K E S A T U A N   K A J I B U M I   M A L A Y S I A

GEOLOGICAL SOCIETY OF MALAYSIA

N E W S L E T T E R

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GEOLOGICAL SOCIETY OF MALAYSIA

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GEOLOGIC NOTE

Preliminary notes on the Mesozoic flora from Maran, Pahang

C.J. Smiley
University of Malaya

Plant megafossils were collected recently from two localities near Maran, Pahang. The localities were discovered originally by Enche M. Ayob (1968) during his study of the Mesozoic sediments in that area. The Maran section correlates lithologically with the middle part of the Tembeling Formation as described by Koopmans (1968).

Plant megafossils in the Maran collections include the following 18 species :

Equisetites cf. burchardti	Zamites cf. megaphylla
Gleichenoides gagauensis	Zamites n.sp.
Gleichenoides pantiensis	Pelourdea megaphylla
Gleichenoides serratus	Frenelopsis malaiana
Gleichenoides cf. stenopinnula	Conites spinulosus
Gleichenoides n.sp.	Cupressinocladus acuminifolia
Otozamites n.sp.	Sphenolepis (?Sequoites) sp.
Otozamites gagauensis	Nageiopsis sp.
Ptilophyllum cf. pterophylloides	Carpolithes spp.

When the two Maran collections are combined as a composite flora, they represent a biostratigraphic zone almost identical to that of the composite flora from the Gunong Gagau area (Ko'no, 1967, 1968). The close floristic similarity suggests that the Gagau and Maran plant-bearing sections are not significantly different in age, and certainly not the full period difference as suggested on Koopmans' correlation chart (1968, p. 39). The plant-bearing beds at G. Gagau are about equivalent in age to the plant-bearing beds at Maran, and thus to the medial portion of the Tembeling section measured by Koopmans (his fig. 3, p. 28).

Local stratigraphic positions (superpositional relations) of the two Maran localities are demonstrated by the section measurements of Enche Ayob. Correlations within the belt of later Mesozoic sedimentation appear to have a high degree of probability because of the close corroboration between lithologic and biostratigraphic correlations. Placement in the world time scale, however, is less precise as this requires correlations outside the Malay region. An early Cretaceous age for the Gagau-Maran floral zone is indicated for the following reasons: (1) gleichenia ferns are not positively known in floras older than Cretaceous, and here the family is represented by five species; (2) the cupressoid conifer

Frenelopsis is a characteristic plant in lower Cretaceous floras from North America and Eurasia, and here it is one of the dominant plants in the flora; (3) the cycadophytes are mainly Jurassic-Cretaceous genera, but are most similar to Cretaceous species. This age assignment of Neocomian conforms also with a limited amount of palynological evidence suggesting a Jurassic age for the lower part of Koopmans' Tembeling section, and an early Cretaceous age for what appears to be lateral equivalents of the middle portion of this unit (the Panti beds in Johore). It would seem that the Tembeling and laterally-equivalent units were deposited commencing in later Jurassic time, with deposition continuing into the early Cretaceous.

References: Ayob, M., 1968. Stratigraphy and sedimentology of the Tembeling Formation in the Gunong Berantai area, Pahang. Unpubl. M.Sc. Thesis, Univ. of Malaya, 150 p.

Kon'no, E., 1967. Some younger Mesozoic plants from Malaya. Geol. & Paleont. Southeast Asia, 3, 135-164.

Kon'no, E., 1968. Addition to some younger Mesozoic plants from Malaya. Geol. & Paleont. Southeast Asia, 4, 139-155.

Koopmans, B.N., 1968. The Tembeling Formation - a lithostratigraphic description (West Malaysia). Geol. Soc. Malaysia Bull., 1, 23-43.

DEEP EARTH SAMPLING RESULTS

The deep sea drilling operations of the JOIDES project (Joint Oceanographic Institutions Deep Earth Sampling), coordinated by the Scripps Insitution of Oceanography in California, has already in its early stages produced exciting and highly significant results.

