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GEOLOGIC NOTES

Differences between the Old Alluvium and Weathered Granite in Perak, West Malaysia.

S.P. Sivam, Jabatan Geologi, Universiti Malaya

The Old Alluvium in Perak is very similar to weathered granite, especially adjacent to the sides of the Kinta Valley. This part of the Old Alluvium has commonly been referred to as "granite wash" because of its similarity in appearance to weathered granite.

The writer has noted various differences between the Old Alluvium and the weathered granite in the field. The various criteria useful in distinguishing between these two are discussed below.

1. Phenoclasts of quartz, quartzite, schist, etc.

Quite often it is noted that phenoclasts of non-granitic material are present in the unconsolidated deposit. If these phenoclasts are of non-granitic composition, e.g., quartzite, schist, phyllite, then the deposit is Old Alluvium and not weathered granite.

2. Rounding of phenoclasts

The phenoclasts of quartz, granite and schist present in the Old Alluvium quite often are well rounded to rounded, though angular phenoclasts are found in some places. The rounding of the phenoclasts suggests transport of the sediment, indicating that it is not an in-situ weathered granite. Care must be taken, not to mistake core boulders in granite for phenoclasts.

3. Sedimentary structures

On careful examination of the Old Alluvium various sedimentary structures are often noticeable which would prove its detrital origin and distinguish it from weathered granite.

Some of the sedimentary structures commonly seen in the Old Alluvium are:

a) bedding and lamination
b) graded bedding
c) cross-bedding
d) armoured mud balls and lutite clasts
e) lenticular channel deposits
f) extreme lateral and vertical variability of different strata within an outcrop
g) other erosional features.

4) Fossils

The presence of fossils in the deposit would prove its sedimentary origin. In the Old Alluvium quite often wood fragments and peat are found. In addition carbonaceous layers are also present. The presence of this vegetable matter could be used as a criterion for differentiating weathered granite from Old Alluvium.

5) Veins

The presence of veins of quartz, quartz-tourmaline and others in the deposit proves that the deposit is weathered granite and not Old Alluvium. At times, joint patterns can be traced in weathered granite, but in the Old Alluvium no distinct joint patterns are visible.

6) Micas

It has been noted by many miners (personal communication) that the micas in the Old Alluvium generally are less abundant than in weathered granites.

Moreover, micas occur in the Old Alluvium rarely occur in thick books but more often as individual flakes. In the weathered granite, however, it is not uncommon to see books of mica.

7) Field Relationships

There are many other features which could be used in their differentiation, e.g. if in one place, exposures are proved to be transported sediment by presence of one of the above features, then the chances are that an adjacent contiguous deposit is also transported material, although care has to be taken as the weathered granite and Old Alluvium could occur side by side. If, however, the basal part of the sequence at any outcrop is proved to be part of the Old Alluvium then any deposit overlying this basal sediment would definitely not be weathered in-situ granite.

Conclusion

These are some of the criteria which could be useful in the differentiation of weathered granite from Old Alluvium in the field. It must be stressed that it is advisable not to make a judgement from just one criterion, but to study the outcrops and conclude from the association of various criteria.

Evidence for the non-marine origin of the tin-bearing Alluvium in the North Kinta Valley, Malaysia

S.P. Sivam, Jabatan Geologi, Universiti Malaya

The unconsolidated alluvium of the Kinta Valley form the largest and economically the most important tin-bearing placers in the world. These sediments were subdivided into four units by Walker (1956). The writer recognized only two major units in the northern part of the Kinta Valley namely: Old Alluvium; and Young Alluvium.

The origin of the Young Alluvium has never been in doubt because it is only found adjacent present-day rivers. The Young Alluvium in the north part of the Kinta Valley is clearly of fluviatile origin (Sivam, 1969).

The origin of the Old Alluvium, has, however, been a problem. Scrivenor (1912) considered most of the Old Alluvium to be of Gondwana age and postulated that these deposits were of glacial origin. Jones (1917) showed the fallacies of the glacial theory, which was in fact withdrawn by Scrivenor. Walker (1956) suggested that the Old Alluvium in the Kinta Valley could be marine based on geomorphology of the valley and sediment characteristics.

