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

Tembeling or Tekai Group

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In a recent note on the stratigraphic position of the Tembeling Formation with respect to the Gagau Group, Yin and Aw (1976) suggested in their final paragraph that the Tembeling Formation be renamed. They suggested the name "Tekai Group".

To upgrade the formation name to a group name seems to me a logical conclusion to the progress in our knowledge of the geology of Malaysia and the refinement in the recognition of the different stratigraphic units. When I proposed the name Tembeling Formation in 1968 I was tempted even then, to define it as a group, because of the large thickness (over 3000 meters) and the presence of distinct horizons clearly present as rock-stratigraphic mappable units. In the type section (Koopmans, 1968, fig. 3) at least 5 distinctive arenaceous/rudaceous horizons were found interstratified with the same number of red-brown argillaceous shale-mudstone sequences. The units, representing thicknesses of several hundreds of meters, were clearly laid down under different depositional conditions and to define them as separate formations would have been entirely justified. Many other these units could be traced on aerial photographs over large distances (Koopmans, 1966). However, at that time I felt that there was a lack of detailed knowledge about the sedimentary relationships, and geographical extension and correlation of the units. This necessitated placing a limitation on the introduction of too many new names which perhaps in future would have to be renamed and redefined, adding to the confusion in the stratigraphic nomenclature of West Malaysia. The work was based on only a few sections: along the Sungei Kenyam Kechil (Perlis syncline), along the Tembeling River (Pagi syncline), along the Tekai River (Tekai and Berentai syncline) and the Jempol River (Berentai syncline). Now, apparently with mapping of the area well underway, 23 units can be recognised (Yin and Aw, 1976).

I should like to encourage the writers of the note on formulating a number of new formations (23 seems to me excessive, but members can also be defined) and on upgrading the Tembeling Formation to the Tembeling Group. Definitions and descriptions should be according to the Malaysian Code of Stratigraphic Nomenclature.

However, I disagree strongly with their suggestion to replace the name Tembeling Group by Tekai Group, although the type section of the Tembeling Formation is situated from the confluence of the Tembeling and Tekai Rivers, but along the Tekai River. The formation (c.q. group) was named Tembeling Formation principally on historical grounds. In 1907, Scrivenor recognised a sequence of typical estuarine rocks in the Tahan range, which he named the Tembeling Series. Later he referred to this sequence as "Gondwana Rocks" (Scrivenor, 1911). For a correct stratigraphic nomenclature Tembeling is preferable to Gondwana. Most of the sequence is outcropping in the drainage basin of the Tembeling River (including the Tekai tributary) so that the name Tembeling as formation or group seems well justified and should not be altered.

Another question concerns the Murau conglomerate. This conglomerate sequence has been described as the lower member of the Tembeling Formation, although the type section has been taken from Tanjong Murau, south-southeast of Mersing in Johore. The rock sequence at Tanjong Murau, although lithologically very similar to the basal conglomerate of the Tembeling Formation along the Maran-Kuantan road (near Maran and near Sg. Berkelah) cannot be traced as a mappable rock-lithologic unit from the type locality to the Tembeling Formation s.s. in Pahang. Therefore it is better, when upgrading the Tembeling Formation to Tembeling Group, to keep the name Murau conglomerate as the formation name restricted to the polymict fluvial conglomerates of Tanjong Murau and adjacent outcrops in Johore, and to create a new formation name for the basal member of the Tembeling group in Pahang.

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Tembeling or Tekai Group - A Reply

E H Yin & P C. Aw, Geological Survey of Malaysia, Ipoh, Perak.

We would like to thank Dr Koopmans for his constructive criticism of the abstract of our paper and would like to take the opportunity to reply to the points he raised.

During the Discussion Meeting held in Ipoh on December 10, 1976, we stated that mapping in the Sungei Tekai area by Khoo Han Peng showed that at least three mappable units could be established. Therefore, we wish to state that the supposedly 23 units as quoted by Koopmans is a typographical error in the abstract circulated.

We are amenable to the suggestion that the word 'Tembeling' be retained when upgrading the Formation to group status. The reason why we first suggested Tekai in preference to Tembeling was because we felt its redefinition entailed more than just the raising of its status. In view of the counter-suggestion by participants at the Discussion Meeting and by Dr. Koopmans, we would go along with the suggestion in retaining the word 'Tembeling'. We are confident that Mr. Khoo Han Peng would give due consideration to the suggestion when he formally describes the units.

To date Khoo has been able to delineate three mappable lithologic units.

The lowest unit estimated to be about 1000 meters thick, informally named the Lanis conglomerate, comprises predominantly reddish coloured pebble to granule sized lithic conglomerates interbedded with conglomeratic lithic sandstones, reddish shales and mudstones.

The middle unit, estimated to be about 2000 meters thick, informally named the Mangkok sandstone comprises predominantly ortho- and protoquartzites with interbeds of greyish siltstones, mudstones and shales. The sandstone commonly exhibit cross-bedding.

The topmost unit, comprises predominantly ferruginous reddish silty shales and mudstones with minor interbeds of sandstones. This unit, informally named the Iermus shale is estimated to be at least 1,300 meters thick with the top eroded.

Plant fossils found in the Mangking sandstone, identified by Kon'no and experts from the British Museum, contained Gleichenoides gagauensis and was dated by them as Upper Jurassic-Lower Cretaceous.

Therefore the Mangking sandstone is contemporaneous with the Lotong Sandstone of the Gagau Group.

Freshwater bivalves found in the Termus shale and identified by the British Museum as species of Unionacea are Lower Cretaceous in age.

With regard to the Murau Conglomerate, we proposed to upgrade it to a formational status, but keeping it distinct from the Tembeling Group. In other words, we do not consider the Murau Conglomerate to be equivalent to the basal unit of the Tembeling Group. The stratigraphic position of the Murau Conglomerate is enigmatic. As Koopmans has rightly stated it cannot be traced as a mappable lithologic unit from the type locality to the Tembeling Formation s.s. in Pahang. It seems to have greater affinity with the Linggiu Formation than the Tembeling Formation, being indistinguishable from some of the conglomerates of the Linggiu Formation (Rajah, oral comm.). The north Cathaysian Gigantopteris-Lobatannloria flora assemblage present in the Linggiu Formation indicates a Late Permian age for the rock unit (Kon'no, et. al., 1970). The Linggiu Formation is associated with the Sedili volcanics which consists of acid to intermediate pyroclastics, lavas and ignimbrites. As the Murau Conglomerate is believed to be of continental origin, it might have been deposited contemporaneously with the Linggiu Formation and the Sedili Volcanics.

