geophysics and have at present, two students pursuing the entire option and four others participating in various segments of the Geophysics core. We have also initiated studies of the Pleistocene geomorphology and recent sediment structure on the West Malaysian western continental shelf, utilizing a shallow penetration seismic profiler, graciously loaned to us by the Department of Geology, University of Malaya.

Research projects awaiting arrival of pertinent data include:

1. Sediment history and processes in the Penang Straits
- and
2. Classification and delineation of coastal types and processes of the Malay Peninsula utilizing satellite and airplane photographs.

Recently, Dr F. Gray, Senior Geophysicist with the Committee for Coordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas (CCOP) of ECAFE, Bangkok, visited the School of Physics and Mathematics, Universiti Sains Malaysia, to advise on equipment purchases and to discuss possible marine geophysical research projects in South-east Asian waters.

### *Geophysics Option for Undergraduate Course*

Recent intensification of offshore exploration for petroleum and tin in Malaysian waters and a focus on diversification of the national economic base underscores a need for qualified Malaysian geophysicists to assume responsibility for the discovery and development of terrestrial and submarine national mineral resources.

The Geophysics option utilizes an integrated approach to the physics of the earth providing the necessary geodetic, seismic, magnetic, geologic and oceanographic background and emphasising the theory and application of geophysical techniques commonly used in terrestrial and marine mineral exploration.

<u>Year</u>	<u>Course</u>	<u>Hours</u>
II	Planetary Science	26
	Geology	26
III	Theoretical Geophysics	52
	Exploration Geophysics	52
	Oceanography	39
	Seminar in Geophysics	26

Third Year optional courses (78 hours needed; each course is 26 hours):

Man and the sea  
Volcanology  
Tectonophysics  
Aeronomy  
Geochemistry

M.J. Valencia

## INTERNATIONAL SEDIMENTOLOGICAL CONGRESS: FRANCE 1975

The Ninth International Sedimentological Congress will be held in Nice, France, from 6 to 13 July 1975, at the invitation of Prof. J.Ph. Mangin of the University of Nice. The general theme of the Congress is to be the comparison of fossil and recent sedimentary environments. In addition, it is planned to organize papers into sessions on the following topics:

1. Sedimentological factors in the reconstruction of paleoclimates and paleolatitudes in connection with global tectonics
2. Geochemical aspects of continental sedimentation
3. Progress in sedimentological techniques and methods (especially mathematical and experimental)
4. Tectonics and sedimentation
5. Sedimentological synthesis of basins
6. Sedimentary mechanics; rates of processes
7. Progress in understanding of diagenesis
8. Deep sea sediments
9. Sedimentology and economic geology

An open session will cater for papers outside these topics.

A number of field trips, of approximately 6-day duration, both before and after the sessions, are planned to range over portions of France, Italy, Spain, and North Africa. Nor will the position of Nice as a port on the Riviera be ignored: it is hoped to assemble oceanographic vessels of various nations for participants to visit, and some formal and informal excursions into the gastronomic and evening life of Nice are expected.

Further information about the Congress and preliminary registration forms can be obtained from:-

Prof. J.Ph. Mangin  
 SEDIM-NICE 75  
 48, Avenue Jean-Lorrain  
 06300 Nice  
 FRANCE

or from the I.A.S. national representatives listed below.



This coming Congress in Nice is sponsored, as were its several predecessors, by the International Association of Sedimentologists, founded over a decade ago to serve the needs of the world's sedimentologists. The international character of the I.A.S. is shown by its current officials:

President: Mme. Y. Gubler (FRANCE)  
 Vice-President: Dr G.M. Friedman (USA)  
 General Secretary: Dr H.G. Reading (BRITAIN)  
 Treasurer: Dr J.W.A. Bodenhausen (NETHERLANDS)  
 Editor-in-Chief: Dr K.J. Hsu (SWITZERLAND)

(Dr Hsu will be familiar to geologists at the University of Malaya, where he is currently the External Examiner in Geology).

In addition to sponsoring the Sedimentological Congress every four years, the I.A.S. organizes symposia in the intervals, and produces the journal Sedimentology, published through Blackwells in England four times a year. Membership in the Association (which includes the journal) is 40 Dutch florins per year (about M\$35), but there is a special rate of 24 Dfl. per year for members under 26 years of age.