However, from my studies it seems beyond doubt that the unconsolidated deposits are terrestrial and not marine in origin. This conclusion is based on the following characteristics:

a) Fossils

The only fossils recorded and found in the Old Alluvium are of land plants and terrestrial vertebrates. Shell-bearing animals are so generally present on the sea-floor and their chances of preservation are so good that the absence of marine fossils in the sediments suggests very strongly that the deposits are not marine. The only marine fossil identified from the Old Alluvium was a crinoid stem which had been washed out of the limestone bedrock. Thus the argument that calcareous shells may have been destroyed by solution of calcium carbonate is not really valid, as the chances of some marine shells being preserved in this vast area is quite high.

b) Texture

Marine sands tend to be better sorted than river sands. However, the sands in the Kinta Valley within the area surveyed are all poorly to extremely poorly sorted which suggests that they are not marine sands.

A plot of the relationship of size parameters on Friedman's (1961, 1967) and Moiola and Weiser's curves (1968) as seen in figs. 5, 6, 21, 22, 23 (Sivam, 1969) also suggests the deposits are all fluviatile in origin.

c) Sedimentary structures

The association of sedimentary structures including cut and fill structures, trough and tabular cross-bedding, imbrication, lenticular bedding, graded bedding suggests that these deposits could be fluviatile.

Clay balls, armoured mud balls, and lenses of clay are common in the alluvium associated with the gravelly and coarser sandy horizons. These are probably formed where streams undercut flood-plain deposits. As the banks cave, the sandy and silty layers quickly fall apart, but the clay layers crumble into chunks with sufficient cohesion to roll along as pebbles and come to rest at the gravel bars further downstream. Clay balls and armoured mud-balls are generally typical of fluvial deposits. The colour of the clay balls in the Old Alluvium is white to whitish grey. This is again in contrast to the lutite clasts found quite commonly in turbidite sequences, which are dark coloured, e.g. in the Crocker Formation, East Malaysia.

d) Lithology and Association of Deposits

Channel sands and gravels are common in the Old Alluvium, and are linear bodies of sand or gravel between probable levee deposits of finer grain. In the sea, sands are generally spread out in sheets. Elongated sand and gravel deposits may be formed as marine bars and barriers, but as the basal contacts of the sands and gravels in the Old Alluvium are erosional and unconformable on the finer grained deposits below, they are more probably fluviatile. Marine bars tend to be built from the sea floor upwards. The high degree of vertical and lateral variability within the Old Alluvium even within the same exposure is strongly suggestive of a fluviatile deposit.

The association of sediments with characters indicative of channel deposits, bar deposits, flood plain deposits, and also probably of levee deposits, indicates that the deposits are not marine.

e) Palaeodrainage

The current directions deduced from cross-bedding and imbrication of the gravels are consistent with transport along different channels away from the Main Range and Kledang Range towards the coast.

The gravel-sized clasts found in the alluvium show a marked decrease in maximum grain-size away from the valley sides. The rate of decrease is different along different channels. Furthermore, the distribution and variations of these gravel-sized clasts along different channels, in different parts of the valley, is quite independent of that in other channels. In addition the percentage of clasts in the three classes (> 6 ins, 3 - 6 ins and 1 - 3 ins) also shows corresponding results, i.e., a variation parallel to the transport direction indicated by cross-bedding and imbrication, the variations along different channels being independent of the variations in other channels.

The composition of the gravel-sized clasts also shows a similar variation. The quartz : granite ratio decreases in the same direction as above.

If the deposits were marine, the gravel beds would be expected to spread out in sheets or extensive lenses across the valley (which is broad and flat), or be concentrated near the valley sides, marking a former beach, rather than, as is the case, having a distribution which can be related to a fluviatile palaeodrainage pattern.

f) Corundum and tourmaline-corundum

The restriction of corundum clasts to the east side of the Sungai Kinta, and tourmaline corundum clasts to the west of Sungai Kinta also suggests that the alluvium is fluviatile. If it was marine, then these clasts would not be as narrowly restricted but would be more widespread across the width of the valley.