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Note from previous Editor

The confusion whether 3 or 23 units have been mapped in the Sungai Tekai area is much regretted. In the abstract of the paper by Yin & Aw (1976), the number 2 has been erased in the stencil. Unfortunately, a 'ghost' of the number 2 can be seen faintly in some copies, particularly those printed towards the end.

G E O L O G Y O N S T A M P S

2. More Extinct Animals, Fossils and Minerals

N.S. Haile, Jabatan Geologi, Universiti Malaya, Kuala Lumpur.

The set of extinct animals on the Polish set (1965) illustrated in the last issue, and composed entirely of reptiles, was followed up in 1966 by another Polish set (Fig. 1). This shows fish, amphibia, a bird, and ~~mammals~~ but no reptiles.

The age when the animal lived is indicated on the stamps in millions of years before present, in decreasing age with the higher denominations. The oldest shown on the 20 groszy stamp, is the giant late Devonian fish, Dinichthys (380 Ma = 380 million years ago), which was 9 m long, and which has been found fossil in black shales of the Cleveland region of Ohio. It is classified into the arthrodire order (jointed-necked fishes) of the Placoderms. The peculiar tusk or beak-like feature which served instead of teeth can be seen on the stamp. Sad to say, the arthrodires became extinct before the beginning of the Carboniferous, and not being on the main evolutionary line, left no descendants.

Eusthenopteron (30 gr; 370 Ma ago) although also a late Devonian form, was a bony fish, a lobe-fin or rhipidistian of a more advanced type, one of whose relatives, a coelocanth, survived to the present day. The stamp shows the peculiar trifid tail possessed by some of the Devonian genera, and also seen in the coelocanths.

It is believed that the early amphibians such as Ichtyostega (40 gr; 355 Ma ago) evolved from the rhipidistians. Ichtyostega is a late Devonian or early Carboniferous form found in Greenland as fossil skulls up to 0.3 m long. It belongs to the Labyrinthodontia.

Mastonosaurus (50 gr; 200 Ma ago) is another labyrinthodont amphibian, abundant in the Triassic, and with a skull 1 m long. These forms became extinct before the end of the Triassic.

Cynognathus (60 gr; 220 Ma ago), from the Lower Triassic of South Africa, is a member of the therapsids or mammal-like reptiles, a lightly built carnivore about 1.5 m long. The skeleton have features resembling mammals, and it is possible that the therapsids were warm blooded, and may even have had hair or fur instead of scales.

The next stamp (2 zloty 50 groszy) shows a reconstruction of Archaeopteryx (140 Ma ago), the well-known "early bird". Its clawed

wings can be clearly seen, but not the well developed teeth. The fascinating story of the discovery of the first Archaeopteryx, the most sensational fossil ever found in the underground Timestone quarry at Solnhofen in Bavaria, is told by Adrian Desmond (The hot-blooded dinosaurs, Blond & Briggs, 1975):

"The following year, 1861, heralded the palaeontological discovery of the century, and the biggest boost that the emergent Darwinism could have hoped to have received. A headless although otherwise nearly complete skeleton of a hybrid bird-reptile was found 60 feet underground in the Ottmann quarry in Solnhofen, Bavaria; a bird because it possessed feathers yet still a reptile because of its clawed fingers and long bony tail. The sensation it caused among the workmen brought it to the attention of the district medical officer Dr. Karl Haberlein, who was not slow to realise the worth of such a creature. Acquiring the fossil from the quarryhands in lieu of medical payments, Dr. Haberlein put it up for sale. Any museum could buy it for their collection; any museum, that is, that could afford the unheard-of asking price of seven hundred pounds. The doctor invited prospective customers to glimpse the reptile-bird, provided no notes or drawings were made, and then to tender their bids. Eminent collectors came from far and wide to gaze upon the relic. Haberlein spent a year hedging in an attempt to raise the price, during which time such a mystique had developed around the relic that the Creationists began to accuse their opponents of manufacturing a 'missing link' to rescue their ailing theory. Andreas Wagner, Munich University's anti-Darwinist, working solely from hearsay and second-hand sketches (themselves the product of memory) did his best to rob Archaeopteryx of any characters that might make it appear a link and thus ammunition for the Darwinians. A bird with a long reptilian tail and clawed fingers would suit the Darwinian purpose well, so Wagner demoted it to a reptile which had acquired feathers independently of birds as 'peculiar adornments'".

Eventually the British Museum bought the specimen for the full price, a sizeable proportion of two years' budget. Thomas Huxley and other supporters of Charles Darwin, had a remarkable piece of evidence with which to refute the embarrassing question of the anti-evolutionists, as to where, if birds had evolved from reptiles, were the intermediate forms.

A second fossil Archaeopteryx was found in Solnhofen in 1877, and this one had a head, with toothed jaws. It was also grabbed by the Haberleins and offered for sale at the enormous price of £1800. The specimen was offered to Kaiser Wilhelm I, whose lack of interest incensed Karl Vogt, the Professor of Zoology at the University of Geneva, who wrote sarcastically 'His Majesty did not enter into these views. Ah! if instead of a bird, a petrified cannon or gun had been concerned!' Vogt used an unsuccessful campaign to raise money to buy the fossil as an opportunity to launch a fiery socialist attack on the Kaiser, German militarism, and imperialism. Eventually a German

industrialist bought the slab for £1000 and sold it to Berlin University. So Archaeopteryx not only is of the greatest scientific interest, but the story of its discovery provides an interesting sidelight on European history.

