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**Placer Gold Discovery in Thailand**

RAU, JON L., Department of Geological Sciences, The University of British Columbia, Vancouver, B.C., Canada.

NUTALAYA, PRINYA, Division of Geotechnical and Transportation Engineering, Asian Institute of Technology, Bangkok, Thailand.

**Introduction**

In March, 1981 the discovery of gold nuggets 155 kilometers north-east of Bangkok precipitated a full scale gold rush to the little-known village of Nong Doan in Prachin Buri's Kabin Buri District (Figs. 1 & 2). The discovery was made in the middle of a newly seeded paddy field just about 30 kilometers east of the district town. More than 500 miners swarm up and down a hundred paddy dykes each day under the intense sun of a typical hot and wet monsoon season. The gently sloping paddy field is located on a terrace about 30 meters above mean sea level. The paddy land is now pock-marked by thousands of holes with many hundreds more under construction. Each hole contains from one to three people all standing waist deep in warm, muddy water, and coated with dried red clay - a classic example of small scale mining at its worst. There is little control over where, how and the quantity of earth moved in search of gold nuggets less than one meter below the surface. Thai miners employ the typical "gophering" method of mining but their holes are very shallow and discontinuous.

**Geology**

Just about a meter below the surface is a layer of iron pisolites, that have been weathered from a hard lateritic soil. It is within this gravelly zone that large gold nuggets, some over two centimeters in length, have been recovered. The origin of the gravelly zone is thought to be the result of a Pleistocene or Tertiary age stream flowing over the underlying bedrock, present at a depth of less than 10-20 meters. The deposit lies in the shadow of the Khao Kam Pla Kang (Hill of Bony Gold Fish), an outlier of Phu Kradung Formation, a predominantly dark brown, grayish brown shale with interbedded siltstones and sandstones of Jurassic age.

Not far from the initial discovery outcrop Triassic granite and granodiorite. Underlying the deposit are rocks belonging to the Devonian Kanchanaburi Formation. This unit is primarily shale, sandstone and their metamorphic equivalents, phyllite, argillite, quartzite, and slate. Locally limestone is present. Although it is difficult to speculate on the source of the gold it probably originates in the quartz veins cutting the Kanchanaburi Formation. These veins may emanate from the plutonic rocks of Triassic age which crop out nearby.
History

There is no way of knowing how long the deposit will hold out but Thailand has placer deposits in 28 of its 72 provinces. Many of these placers have been operated by villagers for more than 100 years. Not far from this discovery, and on strike with it, a notable gold deposit occurs at Bo Thong to the southwest. The mine at Bo Thong was worked during King Rama V's reign and its workings are still clearly visible although it has not been operated since 1916. Several concrete structures, a large water-filled pit with the remains of a head-frame, several other concrete houses can be explored just 1 km south of the main highway between Prachin Buri and Kabin Buri. The gold in the Bo Thong area has been mined for years but in 1880 the Governor of Prachin Buri Province, Samang Amatayakul, was given the authority by the King to develop the mine as he had been trained as an engineer at the University of London. He employed about 300 men to dig down to bedrock (Kanchanaburi Formation) where a true bonanza of gold was found. The weekly yield was equivalent to the bulk of a coconut. Unfortunately, the governor conspired against King Rama V and as a result he was beheaded.

A second attempt to mine the gold at Bo Thong was made in 1906. For 10 years a French company operated it as a joint venture with a Thai company and used mechanical methods to recover the gold. The yield was not as good as expected and could not approach that recovered during the reign of King Rama V in 1880 when it was reported that about 48 kilograms of gold were mined each month. The operation was disbanded in 1916. Nevertheless, the geological structure between Bo Thong and Nong Doan is such that the entire area has promise. Moreover, the gold is so shallow that favourable results might be obtained using a metal detector.