Conclusions

Although some of the characteristics listed above, if taken separately, may be found in a marine deposit, the association of all these characteristics makes me conclude that most if not all the Old Alluvium and Young Alluvium is terrestrial and not marine.

It is, however, possible that some marine deposits may be present which are not presently exposed, or which have not been recognized as such because of their present isolated and restricted occurrence. Further south, i.e., south of Sungai Raia, it is probable that some of the Old Alluvium may be marine, as the elevation of the bedrock beneath the alluvium is below present sea-level. But this is south of the area studied by me.

Another alternative origin for the Old Alluvium suggested by Walker (1956) is that it may be estuarine. The essential feature of an estuary is that tidal currents are equally or more effective in distributing sediments at a river mouth than river currents. However, north of

Sungai Raia, as shown by Sivam 1969 (Chapters IV and V) river currents have been the most important agent in the distribution of sediments. This is concluded from a study of the palaeodrainage.

Thus the sediments, in the area surveyed, which are preserved and exposed today all appear to be terrestrial. Nearly all the deposits in the valley are fluviatile, excepting for narrow stretches at the valley sides where colluvium exists.

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A Dumortierite-bearing Lode at the Gakak Mine, Pahang, W. Malaysia

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Recently one of us (N.K.A.) collected material from an unnamed lode which was intersected by the 6 Level cross-cut (S.E.) from Gakak Mine Shaft and which occurred beyond Gakak No. 3 Lode but trended parallel to it. The lode in question, which is c. 18 inches wide, occurs in slate hornfels, is strongly brecciated, and in the handspecimen the dominant mineral appears to be pyrrhotite.

Examination of thin and polished sections of material from this lode indicated the presence of the following minerals: calcite; dumortierite; pyrite; sphalerite; chalcopyrite; pyrrhotite; and galena.

Early calcite apparently cemented rock fragments of a fault zone, and some of this calcite was then replaced by dumortierite, which contains relicts of the calcite.

The dumortierite, a very rare basic aluminium borosilicate ($8Al_2O_3.B_2O_3.6SiO_2.H_2O$?), is readily recognizable by its optical properties and particularly by its marked pleochroism, which, in the section examined by us, ranged from cobalt blue to light greenish yellow. This is the first record of this mineral occurring in West Malaysia and we think in Southeast Asia.

Pyrite is believed to have been the next mineral to have been deposited after the dumortierite but there is no absolute proof of this. However, the pyrite certainly replaces the calcite, and minute relicts of the latter, and possibly also of the the host rock, are orientated in zones parallel to the faces of the pyrite crystals, but tend to be confined to their cores.

This phase of lode development was followed by one in which sphalerite (containing exsolved bodies of chalcopyrite), chalcopyrite, and pyrrhotite, were deposited more or less contemporaneously, but perhaps the sphalerite was the earliest of these species. These sulphides have all replaced and veined, to varying degrees, all the earlier-deposited minerals, as well as the host-rock fragments. Following the deposition of these sulphides the lode was fractured and the fractures were infilled with calcite.

The last of the sulphides to be deposited was galena, which strongly replaced the earlier ones, and in particular the pyrrhotite. The latter species is often deeply embayed by the galena, and relicts of the iron sulphides are common in it. In addition, it has replaced calcite, and relicts of the late-generation carbonate veins are much in evidence with it.

The final phase of development of the lode was the deposition of calcite in fractures which intersect all the earlier species. It is of interest to note that the late calcite-filled fractures in the galena are strongly cleavage-controlled.

The Mineralogical Character of the Galena Lode, near Sungai Belat, Pahang.

K.F.G. Hosking and E.B. Yeap, Jabatan Geologi, Universiti Malaya.

Fitch (1952, p. 97) in his account of the geology and mineral resources of the neighbourhood of Kuantan, Pahang, records that one of the lodes prospected for tin by the Pahang Consolidated Company Ltd., on its property, was the Galena Lode, situated near the eastern granite shale contact and near Sungai Belat. (Recently Mr C.T. Tay, of P.C.C. L., told one of us (KH) that the investigation of the lode was carried out before the war by means of a winze and adit.) Fitch goes on to state that 'the lode was prospected for tin ore, but little ore was proved. Its name suggests that galena was unusually abundant but the writer has seen no specimens from this lode'.