The thought crossed my mind that it would be a pleasant opportunity for Germany to issue this year a stamp commemorating the 100th anniversary of the discovery of the second Archaeopteryx. After writing the above account I in fact came across, in a local bookstore, amongst a "bumper packet" of 200 E-German stamps, a stamp showing a fossil Archaeopteryx, now in the Berlin Natural History Museum; this is shown in Fig. 2.

The Z1 3.40 stamp shows a giant titanotherium Brontotherium (30 Ma ago) a rhinoceros-like mammal which lived in North America in the Oligocene. It was 2.5 m high at the shoulders. Alas, the titanotheres became extinct by the end of the Oligocene.

A sabre-toothed cat, Machairodus (10 Ma ago) is depicted on the Z1 6.50 stamp, a genus both long ranged (Miocene to Pleistocene) and wide-ranging (Eurasia, Africa, North America).

The woolly mammoth (50 Ma ago) on the final stamp of the series is posed as if it were about to drop dead from boredom. The mammoth is one of the few big prehistoric animals which have been depicted by man (in cave paintings by palaeolithic hunters), and been found complete with flesh, hide, hair, and viscera, in several frozen specimens discovered in Siberia. The "quick frozen" mammoths have long been a subject of controversy, as to whether or not they were killed by a catastrophic change in climate.

The second set illustrated (Fig. 2) shows, besides the fossil Archaeopteryx already noted, a 10 pfennig stamp showing a rather miserable Permian conifer, Lebachia speciosa. These stamps are probably of 1977 since they are not in the catalogue; I do not know whether the set includes other geological stamps.

The Hungarian set shown in Fig. 3 (1969; marking the Centenary of the Hungarian Geological Institute) shows Hungarian fossils and minerals. Greenockite (CdS), calcite, and sphaelerite appear on the 60 filler stamp, quartz, native copper, and cuprite (Cu₂O) on the forint 1.20, 3, and 5 stamps respectively. The forint 4 stamp shows a reconstruction of an upper Triassic placodont, a turtle-like reptile, with a sharp beak, probably used for picking up mollusks. A fossil fern, a fossil herring, and a Jurassic ammonite are shown on the remaining stamps.



Fig. 1. Extinct Animals (Poland, 1966)

20 gr Dinichthys; 30 gr Eusthenopteron;
 40 gr Ichthyostega; 50 gr Mastodonsaurus;
 60 gr Cynognathus; ZŁ 2.50 gr Archaeopteryx;
 ZŁ 3.40 Brontotherium;
 ZŁ 6.50 Machairodus; ZŁ 7.10 Mammuthus

(Photograph by Jaafar bin Abdullah)



Fig. 2. Berlin Natural History Museum
(German Democratic Republic, ?1977)

10 pf *Lebachia speciosa*; 35 pf *Archaeopteryx lithographica*.

(Photograph by Jaafar bin Abdullah)



Fig. 3. Hungarian Fossils and Minerals (1969)

40 f Zelkovia ungeri (fossil fern);
 60 f Greenockite, calcite, sphaelerite;
 Ft 1 Clupea hungarica (fossil herring);
 Ft 2 Reineckia crassicositata (ammonite);
 Ft 3 Native copper; Ft 4 Placochelys placodonta;
 Ft 5 Cuprite

(Photograph by Jaafar bin Abdullah)

MEETING OF THE SOCIETY

E.F. Stumpfl: Sediments, ores and metamorphism and
Tin Mineralization in Cornwall

Prof. Stumpfl, from Mining University, Leoben, Austria, was recently in Malaysia as External Examiner of Applied Geology, of the University of Malaya. In cooperation with the Department of Geology, he gave two talks to Society members.

In the first talk, "Sediments, ores and metamorphism", he presented examples of base metal stratabound deposits. He reviewed the nature of the modern base metal accumulations in the Red Sea muds and brines and further he pointed out that sulphide precipitation is observed in sediments near active volcanoes. The speaker related the nature of the stratabound base metal deposits to the present day accumulations.

In the second talk, "Tin mineralization in Cornwall", the speaker showed a number of slides on the geology of Cornwall. He is in full agreement with other workers regarding the tin mineralization of Cornwall.

There is a revival of tin mining in Cornwall recently. Though no new mines were found, it was observed that reopening and reworking of the old mines are being carried out. The speaker suggested that as the easily exploited deposits in Malaysia become scarce, old workings should be looked at.

Seminar Kebangsaan Perindustrian Perlombongan
(National Seminar on the Mining Industry)

The Seminar which was sponsored by the Ministry of Primary Industries, the Publicity Management Committee of the Tin Industry (Research & Development) Board, the Institute of Mineral Engineering Malaysia, the Institution of Mining and Metallurgy (Malaysian Section) and the Geological Society of Malaysia, was held in Hotel Equatorial, Kuala Lumpur from 11 - 12 August 1977. About 300 participants mainly from the Government Departments and the mining industry attended the Seminar.

The Seminar was opened by Y.B. Encik Lew Sip Hon, Deputy Minister of Primary Industries. In his opening address the Hon. Deputy Minister expressed the hope that the Seminar would deal with the problems faced by the mining industries in a frank and open manner. His Ministry is concerned with the declining tin production in recent years and would like the Seminar to come up with proposals or suggestions as to how the problems faced by the industry would be resolved. The Deputy Minister pointed out that the idea for the Seminar originated from the Ministry of Primary Industries and thank the other organizations for joining with his Ministry in sponsoring the Seminar.