From reports in various magazines and journals, including Science, at least two drilling sites have yielded information with profound implications for geologic theory. The first of these was on top of one of the Sigsbee Knolls, small rounded hills that rise from the flat surface of the Sigsbee Abyssal Plain in the Gulf of Mexico. Here the drill penetrated a typical salt dome cap-rock, virtually proving that the knolls are salt domes. The implications of this are enormous, whether it is interpreted to mean that salt deposits can form in deep water (depth at the site now is 11,746 feet), or that the Gulf of Mexico is a former shallow area, now foundered into the depths.

A second site turned up Jurassic sediments, the oldest sedimentary rocks yet found in the deep ocean.

Further drilling is proceeding on a path that will provide a line of sites across the Atlantic Ocean and may well yield critical evidence on the hypothesis of "sea-floor spreading."

After the debacle of the "Mohole" Project, which died in a tangle of politics after a promising start, it is encouraging to see deep sea scientific drilling back on a successful track.

– PHS

GEOLOGICAL PAPERS 1966 – A REVIEW

Geological Papers 1966, edited by P. Collenette. Geological Survey Borneo Region, Malaysia, Bulletin 8. Government Printing Office, Kuching, 1967. 88 p. Price: M$ 10.

Reviewed by C.S. Hutchison

This bulletin marks the beginning of a new policy to publish papers on the geology of East Malaysia separately from the annual reports. It consists of 88 pages, and 26 unnumbered pages of photographic plates, and sells in hard covers for M$ 10. The format is similar to that of former bulletins and memoirs of the Geological Survey Borneo Region.

The bulletin includes a varied selection of ten papers on such topics as sedimentology, paleontology, structural geology, economic prospecting and hydrothermal mineralization, weathering, glaciation, and one paper which masquerades as petrology. The quality of the papers varies widely from very high (for example the first paper) to abysmal (the fourth paper). The publication is well printed and set out, but most of the photographic plates suffer from over-intense black and too high contrast. The editor may well be criticized for somewhat uncritical acceptance of poor material (the fourth paper), and paper 5 surely does not warrant 8 photographic plates to illustrate a brief note of marginal value (only 1½ text pages). Future bulletins in this series could well benefit from more severe and critical editing and the cost of the publication reduced by drastically cutting the number of photographic plates without in any way detracting from the value of the bulletin. Nevertheless the present bulletin is a valuable publication in that it contains several very useful papers which make significant contributions to the geological literature of East Malaysia.

Paper 1 by P.H. Stauffer describes primary structures in the Crocker Formation (Tertiary) and deduces turbidity currents and mass flow for the deposition mechanisms. Paleocurrent directions indicate northward deposition.

Paper 2 by B.N. Koopmans describes an east-west structural trend in the Crystalline Basement of the southern islands of Darvel Bay and a chaotic structure in the overlying Chert-Spilite Formation.

Paper 3 by Koopmans and Stauffer illustrates many large and small scale glacial features of Mount Kinabalu.

Paper 4 by A.C. Pimm attempts to compare the Triassic volcanic rocks of East and West Malaysia but fails abysmally. Such a study must be based firmly on petrography, but none is included in the paper. His distribution map of Triassic volcanic rocks in West Malaysia contains many errors by including several Paleozoic volcanic rocks and omitting several Triassic localities. The main conclusion of the paper is that the variation diagrams indicate that the volcanic rocks of the two areas belong to different petrographic provinces; but the author has not even attempted to prove that the rocks of any one area belong to one single petrographic province. This paper would have been improved by remaining unwritten.

Paper 5 by G.E. Wilford gives a brief description of a weathering curiosity and is over-illustrated by 8 plates.

Paper 6 by J.M. van Delden and J.P.Y.M. Lalanne de Haut shows convincingly that the variation in water movement due to the different monsoons has had little effect on the sediments and the foraminifera in the Baram Delta.

Paper 7 by H.J.C. Kirk gives a useful summary of hydrothermal mineralization in Sarawak and Sabah in relation to the various igneous cycles. The author gives several useful suggestions for future ore prospecting.