Several months ago, Mr Tay gave the senior author a boulder of ore which he had found in the Sungai Belat, near the mine, and which he believes is a portion of the Galena Lode. A mineralogical examination of the boulder has been carried out and the results of it are given below, as it is believed that they will fill a small gap in the literature relating to the mineral deposits of East Pahang.

The sliced specimen indicates that it is strongly banded and consists essentially of sphalerite and some galena in a quartz/chlorite matrix. However, examination of thin and polished sections indicates that the mineralogy is rather more interesting than a brief examination of the hand-specimen suggests.

The first stage in the lode development was the deposition of a coarse mosaic of quartz and a little topaz. This stage was followed by one in which small and sparse aggregates of pale-brown cassiterite were laid down. A little pyrite was the next species to make an appearance. The lode was then fractured, and a great deal of sphalerite, containing exsolved bodies of chalcopyrite, was deposited. This sphalerite invests some of the cassiterite and embays and otherwise replaces some of the pyrite. A little chalcopyrite continued to be deposited after the sphalerite and is to be seen locally veining the zinc sulphide and infilling voids in it. After further reopening of the vein, major amounts of chlorite were deposited, largely by replacement of quartz, but also by some replacement of the sphalerite.

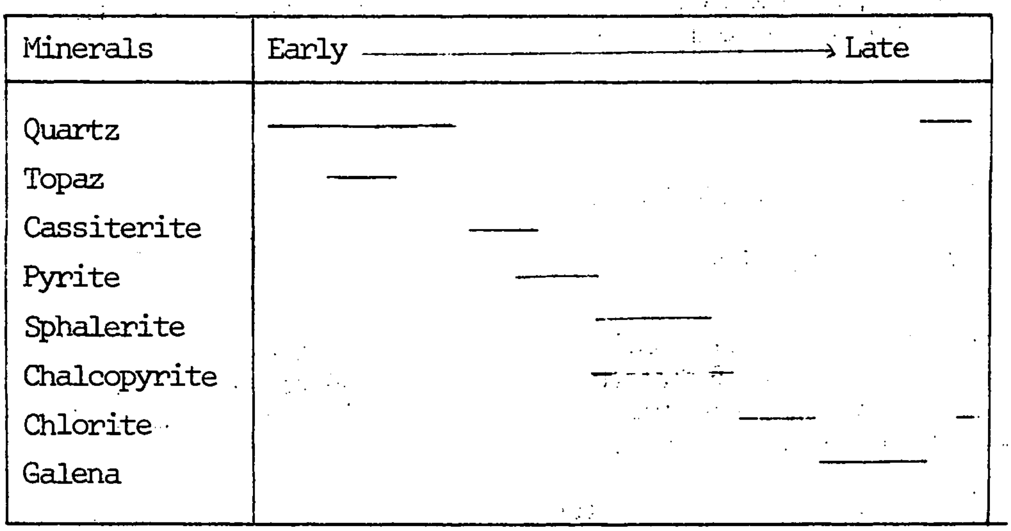
After yet another period of fracture considerable quantities of galena were laid down. This galena developed largely by replacement of the sphalerite, but it also replaces the quartz and the pyrite, the former to an appreciable extent, the latter but slightly. In addition, some of the exsolved chalcopyrite bodies were partly replaced by the lead sulphide. The galena also replaces the chlorite, possibly to a limited extent, and relicts of chlorite appear in the sulphide. Finally the body was severely brecciated, and the fragments were cemented by quartz which, unlike the earlier generation, crystallised as a fine mosaic. Small flakes of chlorite tend to rim the grain boundaries of this late-generation quartz, and would appear, therefore, to be the last of the minerals to be deposited in the Galena Lode.

Table I summarises the mineral paragenesis of the lode.

This is yet another example of a primary tin deposit of West Malaysia in which early ("high-temperature") and late ("low temperature") species are closely associated.

TABLE I

MINERAL PARAGENESIS OF THE GALENA LODE, PAHANG



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REGIONAL CONFERENCE

Planning for the Regional Conference of the Society to be held from 20-25 March 1972 is continuing and a second circular is enclosed with this issue.