Altogether 16 papers were presented. The papers highlighted and examined various problems faced by the mining industry. The papers presented are as follows:

- Paper No. 1.1. A Review on the Development and Problems of the Mining Industry in Malaysia
(Authors: Dato Mohd. Salleh bin. Abdul Majid and Chue Hang Cheong)
- Paper No. 1.2. Safety in Gravel Pump Mines
(Author : Choong Tet Foong)
- Paper No. 1.3. Tailings Retention in Opencase Mining in Alluvial Mines: Mines Department Practice
(Author : Wan Abdul Halim bin Ismail)
- Paper No. 1.4. Procedure of Soil Mechanics Investigation at the Mines Research Institute
(Authors: Abdullah bin Mohd. Yusof and Mohd. Aljunid bin Abdul Ghani)
- Paper No. 1.5. Standardisation of Description of Alluvial Material: The Need for a more Precise Presentation of Engineering Reports of Evaluation Prospecting, Mining and Mineral Processing
(Authors: Dr. Hussin bin Hassan and Mohd. Zaki b. Taib)
- Paper No. 1.6. Primary Concentration of Tin Ores at Gravel Pump Mines
(Author : Dr. Abdullah Hasbi bin Hj. Hassan)
- Paper No. 1.7. The Present Tax Structure of the Tin Mining Industry Obstructs Underground Hard Rock Mining
(Author : W.H. Tinker)
- Paper No. 2.1. Land Matters
(Author : M. Joll)
- Paper No. 2.2. Prospecting and Related Matters
(Author: D.R.S. Walker)
- Paper No. 3.1. Some Problems in Estimating Malaysia's Tin Reserves
(Author : Dr. Jaafar bin Ahmad)
- Paper No. 3.2. Geochemical Exploration in Malaysia
(Author : F. Chand)

- Paper No. 3.3. Gold Mineralisation in Peninsular Malaysia
(Author : D. Santokh Singh)
- Paper No. 3.4. Industrial and Constructional Rocks and Minerals -
Resources, Utilization and Planning
(Author : P.C. Aw)
- Paper No. 4.1. Taxation and the Tin Mining Industry
(Authors: H.C. Lai, Ho Cheong Fook, Dato Leow Yan
Sip and Jaafar bin Chik)
- Paper No. 5.1. Minerals in the Eyes of Malaysian Legislation
(Author : Redzwan Sumun)
- Paper No. 6.1. A Tin Exchange in Malaysia
(Author : A. M. Murray)

Paper 1.1 is a keynote paper which traces the development of the mining industry and points out several problems facing the industry and suggests solutions to overcome these problems (land, taxation, production costs, legislation, etc). The paper was warmly congratulated by numerous participants who also asked questions on points raised in the paper.

Paper 1.2 outlines the legislations concerning mine safety and suggested that all those directly involved in mining should know their duties and cooperate to prevent mishaps in mining. Questions on the legislations were asked and a participant from the Attorney-General's Chambers answered them. To a question on lack of posters on mine safety in mines, the Chief Inspector of Mines said that Lat, the well-known cartoonist, has been approached to draw some posters.

Paper 1.3 gives the Mines Dept. practice with regard to tailings retention and the enactments and rules governing the practice. Interesting questions were asked regarding the height of bunds for retention of tailings. It was pointed out that mines with small land area face great problems regarding tailings retention as the permitted height of the bund (which is arbitrary chosen at 10 feet) is too low and the employment of engineers to supervise the construction of higher bunds would add to the production costs.

Paper 1.4 gives the present procedure and objectives of soil mechanics studies in the mining industry. A geotechnical laboratory was recently started at the Mines Research Institution and more detailed laboratory studies will be carried out when equipment arrives. Paper 1.5 points out the advantages of using a standard nomenclature of alluvial and tailings materials for technical reports. Paper 1.6 discusses the primary concentration of tin ores at gravel pump mines using and not using jigs.

Paper 1.7 endeavours to establish a case for a different taxation legislation for underground mines which have higher production costs than alluvial mining by dredging and opencast methods. The case was very well presented and was supported by several members of the audience.

Paper 2.1 according to the author "serves to identify the major problems specific to land matters which are currently confronting the tin industry and puts forward certain recommendations which it is felt, if implemented, would help to eradicate or alleviate such problems". Points raised by the authors were commented upon by an official from the Ministry of Lands and Dato Salleh. An official from the Perak State Government was present to explain the views and actions taken by the authorities.

Paper 2.2 reviews some of the problems relating to land matters and mining title. The existing machinery for the award of prospecting permits is not considered to be conducive to effective prospecting. Dato Leow Yan Sip pointed out that delay in the processing of an application sometimes resulted in numerous applications for prospecting permit being lodged over the same piece of land. To resolve the matter simply, he suggested that late applications should not be allowed. A participant from Utah Pacific pointed out that the Sarawak State Government has been very cooperative and helpful towards potential prospectors.

Paper 3.1 outlines the problems encountered in calculating the tin reserves of Malaysia. In the discussion that followed it was suggested that the mines should report on the ore reserves to the relevant government agencies so that a better estimate can be obtained.

Paper 3.2 describes the application of geochemical exploration methods in Malaysia. It gives examples of areas which have been found to be geochemically anomalous. The Mamut copper mine was given as a successful example of such exploration and the success was the spur to the application of geochemical prospecting in Peninsular Malaysia.

Paper 3.3 outlines the gold mining industry in the country and also the geology of the deposits. Among the more promising area for further studies are northwest Kelantan and Gunung Besar area of Perak. After the paper a participant gave an interesting account of gold mining in the Tapah area.

Paper 3.4 gives an account of industrial minerals production and occurrences in Peninsular Malaysia. It considers that industrial mineral resources are valuable and should be carefully considered when planning urban and industrial development so that there may be no wastage.

Paper 4.1 sets out the various forms of taxes payable and discusses the adverse effects of taxation on the tin mining industry. The authors suggest that a complete review of the taxation structure in relation to the tin mining industry is necessary in order to lift the industry from its present depressed condition. After the paper, several participants spoke on various aspects of the problem. There was no official representative available to give the Treasury's view of the taxation problem, which was most disappointing.

Paper 5.1 stresses the importance of giving clear definitions of word 'mineral' in legislations. The author pointed out that the word has not been defined in Malaysian legislations. A participant from the Attorney General's Chambers said that for the word to be defined an exhaustive definition is required.

Paper 6.1 states that the Government is investigating how tin could fit into a multi-commodity exchange. It outlines how the tin exchange works. A participant from a smelting company was skeptical that the scheme will help small mines.

A panel, chaired by Tan Sri Tengku Ngah, Secretary-General of the Ministry of Primary Industries, answered questions from the floor. The panel agreed to a suggestion that a committee be set up consisting of members from the industry and relevant Government Ministries to look into the problems aired during the Seminar and present the recommendations to the appropriate person or body. The panel also agreed that in future similar Seminars should be held regularly.