Membership application forms and further information about the I.A.S. can be obtained from the General Secretary or from the national representatives. For the region of South and East Asia these are the following:-

Dr P.H. Stauffer  
 Department of Geology  
 University of Malaya  
 Kuala Lumpur  
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 Nat. Inst. of Geology and Mining  
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(PHS)

CIRCUM-PACIFIC ENERGY & MINERAL RESOURCES CONFERENCE  
Honolulu, Hawaii, August 26-30, 1974

The Conference will be sponsored jointly by the American Association of Petroleum Geologists (AAPG), the Committee for Coordination of Joint Prospecting for Mineral Resources in Asian Offshore Areas (CCOP), a United Nations funded organization, Bangkok, Thailand, and the Pacific Science Association (PSA).

Invitations to actively participate in the Conference program will be extended to all Circum-Pacific countries and their appropriate agencies and associations.

Outline of Technical Program

Conference Objectives:

1. To focus attention on present and future availability of energy and mineral resources in land and offshore areas bordering the Pacific Ocean.
2. To consider where and how exploration efforts may be most effectively directed.
3. To enlist the experience, skill and special know-how possessed by specialists in the Circum-Pacific region.
4. To encourage the free exchange of pertinent ideas and information among Circum-Pacific countries toward solving common problems of energy and mineral resources.

Ultimate Goal:

To advance the exploration and development of the total energy and mineral resources of the Circum-Pacific area and to insure their compatibility with the environment.

Scope of the Technical Program:

Countries bordering on the Pacific Ocean are being invited to report on:

1. The success of exploration and development programs aimed at filling their present and future energy and mineral needs.
2. The status and effectiveness of current programs designed to increase production and reserves of energy and mineral resources.

### Technical Program Content:

A presentation of the geologic setting of the Circum-Pacific region and the relation of economic concentrations of energy and mineral resources to this setting will introduce the technical program.

The substance of the Conference program will be individually prepared discussions of energy and mineral resources, presented by geographic regions or by selected topics. These topics will include, as energy resources:

Oil and gas  
 Oil shale, tar sands, and coal  
 Geothermal and solar energy  
 Nuclear energy

and as mineral resources:

Metallic minerals (ferrous, and non-ferrous)  
 Non-metallic minerals  
 Ground-water

Where applicable, papers on these topics contributed for Conference presentation should include a discussion of the following:

- (1) Geologic occurrence
- (2) Geological and geophysical exploration
- (3) Production, economics, and future outlook (economic, environmental, legal and political problems)

### Criteria for Selection of Conference Papers:

Wide differences in the format of papers at this first Circum-Pacific Energy and Mineral Resources Conference are welcomed. The basic criterion in the selection of papers is whether or not a significant contribution is made to the achievement of Conference objectives. Both documentary and theoretical papers are acceptable.

A 5-day program is envisioned.

A presentation time of 25 minutes is suggested for papers. A 300-word abstract must be provided to the Technical Program Editor by February 1, 1974, in order that the abstracts can be edited and published in the July 1974 issue of the Bulletin of The American Association of Petroleum Geologists. The complete paper should not be over 4,000 words in length and the manuscript must be in final form, including illustrations, at the time of presentation. All manuscripts submitted are subject to review by the Editorial Board prior to acceptance. Papers from this Conference will be published as an AAPG Memoir.

All slides must be 35 mm. (2x2 in.) size, and must be submitted for review to the Slide Editor by March 1, 1974. Speakers will be supplied with a copy of the AAPG Slide Manual upon acceptance of the Conference invitation to present a paper.

Twin projectors and screens will be provided.

Unfortunately, there are no funds presently available for speakers' travel expenses or for expenses in connection with paper and slide preparation. If you are interested in presenting a paper, please contact one of the following members of the Technical Program Committee:

Harold M. Lian, Chairman  
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The Circum-Pacific Map Project with the objective of bringing together in a integrated series of maps the latest information on geological features, mineral, geothermal and hydrocarbon resources of the Pacific region will be carried out in connection with the Conference.

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#### OFFER OF EXCHANGE OF SPECIMENS WITH FELLOW COLLECTORS

Dieter Gebauer of Weissenhorner Str. 38 D-7911 Illerberg, Illerkreis, W. Germany, a collector of minerals and fossils would like to exchange specimens with fellow collectors in Malaysia. He has the rare rock suevite, an impact rock from Bavaria and could offer this in exchange for defectless crystal specimen or fossil.

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