Papers 8, 9, and 10 summarize the results of investigations of copper prospects located by geochemical anomalies in the Karang area (D.E. Lewis), the Mamut area (H.J.C. Kirk) and the Bambangan valley (N.P.Y. Wong). All three areas are characterized by low grade ores characteristically of pyrite, chalcopyrite and quartz. The results of all three investigations are discouraging and further work is recommended only in the Mamut Prospect, in the Kinabalu National Park; the other two are considered of no economic importance.

EXTERNAL EXAMINER IN APPLIED GEOLOGY

Dr. W.R. Dearman has been appointed External Examiner in Applied Geology at the University of Malaya for a term of 3 years, beginning with the 1968/69 session. Dr. Dearman is at present Reader in Geology at the University of Newcastle. He has had long practical experience in engineering geology with British Railways, where his work involved slope stability problems, aggregates, and large-scale quarry development. His interests also include structural geology, geology of ore deposits, ore mineralogy, and geochemical prospecting. Dr. Dearman is expected to visit Malaysia in January 1970.

Dr. Dearman's experience in slope stability is likely to be of special interest in Malaysia, not least to Professor Haile, whose house is threatened by a recent land-slip at Lorong Jambatan in Kuala Lumpur.

– NSH

MEETINGS OF THE SOCIETY

Ordinary meeting on 29 November 1968: E.P. Hodgkin

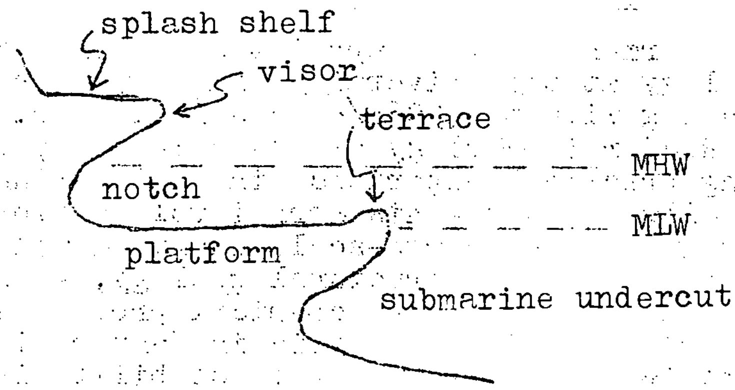
Dr. Hodgkin, who is Professor of Zoology at the University of West Australia, has recently spent six months in Malaysia studying coastal erosion by organic activity. His talk was entitled "Recent marine erosion of limestone on the coasts of Malaysia and West Australia". A synopsis follows.

Descriptions of the zonal arrangement of the fauna and flora on rocky sea shores are usually confined to shores with a sloped profile.

However, limestone shores often have a stepped profile. This profile is best developed in the tropics and subtropics and may occur in modified forms in higher latitudes. These features are characteristic of limestone shores and only occur in very modified forms with other rock types.

These features are well illustrated by the Pleistocene coastal limestone, or dune rock, and coral rock of Western Australia. The dune rock, a calcareous sand, is very soft above the level of splash and often capable of being wind eroded. As one approaches sea level the soft porous rock becomes very hard and not porous. Bedding planes can be seen to pass through this transition at all angles and hence this effect is not due to a changing lithology but to a process associated with the sea water.

The wide platform (see diagram, next page), up to 100 meters wide, rarely has any sand or rocks on it, although plants and animals exist and hence there is no material to act as an abrasive to cut back the coast.



The sea has probably only been at its present level for about the order of 5,000 years and therefore the formation of the platform has to be completed in this time.

Kuenen put forward the idea of the sea cutting like a saw into the rock and acting through chemical processes in the intertidal range. Verstappen measured notches in coral limestone blocks thrown up by the Krakatoa tidal waves on Celebes and estimated a rate of erosion of ½ cm per year, or 25 meters in 5,000 years. In Australia a rate of erosion of dune rock of 1 mm per year was measured in the notch, where one would expect the rate of erosion to be greatest. Hence either the measurements and calculations are wrong, or other processes are involved.