The Seminar was a successful and interesting one. Many participants were constructive; in particular Senator Ahmad Azizuddin, Dato Mohd. Salleh and Dato Leow Yan Sip. However, the Seminar would have been a greater success if the Treasury was represented as taxation was and still is a key issue. Credit should be given to the steering committee, for organizing the Seminar and in particular, Dato Mohd. Salleh, the Chairman and Encik Redzwan Sumun who did a yeoman service.

TTK .

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Change of Address

Robert E. Besley
 c/- Minerals Exploration Co.
 P.O. Box 54945
 Los Angeles, Ca. 90054, USA

Addresses of Members

The addresses of the members listed below are wanted:

Ray T. Johnson, formerly of Esso Singapore, P. O. Box 2824, S'pore 1
 Dr. J.A. Katili, formerly at Dept. of Geology, Bandung Institute of
 Technology, Bandung, Java, Indonesia.

O T H E R N E W S

Recent Global Developments in the Mineral Sector

According to a report of the United Nations Secretary-General prepared for the fifth session of the Committee on Natural Resources (9-20 May, 1977), recent developments in the mineral sector have shown again that demand for minerals is highly sensitive to changes in economic activity.

Although the world minerals market improved noticeably in 1976, the improvement was not sufficient to restore to the market the strength it had lost in 1975, one of the worst years in the industry's history. This can be traced directly to the performance of the world economy. The recovery of world economic activity has been slow to gather force and to spread. Furthermore, some of the large metal-using sectors, such as construction and shipbuilding, have been weak. Producers of some metals reacted to the first signs of the recovery by increasing production despite the large consumer and producer stocks at hand. While consumption did rise, in some cases significantly, it did not always match the increase in production.

Prices of most major minerals and metals averaged higher in 1976 than in 1975, with the notable exceptions of phosphate rock and zinc.

Consumption did rise in 1976 in nearly all cases, as did production. Although consumption figures for the full year are not available yet, preliminary estimates indicate that consumption of copper and aluminium in the market economies was up by more than 20 percent, consumption of zinc by 17 percent, and consumption of lead by 10 percent. The reasons for the mixed performance of minerals over the year were twofold. First, for a number of metals, total production in 1975 and 1976 exceeded total consumption in the same period, adding on to the already high stocks. While aluminium, lead and tin stocks declined significantly, copper and zinc stocks grew to twice the normal level; the year-end stocks of copper were close to 2 million tons, more than one third of this in the warehouses of commodity exchanges. Secondly,

some prices (copper, zinc and nickel, in particular) were raised but failed to hold; unfulfilled expectations contributed to the weakening of prices in the second half of 1976. The rate of capacity utilization improved, but remained below normal on a number of cases. In copper, for example, the global rate of capacity utilization was 85 percent. In zinc, Western European smelters operated at 60 - 70 percent capacity in the second half of 1976.

Low prices, high stock levels, increasing investment costs and financing problems during the past two years have contributed to frequent postponements of both new projects and expansions. This has taken the form of outright cancellation, suspension, or 'stretching' of investment programmes. The best example is probably the Tenke-Fungurume copper project in Zaire, which was suspended in early 1976.

At present, there are indications that exploration expenditures have declined, at least in constant money terms. If this trend continues for an extended period, problems of supply can emerge in the long-run. The importance of continued exploration bears not only on the future global mineral supply, but also on the future regional distribution of production.

(CGLO Newsletter, June 1977, abstracted from the Natural Resources and Energy Newsletter, April 1977)

Fuels: The Future Trends

The pattern of world energy consumption has changed radically in the last decades and will be forced to change yet more in the closing years of this century as the availability of some fossil fuels becomes restricted. In the ten years to 1975, the latest years for which comparable statistics are available, crude oil and natural gas came to the fore, supplanting coal and accounting for 70 percent of energy usage.

The rate of discovery of new oil reserves has not kept pace with the rate at which the world is using up its known reserves; for the past several years, world reserves have been falling. New reserves will be found, of course, but the likelihood of finds as prolific as those in the Middle East or even as large as the North Sea is increasingly remote. Besides being smaller, many of the areas left to explore are also less accessible both physically and with present levels of technology. This means that much new exploration will be more expensive than in the past. Although the current main producing areas, particularly the Middle East, which today hold 57 percent of world reserves, will still have spare capacity, this cannot continue indefinitely. The world's largest oil company, Exxon, has recently published a report, which suggests that sustained growth in oil pro-

duction worldwide can only be expected for another 15 - 20 years. This does not leave much time to discover and develop new energy supplies.

Non-conventional sources of energy, even those advanced, such as solar power for domestic water heating, are not expected to make an appreciable impact on energy supplies in the period. Others, such as oil from shale or tar sands or gas from coal, while technically feasible now in small-scale plants, will remain uneconomic until oil is at least double the price it is now or until a technological breakthrough cuts the cost of these unconventional sources of supply. Others, such as wave power, are unlikely to become important until after the turn of the century.

The scope of the problems, that could arise as oil supplies dwindle, has not yet filtered through from the scientific community to the businessman. Although Governments are now at least paying a little more than just lip service to the need for research and development into alternatives to oil and gas in some of their applications at least, the sense of urgency which would galvanise men and resources is only just emerging.

While alternative sources of energy cannot be expected to be commercially viable on a large scale until the 21st century, every country can make a concerted effort now to conserve energy sources being used today.

(CGLO Newsletter, June 1977, quoted from Barclays Commodity Reports, April, 1977)

Third Regional Conference on Southeast Asia

The Third Regional Conference on Geology and Mineral Resources of Southeast Asia (1978) is being organized to ensure continual advance in research and development programs on a regional scale. This conference follows those held in Kuala Lumpur (1972) and Jakarta (1975).

The objectives of the conferences are:

1. to promote regional cooperation in research and development programs in the field of geology,
2. to provide an opportunity for geologists and others to exchange ideas and experiences,
3. to discuss regional geological problems in order to achieve a better understanding of the geology of Southeast Asia, and
4. to exchange new methods and techniques of study in order to promote practical advancement.

The conference will be held in Bangkok, Thailand from November 14 - 17, 1978.