Meanwhile further contributions in the form of papers, short discussion notes, or suggestions as to useful discussion sessions which could be held, are invited. The Committee particularly hopes for contributions from young geologists working in the region, as well as from their more senior colleagues.

Dr Delany, Secretary of the Commission for the geologic map of the world, visited Kuala Lumpur on 6-7 October, and held talks with members of the Organizing Committee of the Regional Geological Conference. She suggested that a meeting of the Editorial Committee for the proposed Tectonic Map of Southeast Asia should be held concurrently with the Conference. It is to be hoped that UNESCO and ECAFE will jointly sponsor the meeting. The Committee has agreed in principle to this suggestion, as this would ensure the participation of several senior structural geologists concerned with this region, and add the value of the discussions on regional tectonics.

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TWELFTH PACIFIC SCIENCE CONGRESS

Two personal views I

The Twelfth Pacific Science Congress was held in Canberra, Australia from 18 - 27 August 1971, with reportedly 1000 participants. The geological section - geological structure and mineral resources in the Pacific - was divided into five symposia:

D1 : Structure and tectonic history of the Pacific Ocean Basin.

D2 : Island arcs and related structures of the western Pacific region.

D3 : Evolution of the continental shelves of the Western Pacific.

D4 : Mineral resources of the Western Pacific.

D5 : Petrology and geochemistry of island arcs in relation to tectonic environment.

The geological section was dominated by deep-sea marine geologists and geophysics. This dominance was a natural result of the tremendous increase in knowledge of the deep ocean bed through magnetometer studies, palaeomagnetic studies, combined with geochronology, palaeontology, and other studies of cores obtained from deep sea drilling, integrated in the hypotheses of sea floor spreading and plate tectonics. The history of the deep oceans is now known in broad outline, and there is a general concensus about what is happening along the mid-ocean ridges. However, great uncertainty and some controversy remain about what is happening at the trench-arc systems, and in the mantle under the moving plates. Nor has any acceptable mechanism for the movements been postulated.

It was rather strange and disappointing that Symposium D3 'Evolution of the continental shelves of the Western Pacific' contained not a single paper which mentioned continental shelves. Apparently only a few papers on continental shelves were provisionally included, and these were all cancelled due to the non-arrival of a number of speakers from the USA and USSR. It became noticeable in this session that some of the deep-sea marine geologists were most unhappy when discussion strayed out of the ocean basins, because (they admitted) they were innocent of any knowledge of continental geology. Those geologists who have taken up marine work after a thorough grounding in "classical" land-based geology seem to be better equipped to consider global theories.

The general standard of presentation of papers and especially visual aids was rather poor, some papers presenting valuable data and conclusions (some the result of field investigations representing enormous expenditure in money and time) being rendered almost unintelligible by illegible slides, inaudible speech, or inordinate length - the last the responsibility of too lenient chairman. For this reason the well-presented papers stood out and were particularly memorable: of those in my special fields of interest I recall especially J.A. Katili on the Indonesian Island Arcs, and R.P. Koesoemadinata, who presented a paper on offshore Tertiary sedimentary basins between Java and Borneo, giving a wealth of stratigraphic detail released by the oil companies, and well illustrated by clear profiles. It would appear that the oil companies in Indonesia are following a very enlightened policy in releasing information to the scientific community - a stage which is just beginning (as far as offshore results are concerned) in Malaysia.

I understand that the leader of the Malaysian delegation (Professor S.S. Dhaliwal) presented an invitation for the next Congress (in 1975) to be held in Malaysia, and that this invitation was considered by the Council with appreciation. Although it was decided that the next Congress will be held in Vancouver, the succeeding one may well be in Malaysia. This would be appropriate, as Malaysia has yet to be the venue of a Pacific Science Congress, and has much to contribute as a host.

N.S. Haile

II

The emphasis of the geology sections was predominantly on the new global tectonics. Even the D4 symposium was so oriented, and it was interesting to find that mining geologists also were trying - not always with great success - to fit the regional schemes of mineralization into the plate tectonic theory. In particular several speakers drew attention to the Circum-Pacific "porphyry copper mineralisation". This discussion was initiated by Dr K.C. Dunham. Dr S. Ishihara gave an interesting paper relating tin, tungsten, and molybdenum mineralization to tectonic zones in Japan and the Americas.