Hodgkin's observations suggested that a number of different processes are at work. These depended upon water temperature, and hence variations with latitude would be expected, as noted by Guilcher, and the level on the shore.

Where there is soft porous rock induration occurs when the rock comes in contact with sea water. The soft rock may become massively hardened or coated with a hard skin up to several inches thick. The point of the visor is very hard, but the back of the splash shelf which is less exposed to sea water is softer. The notch and submarine undercut are possibly formed by corrosive processes of a biologic origin.

The platform on the dune rock shores is clearly of erosional origin. One possible origin for the wide platform depends on the formation and break-away of the visor. A notch and visor are formed, with the hardened surface discussed above and erosion proceeds at the rate noted above. Eventually in a violent storm the visor is broken away, leaving the soft uncemented rock exposed to erosion. The sea then cuts back quickly until a stage is reached when most of the erosional power of the sea is dissipated on the platform and the exposed rock has time to become indurated and once again resistant to erosion and a notch is again developed. On this hypothesis the platform is formed in a series of rapid cut-backs and more static periods. Ramps in the dune rock, sometimes with a cliff behind, probably represent shores where a breakthrough has recently occurred.

Another possibility is that in early post-glacial times sea level was one to two meters higher than at present and a platform was roughly shaped before sea level reached its present mark. Downward erosion of about 2 meters to the present level would only require 2000 years (at 1 mm per year).

Where there is a cliff in hard limestone, the profile should show a notch but little or no platform. This is the case at Pulau Langkawi.

The surface of the notch, whether in hard or soft rock, is covered with algae which penetrate the limestone to a depth of several millimeters. The algae are browsed by mollusks and are being eaten as fast as they grow. Molluscan fecal pellets contain rock particles, consumed along with the algae. There is therefore a continual removal of the rock surface, estimated at about 1 mm per year.

At Langkawi the rock is covered with barnacles up to MHWS and under these the rock is honeycombed by the sponge Cliona and bevalve mollusks.

The notch height above the platform depends on tidal range and wave action. In sheltered places it has the height of the spring tide range; where there is constant wave action it may be considerably greater.

In summary, the following features of stepped limestone shores can be noted. The intertidal limestone is always hard. The notch is caused by biologic corrosion, the submarine undercut probably by boring animals, and the platform is residual. These features are only possible in very modified forms in non-calcareous shores. Marine notches and holes made by boring organisms are good markers of former sea levels.

Color slides from Western Australia and Langkawi and some limestone samples illustrated the talk.

The discussion revolved around the biologic erosion on the notch and on the formation of the platform. It was remarked that the shape of the notches in different types of limestone were remarkably similar. Differences in algal flora possibly account for differential erosion rates in the notch. Deep notches are best developed in areas of comparitively quiet water probably because in rough water the visor is more readily removed.

N.S. Haile proposed a vote of thanks and the meeting ended at 6:20 p.m. About 40 persons attended.

– JDB

Ordinary meeting on 20 December 1968: G. Jacobson

A meeting of the Society was held at 5:00 p.m. on the 20th of December in the Lecture Room of the Geology Department, University of Malaya. The Secretary, Mr. W.K. Lee, introduced the speaker, Mr. Gerry Jacobson, an Australian geologist who has been working for the past year with the Geological Survey in East Malaysia under the AVA program. Mr. Jacobson's topic was "Engineering geology in East Malaysia." A synopsis of his talk follows.

In East Malaysia considerable Geological Survey effort goes into assisting agricultural, forestry and civil engineering development. Development is proceeding at an accelerating rate in Sarawak and Sabah. This includes road building, land development for agriculture, buildings, coastal facilities, and other aspects. One of the largest projects is the completion of a road which will make it possible to drive from Kuching to Sandakan in a few years. The most difficult part of this project, the stretch from Ranau to Telupid, is being constructed now with Australian help.