Original papers are invited on the topics listed below:
 Regional Geology - Structural Geology and Tectonics - stratigraphy & Sedimentology - Igneous & Metamorphic Petrology - Paleontology & Biostratigraphy - Marine Geology - Mineral Deposits - Fossil Fuels - Geochronology - Hydrogeology - Geochemistry - Quaternary Geology - Engineering Geology & Geotechnics.

Authors are requested to return the attached form as soon as possible. Two copies of abstracts, in English, of not more than 600 word equivalents should be submitted before January 1, 1978 to:

Conference Secretary, III GEOSEA
 Division of Geotechnical & Transportation Engineering
 Asian Institute of Technology, P.O. Box 2754
 Bangkok, Thailand.

Final manuscripts of not more than 6000 word equivalents must reach the Conference Secretary not later than July 15, 1978.

A 5 day pre-conference short course on Computer Applications in Geosciences is being organized. The course is designed to provide geologists who have not had any prior training in computer technology with an outlook into its utilization and applicability and to enable them to understand the computer language and make use of the existing programs in their work.

14th Congress of the Pacific Science Association

The 14th Congress of the Pacific Science Association is to be held in the USSR in 1979. Academician B.G. Gafurov, Chairman of the Soviet National Pacific Committee, Academy of Sciences of the USSR, Moscow has called for suggestion from members on the structure and content of the scientific program of the Congress.

The Geological Society of Malaysia is a member organisation of this Association.

International Geodynamics Conference - "Western Pacific and Magma Genesis"

The Inter-Union Commission on Geodynamics will be organising an international conference in Tokyo from March 13 - 17 1978 on the themes

of geodynamics in the Western Pacific - Indonesian Region and the physics and chemistry of magma genesis. Papers dealing with plate tectonics of the Western Pacific - Indonesian continental margins, island arcs and basins and on geochemistry of magma generation particularly in relation to plate movement are welcomed.

For further information please write to:

Prof. K. Kobayashi
Secretary-General
Local Organising Committee
International Geodynamics Conference
Ocean Research Institute,
University of Tokyo
1-15-1 Minami - dai
Nakano-ku, Tokyo 164, JAPAN.

AAPG - SEPM National Convention

The American Association of Petroleum Geologists (AAPG) and the Society of Economic Paleontologists and Mineralogists (SEPM) are sponsoring a Convention at Oklahoma City, Oklahoma on April 9 - 12, 1978 and papers are being solicited.

"Generate in '78'" has been chosen as the theme for the Convention. The theme will be broadly construed to include new ways of generating the recovery of the energy reserves so desperately needed by our industry and the nation. Special sessions are being planned for the following subjects: Computer Applications, Energy Minerals, Petroleum Geology, Mid Continent Geology, Foreign Geology, Geology of the Atlantic Coast Offshore and Geo Chemistry. Papers on other subjects of broad general interest to Association members also will be accepted.

Abstracts of papers, a double-spaced typed original and one copy not to exceed 250 words with the author's address at the bottom of the page, are to be submitted by October 1, 1977, to AAPG Program Chairman, THOMAS N. CAPUCILLE, 1500 City National Bank Tower, Oklahoma City, Oklahoma 73102.

Seventh International Geochemical Exploration Symposium

The Association of Exploration Geochemists will sponsor the seventh international geochemical exploration symposium, to be held in Golden, Colorado, USA from 16 - 20 April, 1978. In addition to

technical sessions, a number of geochemically orientated field trips are planned to various mining districts in the western United States. Intending authors of papers should submit synopses (in English) by 1 October, 1977. Further information may be obtained from M.A. Chaffee, Secretary, Organizing Committee, 7th International Geochemical Exploration Symposium, U.S. Geological Survey, 5946 McIntyre Street, Golden, Colorado 80401, USA.

Oceanology International 78 Conference

The Institution of Mining and Metallurgy in association with eleven other societies, will be participating in the Oceanology International 78 Conference and exhibition to be held in Brighton from 5 - 10 March, 1978, and will present a one-day session on "Offshore mineral exploitation". Papers will likely be on the following subjects:

Recent advances in geochemical exploration for undersea mineral deposits,
Underwater tracking and dynamic positioning in deep-sea mining applications,
Test requirements for exploitation and transportation of minerals at sea,
Mining the deep seabed-assessment of technical feasibility.

Tin Snippets

It has been reported that Malaysian and Bolivian state mining companies are attempting to form a joint venture company to explore Bolivian tin deposits.

As part of its plans to increase Indonesia's tin production to 27,000 tonne/year from its present level of 24,100 tonne/year, the state owned tin company PN Timah plans to buy a new dredge.

(Mining Magazine, May 1977)

Extract from a student's essay on 'Evolution of Man'

The overwhelming evidence that man has eaten man throughout his history might add to the list of the distinguishing features whereby

Hominids differ from anthropoids, i.e. cannibalism. It is tempting to see in the most ancient evidence for cannibalism evidence also for some sort of 'ritual', some sort of belief in the transference of 'virtue' from victim to eater.

R.M. Berndt of Sydney has pointed out that "cannibalism is a most nourishing and hygienic means of disposing of the dead". And only only of those who have died naturally, the old and helpless must be knocked off, and why waster good meat?

Letter to the Editor

Dear Sir

On who is a miner

Among some of the more publishable jokes in a University Rag Week magazine is this one.

Q. What would happen if you throw a piano down a mine shaft?

A. A flat miner (Hint: pronounce 'Eh' for 'A').

Well, the possibility of the piano falling on an English miner is very high but the possibility of that happening to a Malaysian miner is very slim. This is not because there are few mine shafts in Malaysia. The reason is what do we mean by the word 'miner'.

The popular meaning of the word 'miner' in Malaysia is elegantly and clearly given in a constructive paper on 'Safety in Gravel Pump Mines' presented by Choong Tet Foong, Acting Deputy Senior Inspector of Mines, North Zone, Malaysia at the National Seminar on the Mining Industry held in Kuala Lumpur from 11 - 12th August, 1977. In the paper it is stated that 'the miner, the engineer, the manager, the kepala, the shift kepala and the workers have each a definite role to play' and also that the miner should 'organize through his Mining Association safety training for manager, assistant manager, kepala, shift kepala and workers and safety campaigns.' Also in the paper he has inserted the words 'i.e. the miner' after the words.