I must agree with Professor Haile's remarks that the organisation was not always as good as one would desire. Chairmen were rarely in control and many papers, which would have benefited from brevity, were allowed to drag on to boredom. I feel strongly that discussions are usually the most important part of a meeting, so it was a pity that some chairmen did not, apparently, hold this opinion. In the session which I chaired there was always at least 5 and usually nearer 10 minutes left for discussion, although admittedly this was achieved only by ruthless time-keeping, involving the ringing of bells, and other suppressive measures.

The most fascinating symposium for me was D5 and it was highlighted by excellent presentations by the Green brothers - T.H. and D.H. - and A.E. Ringwood. Their combined work presents a tenable hypothesis, based on experimental petrology, for the driving mechanism for subduction and mantle convection.

The weakness in the new global tectonics is that there is no mechanism for the emplacement of ultramafic bodies into the crust. Yet we had excellently documented cases of large ultramafic mantle slices thrust, for example, over the North East coast of New Guinea (Papua).

The Pacific Science Congress can now no longer find a unifying sphere of interest which can successfully bring together biologists, geologists, sociologists, etc. This was not a Congress, but a group of separate and distinct symposia which did not need to be held simultaneously. Indeed, even within the geological group one was continually aware of a fundamental dichotomy: marine geologists and geophysicists, who have largely been responsible for the new global tectonics theory are not at home on the land. They talk a different language from the traditional land-based geologists.

I came away from the Congress with one most important impression - that we know so much about the continental crust yet so little about oceanic crust, yet it is from the oceans that the new global tectonics has been postulated. It is hard, if not impossible, to fit the large amount of data known about the continents into the ocean-based plate tectonic theory. I have strong doubts if pre-Tertiary orogenic belts can ever be reconciled completely with the plate-tectonic theory. And of course it is possible that pre-Mesozoic geosynclines and oroginies should not be fitted at all.

This is an exciting era in geologic thought, and the Pacific Science Congress did manage to capture some of the excitement. Accordingly it must be classified as successful.

C.S. Hutchison

GEODYNAMICS PROJECT

The Geodynamics Project is an international program of research on the dynamics and dynamic history of the earth with emphasis on deep-seated foundations of geological phenomena. This includes investigations related to movements and deformations, past and present, of the lithosphere, and all relevant properties of the earth's interior and especially any evidence for motions at depth. The program is an interdisciplinary one, coordinated by the Inter-Union Commission on Geodynamics (ICG) established by International Council of Scientific Unions (ICSU) at the request of International Union of Geodesy and Geophysics (IUGG) and International Union of Geological Sciences (IUGS) with rules providing for the active participation of all interested ICSU Unions and Committees.

The principal task of the Geodynamics Commission is to promote and coordinate international and interdisciplinary research and cooperative programs related to the Geodynamics Project. Many aspects of the Geodynamics Project will have inherent technological and economic advantages: the Geodynamics Commission will seek and encourage programs that have these advantages, especially for the developing countries.

The Geodynamics Project is focused on movements at the surface and within the upper portions of the Earth's interior.

A major part of the geodynamics program will be to further understanding of the relations among forces, processes and geologic structure. Working groups concerned with these areas might be geographically oriented as:

(a) Western Pacific
(b) Eastern Pacific
(c) Alpine-Himalayan System (Tethyan)
(d) Continental and Oceanic Rifts

Regional groups would also be appropriate for considering many aspects of this part of the program. These could communicate through working groups concerned with:

(a) Paleomagnetism and its implications on past movements.
(b) Geological correlations of rifted margins.
(c) Igneous, metamorphic and tectonic relationships in orogenic belts, including the role of the ophiolite suite.

A working group for the Western Pacific has been set up under the Chairmanship of Professor Rikitaki of Japan. Professor N.S. Haile of the Department of Geology, University of Malaya, is a member of this working group, and invites any suggestions as to possible projects which could be included for the Southeast Asian region.