The efforts of the Survey in relation to development include:

(1) Construction materials: Supplies are difficult to find because most of East Malaysia is underlain by soft sediments, while the hard igneous and metamorphic rocks which do occur are mainly in rugged areas far from the sites of development. West Sarawak is the best area, with many accessible igneous rock bodies. Most serious problems are encountered around Miri, where stone must be imported from Kuching, and around Sandakan, where good stone is so scarce that individual blocks of sandstone in slump breccia have to be quarried.

(2) Water supply: Despite high rainfall, water supply is a problem in some areas, especially near the coast. Here large rivers are tidal (brackish), while drainage basins on steep coasts are too small for a sufficient water supply. Kota Kinabalu already has to pipe water from 10 miles away, while in Sandakan ground water development from sandstone aquifers is being investigated. Lack of water is also a serious problem in land schemes, whose sites are usually selected without regard to water supply. Indeed, the favorable sites - areas of low, rolling topography - are often lacking large rivers and underlain by shales, and are therefore precisely the areas where water supply is limited. Yet treatment plants for oil palm schemes require great amounts of water.

(3) Slope stability: With the increasing number of artificial cuts being made, slope stability becomes a more important question. In the past, the tendency has been to make cuts

cheaply (steep), and simply repair them when they failed. But now, with modern earth-moving equipment, larger cuts become practical while repair becomes more expensive. So new cuts are made broad, low-angle, and designed to last. Very little published data on slope stability in tropical areas is available, so the Geological Survey has been noting and compiling data on failures in East Malaysia, with the hope that in a few years' time this can lead to the development of criteria for slope stability under these conditions. Under suitable conditions, slopes as low as 10° may fail, and some houses have been damaged or destroyed this way. What can be done to increase stability? One can 1) lower the angle of the cut; 2) put in drains to keep water off the area; and 3) plant vegetation to help hold the ground.

(4) Foundations: As most construction in East Malaysia has so far been small, foundation problems have not yet come up very seriously, but with increasing development they surely will. So far, simple piling to a hard layer has normally been adequate. In the future, friction piling and concrete raft foundations will have to be used more, especially as reclaimed coastal land is built on.

Engineering geology work is likely to increase markedly in the future, in East Malaysia as in other areas. The Geological Survey, at present the only group of trained geologists on the scene, must be prepared to fill this need.

The role of the engineering geologist is sometimes difficult. He must be asked for his opinion, must be consulted. He cannot usually take the initiative (except where a real danger is going unnoticed, in which case he has a duty to point it out). He must develop good relations with engineers and builders, who generally know little about geology and have to be convinced of the use of its application in their work. This convincing has to be done in non-technical language, as they are laymen to geology. The effort is, however, well worth the while, since good cooperation between geologists and engineers can be very fruitful and valuable in the course of development.

Discussion:

R.F.G. Hosking: Is the concrete used for foundations in swamps not attacked?

G.J.: I assume not, or it wouldn't be used. One must be careful that aggregate used is not susceptible to corrosion as well.

C.H. Yeap: Do igneous rocks in general provide more stable foundations?

G.J.: Igneous rocks develop a thick weathered zone which behaves as a homogeneous mass and may fail on slip-circle surfaces. Sedimentary rocks typically fail along some geologic structural plane.

W.K. Lee: Where failure is along a geologic plane, can bolts be used to hold the slope?
G.J.: Yes, but this is expensive.

N.S. Haile: Has there been progress toward local production of cement?
G.J.: A limestone on an island off the north tip of Sabah is under lease, and there are rumors of possible development elsewhere, but nothing definite. Perhaps the local demand is not yet sufficient to justify the very large expense of building a cement plant.

M.K. Choo: How extensively is live coral used for roads, and how good is it for this purpose?
G.J.: It is used only in coastal towns, and on a small scale. It is not very good material.

C.H. Yeap: What is the best rock for aggregate - gabbro or granite?
G.J.: Both os those are suitable for aggregate.
N.S. Haile: Basic rocks are usually considered better, because the free quartz does not bind well.