'occupier' in Rule 6 (iii) of the Mining Rules 1934 and 'lessee' in Section 16 (vi) and (xiv) of the Mining Enactment (F.M.S. Capl 47).

In the Malaysian sense, it appears that the miner is the occupier, the lessee, the sole owner or major share-holder of the mine and is more probably the big towkay smoking an expensive cigar in the penthouse at the top of a hotel.

However, the popular meaning of the word 'miner' in Britain is a

person who works in a mine. This definition given in the Oxford English Dictionary is used by the British Prime Minister, The Times and Miss Lilywhite. The British miners have also an important role to play in their country. They have organized through their Unions (e.g. Miners' Federation of Great Britain) campaigns for better working conditions, shorter working hours and higher wages. In the British sense, it appears that the miner is the face ripper, the colliery electrician, the fork-lift truck or the Euclid lorry driver and is more probably the small coolie smoking a cheap cigarette in the pump-house at the bottom of a mine.

The British and Malaysian miners evidently do not do the same kind of job. A British mine-owner would be called a miner in Malaysia. A British miner or mineworker would be known simply as the worker, the workman, the coolie or the mining worker (e.g. as in National Mining Workers Union of Malaya) in this country. It will be interesting to know the reason for the deviation from the original meaning of the word 'miner'.

It is most fortunate that in the Mining Enactment and the Mining Rules 1934, the word 'miner' has appeared very rarely. One instance, which may be the only instance, where the word appears is in the marginal note of Section 134 of the Mining Enactment which reads :

"No title, licence or other authority issued under this Enactment shall exempt any person from liability in respect of any damage occasioned by such person to the property of the Government or of any person."

The marginal note reads "Miner's liability for damage".

If any person (underlined) in the Section means the miner and if miner means the mineworker and not the mine-owner, it is obvious that the section will be rather absurd. Again fortunately, in the interpretation of statutes marginal notes carry little weight, if any at all. Future mining legislations should avoid using the word 'miner' which is rather ambiguous and if used, should be clearly defined. Perhaps the problem over the word 'miner' will not arise if future legislations are in Bahasa Malaysia or will it?

Dr. T.T. Khoo
Jabatan Geologi
Universiti Malaya
Kuala Lumpur

Payments by Money Order/Postal Order

The Chartered Bank had informed the Society that it can no longer accept Money Order or Postal Order. Members are requested to pay their subscription or any payments by cheque, bank draft or cashier's order. Your cooperation is appreciated.

Hon. Treasurer

PublicationsCOSTED

Recent Costed proceedings available are:

1. Exploration Techniques for Ground Water, edited by Hari Narain, K.V. Raghava Rao, S. Balakrishnan, pp. 380, for sale at Rs. 35/- or US\$7/- The proceedings is a collection of 20 papers on experimental and theoretical aspects of ground water exploration.
2. Science and Technology for Integrated Rural Development edited by S. Radhakrishna, pp. 310, for sale at Rs. 35/- or US\$7/-.

For copies please write to:

The Scientific Secretary
 COSTED Secretariat
 Indian Institute of Science
 Bangalore 560 012, INDIA.

SEAPEX

The Southeast Asia Petroleum Exploration Society (SEAPEX) has recently published "SEAPEX Proceedings Volume III, 1976" and the "Geothermal Gradient Map of Southeast Asia, 1977".

Geothermal Gradient Map of Southeast Asia, 1977 edited by C.S. Kenyon and L.R. Beddoes, Jr. A joint publication of the Southeast Asia Petroleum Exploration Society (SEAPEX) and the Indonesian Petroleum Association (IPA). Text (50 p.) and map (scale 1:6,000,000). US\$10 (text & map) to non-members inclusive of surface postage. Add US\$5 for airmail delivery from Singapore. US\$5 for additional copy of map. Data from 393 wells drilled for oil and gas in Indonesia, Malaysia,

Thailand, Brunei and the Philippines have been compiled, tabulated and geothermal gradients calculated. The map uses color-coded gradient intervals of 0.5°F/100 feet to highlight the colder and warmer gradients. The regional subsurface temperature data may be of use to the petroleum exploration industry and those involved in solving the problems of geotectonics. It is perhaps the most comprehensive survey of temperature data yet published for an active island arc system. Order from SEAPEX, Tanglin P.O. Box 423, Singapore 10 or IPA, Jl. Menteng Raya 3, Jakarta.

SEAPEX Proceedings Vol. 3, 1976 edited by M.C. Cater and J. MacDonald. 134 p. US\$11 to non-members including surface postage. Add US\$9 for airmail delivery from Singapore. This book contains nine full texts of presentations made to meetings of the Southeast Asia Petroleum Exploration Society (Tanglin P.O. Box 423, Singapore 10) during the 1975 - 1976 fiscal year. The papers concern palaeo-environmental studies, petroleum geology of young regressive sequences, palaeomagnetic research in S.E. Asia, geothermal gradient map of Indonesia, dipmeter interpretation, petroleum geochemistry, terrestrial heat flow measurements and sedimentary basins of China and their petroleum potential.

Review: Geology of the Republic of Singapore

GEOLOGY OF THE REPUBLIC OF SINGAPORE. Published by the Public Works Department. December, 1976. Singapore \$60 from the Senior Executive Engineer, Structural Design and Investigation, Public Works Department, Kallang, Singapore 14.

This publication consists of an attractive folder containing a hard bound 30 x 21 cm text of 79 pages and 10 folded 82 x 60 cm sheets, eight of which constitute a complete coverage in colour of the geology of the country on a scale of 1:25,000. Sheet 9 is of colour printed cross-sections and sheet 10 is a black and white index map.

The nine coloured sheets each repeat the well designed geological legend and stratigraphical column, so that the maps are individually complete for field use. The map printing is of very high quality, and the printed data can be read easily even through the rather intense colours used for some formations.