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NEWS OF THE SOCIETY

Meeting of 21 September 1971 : A.R. Crawford

Geochronology of India and Ceylon, with reference to Continental Drift in the Indian Ocean.

Dr A.R. Crawford, Senior Research Fellow, Department of Geophysics and Geochemistry, Australian National University, Canberra, addressed a meeting of 32 members, with the President, Dr D. Taylor, in the chair, on 21 September 1971, in the Department of Geology, University of Malaya.

Dr Crawford described some of his recent work in geochronological dating by the Rb/Sr method, done on nearly 400 specimens of Pre-Cambrian rocks of Peninsular India, and Ceylon, collected by him in cooperation with the Geological Surveys.

One of the aims of the research was to provide evidence to test the hypothesis that the West Coast of Australia and the east coast of India and Ceylon were in close proximity before the break up of Gondwanaland.

In Rajasthan and Bundelkhand, northern India, a general succession was established as under:

		Age (m.y.)
8.	Pegmatitic intrusions	
7.	Granite	750 - 1000
6.	Granite	1650

		Age (m.y.)
5.	Delhi System	
4.	Granite	1900 - 2100
3.	Aravalli System	
2.	Bundelkhand and Berach Granites	2550
1.	Pre-Cambrian sediments	

The Banded Gneiss Complex of Rajasthan contains components of ages ranging from at least 2000 to less than 1000 m.y. These determinations showed that the Precambrian in Rajasthan is much older than previously suggested. They confirm the antiquity of the Bundelkhand-Berach craton suggested by field studies, and disprove its derivation from Aravalli System rocks by granitization.

The Vindhyan System of India proved difficult to date, but was shown to have a base with an age of at least 1200 and possibly 1400 m.y. The underlying Gwalior Series is between 1600 and 2000 m.y., whereas the Bijawar Series is much older at about 2500 m.y. Paleomagnetic interpretations, based on previous very different age estimates, requires revision.

In southern India the Peninsular Gneiss of Bangalore was metamorphosed 2590±40 m.y. ago, and much of the Peninsular Gneiss in Mysore is of this age. The oldest rocks measured were from Kerala, where ages of 3065±75 have been obtained.

The granulite-facies, Highland Series of central Ceylon, and the Kataragama Complex of Southeast Ceylon were metamorphosed more than 2000 m.y. ago and probably contain relics of earlier metamorphism. There is evidence of at least one period of charnokite formation, at about 1250 m.y. The Vijayan retrogressive metamorphism ended by about 1250 m.y. ago. The high level Tonigala granite of the northwest gives an age of 985±30 m.y. older than the oldest date obtained from this granite by the K/Ar method.

The results of this reconnaissance survey enabled a preliminary broad delineation of geochronologic zones of the Precambrian of the subcontinent to be made. Various correlations with western Australia had been attempted on the basis of these data, but independent lines of evidence, namely paleomagnetic studies, indicated that it was likely that India and Australia were rather widely separated in the Mesozoic, and by implication the proposed continguity in the Paleozoic and Precambrian was less likely. Du Toit's earlier reconstruction, which placed India between Africa and Antarctica, now seems rather more [illegible], and is being tested.

In answer to numerous questions, Dr Crawford emphasized that radiometric dating of individual samples haphazardly collected was likely only to lead to obfuscation. Except for samples well enriched with radiogenic strontinum, confident results could only be obtained where a series of specimens from the same coeval unit, with varying Rb/Sr ratios, were determined, thus enabling an isochron to be drawn according to Nicolaysen's method. Although the actual determinations were made by sophisticated mass-spectrometric analysis, the investigator should not be just an "instrument fanatic", as the selection of suitable samples and interpretation of the results required a knowledge of "classical" geology preferably combined with long field experience.

Some references to relevant papers by Dr Crawford are listed below:

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*Refers to reference number of reprint in the Klompé Reading Room, Department of Geology, University of Malaya.

Bibliography

Dr D.J. Gobbett and Dr P.H. Stauffer are planning to continue with the preparation of supplements to the Bibliography and Index of the Geology of West Malaysia and Singapore. They would appreciate receiving offprints of any publications of Society members, including maps, and titles and repositories of any unpublished reports which the author would like to be included in the bibliography.