P.H. Stauffer: Have special problems been encountered in building bridges for these major new roads?
G.J.: Yes, bridges are a major problem. In the stretch from Kuching to Semanggong it was necessary to build nine major bridges. The alluvium is generally deep, creating cupport problems. The criterion used is that a bridge must be able to survive the once-in-a-century flood, so they have to be built high, which makes them also much longer.

W.K. Lee: Have geophysical methods been used in any of these problems?
G.J.: Not much up to now. Geophysical methods are expensive and require special equipment and trained people, which the Survey at present does not have.

C.W.E.H. Smith: Has the Survey been consulted in problems of deforestation?
G.J.: No. In the case of most logging operations, it is not permanent clearing but "permanent forest" which is allowed to grow back naturally.

C.H. Yeap: Can one use river sand for concrete? Or is it too slippery?
G.J.: Yes, some sand is in fact needed in concrete. Angular fragments are better than rounded ones.

N.S. Haile: In some parts of Sarawak, there just isn't much sand, and what there is may be too fine grained.

Mr. T. Suntharalingam proposed a vote of thanks to the speaker, and the meeting then adjourned. About 20 members attended.

During tea before the meeting, members were able to examine a special exhibit prepared by Mr. N.P.Y. Wong of the Geological Survey. This exhibit, in maps and photographs, showed the evolution of the Mamut copper prospect in Sabah, from early reconnaissance surveys of several years ago, which revealed the first anomalies, to the present intensive development work by the Japanese company awarded the rights.

- PHS

NEWS OF THE SOCIETY

New Members

At its meetings of 16 and 30 December 1968 and 14 January 1969, the Council elected the following to membership in the Society (A = Associate member; others Full members):

Andel, J.P. (A)
Biswas, B.
Douet, B.M. (A)
Dunham, K.C.
Edwards, N.V.
Gowda, S.S.
Parker, J.D. (A)
Seetharam, R.
Singh, J.
Starr, S.G.
Tan, K.M. (A)
Wilson, R.A.
Documentation section, Australian Aquitaine Petroleum Pty., Ltd (A)
Geology Library, University of Texas (A)

A reminder

Members are reminded that the Annual General Meeting will be held on 31 January, in the Geology Department, University of Malaya. In conjunction with it will be two Discussion sessions, on "Problems of Mesozoic geology in Malaysia" on 31 January, and "Problems of mineralization and mineral prospecting in Malaysia" on 1 February. In addition, the annual Presidential address will be delivered by Mr. Olander on the evening of the 31st, and a special dinner will be held on the evening of the 1st. It is hoped that as many members as possible will attend these functions.

A NOTE FOR TIN PROSPECTORS

In conclusion I would appeal to prospectors to remember posterity in recording their results. A scientist, trained to note every detail, because he is taught that they may prove useful someday, perhaps sees things in a different light: perhaps he views posterity in a different light. Nevertheless it is hoped that it is not useless to suggest that results that may be unattractive to one individual or one company, may prove attractive to another individual, another company, or posterity, and that even negative results should be recorded to save posterity the expense of prospecting the ground again. At the time of writing I am engaged on an attempt to discover what amounts of prospecting has been done in Kinta, and with a few exceptions, no details can be obtained at all, because they were not recorded. A leaseholder says he put down so many pits or bores and that there was not enough tin to make working the land profitable. He very rarely knows anything about the value per cubic yard. Records of prospecting should contain the following information: the date of boring, the relative position of the bores, the depth of the bores, the value, however small it may be, of each sample in katis per cubic yard shown at its proper depth, the nature of the bedrock, the nature of the ground bored, the nature and size of the tools used, and the name of the kapala in charge. Useful additional information would be the grade of the ore determined by standard sieves, and the nature of the heavy impurities. The samples should always be assayed unless it is obvious that no heavy impurities are present.

- J.B. Scrivenor
"Notes on prospecting for tin-ore in the Federated Malay States", 1911, p. 23-4