My one criticism of the mapping is that the well known member names within the Jurong Formation - Bukit Resam and Pasir Panjang Members - have been completely abandoned in favour of new names. This will cause some confusion to readers of the 'Geology of the Malay Peninsula: West Malaysia and Singapore' (Eds. D.J. Gobbett and C.S. Hutchison; publ. 1973 by John Wiley, New York).

Of fundamental interest to geologists in this region is the nature of the contact between the Jurong Formation and the Bukit Timah Granite and its satellitic norite. The palaeontological age of the Jurong Formation and the radiometric age of the granite requires the sedimentary formations to lie on an eroded granite surface. However, disappointing to relate, the large amount of building foundation excavation has not yet exposed the contact and it is hoped that the P.W.D. of Singapore will succeed in exposing this fascinating contact in the near future.

The text is attractively laid out and includes several high quality colour photographs and a large number of adequate black and white photographs of outcrops and thin sections, as well as a number of line drawings. There is an excellent tabulation of the fossil species and their occurrences. The text makes an admirable modern successor to Mrs. Alexander's 1950 report compiled for the Public Works Department, and it gives a good summary of all significant geological mapping and geological research in the country. The newer data on the Old Alluvium is particularly welcome since it includes several bore hole logs.

The text is well written and reads as if it is of single authorship. This reviewer, however, is unhappy that the writer remains anonymous, for the written geology of a country cannot be impersonal and must reflect the writer's personal views.

Printing by the Singapore National Printers is of a very high standard and the complete folder is a very good value for Singapore \$60.

Calender

Under this column the Society will note coming events on meetings, courses and symposia of interest to members. Date in parentheses gives the issue of Newsletter containing more information pertaining to the event.

Geological Society of Malaysia

1977

- Oct : Geotechnical Seminar with field trip. J.K. Raj, c/o Dept. of Geology, University of Malaya, Kuala Lumpur, 22-11, (Mar-Apr 1977).
- Dec : Ipoh Discussion Meeting on some aspects of petroleum geology in Malaysia and the neighbouring region.

1978

Mar 24 - Apr 15 : Geology of Tin Deposits: An International Symposium and Training Course. Secretary, Organising Committee, Symposium/Training Course on Tin Deposits, c/o Dept. of Geology, University of Malaya, Kuala Lumpur 22-11, Malaysia, (Jan-Feb 1977).

Other Events1977

Aug 3 - 5 : Utilization of mineral resources in developing countries, conference followed by visits to mining operations, Lusaka, Zambia. Prof. A.G. Shakespeare, School of Mines, University of Zambia, P.O. Box 2379, Lusaka, Zambia.

Oct 30 - Nov 2 : Pecora III, Application of Satellite Data to Petroleum Mineral Exploration. Sherry Linville, AAPG Headquarters, P.O. Box 979, Tulsa, Okla. 74101, (May-June 1977).

1978

Mar 5 - 10 : Oceanology International 78 Conference and Exhibition, Brighton, England. Conference organisers, BPS Exhibitions Ltd., 4 Seaford Court, 220 - 222, Great Portland Street, London W1N 5HH, (Jul-Aug 1977).

April 16 - 20 : Seventh international geochemical exploration symposium to be sponsored by the Association of Exploration Geochemists in Golden, Colorado, USA, (Jul-Aug. 1977).

May 6 - 12 : Eleventh Commonwealth Mining and Metallurgical Congress in Hongkong. Secretary, The Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, England, (Mar-Apr 1977).

May 8 - 11 : Offshore Technology Conference, Houston, USA. 6200 N. Central Expressway, Dallas, Texas 75206, USA.

June 23 - 28 : International Symposium on World Oil and Gas Occurrence, sponsored by Canadian Society of Petroleum Geologists: Facts and Principles of World Oil and Gas Occurrence. Calgary, Alberta. Information: J. Bronwing, General Chairman, International Symposium '78, c/o 612 Loughheed Building, Calgary, Alberta T2P 1M7, Canada.

- Jul 2 - 4 : Fifth Southeast Asian Conference on Soil Engineering, Bangkok, Thailand. Dr. A.S. Balasubramaniam, Secretary, 5SEACSE, Asian Institute of Technology, P.O. Box 2754, Bangkok, Thailand, (May-Jun 1977).
- Jul 5 - 6 : International Symposium on Soft Clay, Bangkok, Thailand. Dr. R. Peter Brenner, Secretary ISSC, Asian Institute of Technology, P.O. Box 2754, Bangkok, Thailand, (May - Jun 1977).
- Jul 18 - 22 : 3rd Inter-Congress of the Pacific Science Association in Appropriate Technology, Bali, Indonesia. Miss Sjamsiah Achmad, Indonesian Institute of Sciences, Tenka Cik Ditiro 43, P.O. Box 250, Jakarta, Indonesia, (May-Jun 1977).
- Jul 30 - Aug 4 : Second Circum-Pacific Energy and Mineral Resources Conference, Honolulu, Hawaii, c/o AAPG, P.O. Box 979, Tulsa, Oklahoma 74101, USA, (May-Jun 1977).
- Nov 14 - 17 : Third Regional Conference on Geology and Mineral Resources of Southeast Asia, Bangkok, Thailand. Conference Secretary, IIIGEOSEA, Division of Geotechnical & Transportation Engineering, Asian Institute of Technology, P.O. Box 2754, Bangkok, Thailand, (Jun-Aug 1977).

1979

- 1979 : 14th Congress of the Pacific Science Association, USSR. B.G. Gafurov, Chairman of the Soviet National Pacific Committee, Academy of Sciences of the USSR, Moscow, (Jul-Aug 1977).

PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)

Tujuan Persatuan Geologi Malaysia adalah untuk memajukan sains bumi, terutamanya di Malaysia dan tempat-tempat berhapiran. Sesiapa yang ingin menjadi ahli Persatuan sila dapatkan borang-borang daripada Setiausaha Kehormat.

The aim of the Geological Society of Malaysia is to promote the advancement of geological sciences particularly in Malaysia and nearby areas. Anyone interested in becoming a member of the Society should obtain the necessary forms from the Hon. Secretary.

Some Bahasa Malaysia (Malay) geographical terms

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