Kindly send offprints and/or information to:

Dr D.J. Gobbett
Sedgwick Museum
Downing Street
Cambridge, U.K.

and/or

Dr P.H. Stauffer
Department of Geology
University of Malaya
Kuala Lumpur, MALAYSIA

Cooption to Council

Resignation of Assistant Secretary/Appointment of New Assistant Secretary.

Mr A.P. Ng has resigned from the post of Hon. Assistant Secretary of the Society as he is on transfer from Kuala Lumpur to Batu Gajah, Perak. Mr A.P. Ng has been the Assistant Secretary since the beginning of this year. The Council has recorded its appreciation of his valuable contribution in running the Society during his term of office.

Dr C.H. Leigh of the Department of Geography, University of Malaya, has been appointed as the Hon. Assistant Secretary with effect from 1 September 1971.

Two new Committee members were co-opted into the Council of the G.S.M. for the rest of the year. Enche Nik Mohamed was co-opted with effect from 1 September while Dr P.H. Stauffer was co-opted from 21 September.

Membership

The following have been elected full members of the Society:

Dr James MacGregor Dickins
Bureau of Mineral Resources, Geology & Geophysics
P O Box 378, Canberra City
AUSTRALIA 2601.

Dr K.R. Chakraborty
Jabatan Geologi
Universiti Malaya
Kuala Lumpur, MALAYSIA

Mr Ben Nurtjahja Wahju
c/o P.T. International Nickel Indonesia
P O Box 143, Makassar, INDONESIA.

Elected from student member to full member:

Enche Nik Mohamed
Jabatan Geologi
Universiti Malaya
Kuala Lumpur, MALAYSIA

Elected as a student member:

Syed Sheikh Almashoor
Jabatan Kajibumi
Universiti Kebangsaan
Kuala Lumpur, MALAYSIA

Change of addresses:

Mr Rabinder Singh
6 Jalan Aitken
Off Tambun Road
Ipoh, Perak, MALAYSIA

Mr Beh Cheng Aun
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Perak, MALAYSIA

Mr H.T.L. van Eyk
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England, U.K.

Mr X de Peyronnet
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Tanglin Road, SINGAPORE 10

Mr P.H. Quah
Gopeng Consolidated Ltd.
Gopeng, Perak
MALAYSIA

Dr Harvey C. Olander
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P O Box 57, Tanglin Road P.O.
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Mr Khoo Hun Hock
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Woodsville Court
SINGAPORE 13.

Mr I.L. Burnet
c/o Data Analysis
28 Oxley Gardens, Oxley Rise
SINGAPORE 9

Mr S. Senathi Rajah
c/o Geological Survey H.Q.
P O Box 1015, Ipoh
Perak, MALAYSIA

Dr Clive R. Jones
c/o Geological Survey Dept.
Private Bag 14, Lobatsi
BOTSWANA

Mr Chin Lik Suan
c/o 8 A, Malayan Teachers' College
Quarters, Glugor, Penang
MALAYSIA

Mr A.P. Ng
c/o Malayan Tin Dredging Ltd.
Batu Gajah, Perak
MALAYSIA

The following members have resigned from the Geological Society of Malaysia:

1. Enche Abdullah bin Ismail
2. Mr S. Gopalapillai

Addresses unknown

The Secretary has been unable to contact the following members and would be grateful for any information on how to reach them:

Dr Thomas F. Weaver (formerly of Faculty of Agriculture, University of Malaya).

Mr J.R. Fletcher (formerly Quaker Lodge, Somerset, England, UK)

Mr Robert H. Cook (formerly c/o Geological Survey Office, Johore Bahru, Johore).

Annual Fieldtrip

The Society, in conjunction with the Department of Geology, University of Malaya, is planning to have its annual field trip on the 6 and 7 November 1971 to Singapore and Johore. Places of interest to be visited include the gabbro masses in Singapore and the bauxite mine in South Johore.

Interested members are requested to write to:

Enche Nik Mohamed
Department of Geology
University of Malaya
Kuala Lumpur
MALAYSIA