Geophysical Data

In 1954, Hunting Geology and Geophysics Ltd. was contracted to perform an airborne magnetometer survey of the Chao Phraya Basin of central Thailand. The magnetometer utilized was a Gulf fluxgate magnetometer capable of measuring the relative total field - the datum being arbitrary. A part of the 35,000 square kilometer survey included the Kabin Buri area where the new placer gold discovery occurs. East of Kabin Buri to a point 8 kilometers west at Ban Bo Thong, the magnetic pattern clearly supports the east-west strike interpreted from geologic maps of the area. There is a suggestion of east-west faulting between Nong Doan and Bo Thong. Moreover, a north-south fault is interpreted from the magnetic data for an area about one kilometer west of Bo Thong. The magnetic data suggest that an igneous contact occurs about 2 kilometers south of Ban Bo Thong. East-west striking quartz veins occur in the old mine at Bo Thong and support the magnetic data indicating a dominant east-west shear zone with probable intersection by a north-south zone just west of Bo Thong (Fig. 2).

Conclusion

The gold at Nong Doan is probably weathered from the quartz veins cutting the Kanchanaburi Formation. Mineralization of the quartz veins emanates from buried igneous bodies to the south of Bo Thong. The original placer deposit probably formed in either the Tertiary or Pleistocene before it was incorporated in a laterite resulting from ground water discharge on the south side of the Khao Kam Pla Kang range.
Later, possibly in early Holocene time, the laterite was weathered and the nuggets were freed again and mobilized by streams flowing south to the Prachin Buri River. A final episode of entrenchment lowered the water table and favoured the development of the brown loessial soil now found above the placer deposits. The entire area between Nong Doan and Bo Thong warrants further prospecting.

Manuscript received 5 October 1981

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Scenes of the gold rush at Kabin Buri
Fig. 1. Map showing the location of Nong Doan area.

Fig. 2. Map showing the geology and location of placer deposits in the Kabin Buri district, eastern Thailand.
VIEWPOINT: THE EXPLOITATION AND CONSERVATION OF NATURAL RESOURCES

KIEW BONG HEANG, Dept. of Zoology, Universiti Malaya

Abstract

The industrial minerals in Malaysia are finite. As non-renewable resources their total depletion in the future is inevitable. For their long term utilisation in relation to national development a conservation policy is essential. To allow for growth at the optimum sustained output level a long term plan for the development of industrial minerals at the national level should be given more emphasis than the short term interests of the states. In conserving our industrial minerals, there should be a prevention of wastages, regulation of speed and ways of exploitation and the minimisation of environmental damages to neighbouring renewable resources such as the top soil, water, forests, national parks, and wildlife and recreational areas. Pollution should be avoided where possible or minimised. Industrial minerals unexploited can only appreciate in value in this world of diminishing natural resources.

The exploitation of a natural resource is the turning to economic account of that resource whereas conservation is the aggregate of practices and customs of man that permit the perpetuation and sustained yield of renewable resources and the prevention of waste of non-renewable resources.

The world we live in is a finite entity and so is Malaysia as a country on it. The supply of natural resources including that of industrial minerals is limited. As industrial minerals are non-renewable resources their continuous exploitation could only result in total depletion in time. It is important that the exploitation of these industrial minerals be kept at an optimum level in pace with the country's over-all development plan in order that the country can benefit the most out of it for the longest period of time. With this in mind, the need for conservation is inevitable if the country would want to see a prolonged healthy period of economic growth.

The conservation of industrial mineral resources is best achieved through the prevention of wastage, regulation of pace of exploitation and appropriate utilisation of each mineral. In conjunction with this, there is a need to conserve the surrounding environment and existing neighbouring renewable resources such as top soil, forest, water, national parks, wildlife and recreational areas through minimization of damage done during the course of exploitation by way of mining.

The prevention of wastage can be ensured by the industries through the development of more efficient mining technology such as that observed in the remining of old mined land. The supporting industries that utilise the minerals mined can assist in using the minerals more economically. Cars can be built with thinner steel plates. Tins can be plated more thinly with tin. More efficient motor engines can be built.
which are more economical on fossil fuels. In ensuring the prevention of wastage, the consumers would have the biggest role to play in seeing that wastage is discouraged and the proper minerals used in appropriate products through the creation of desirable market situations.

The regulation of the pace of exploitation is essential because if exploitation is allowed to run free there is a general tendency of exponential growth which will result in slumps in the market, wastages and ultimately the exhaustion of the mineral resource. A national conservation policy is needed to facilitate a more coordinated and planned developmental growth of all our industrial minerals. The formation of Petronas for the petroleum industry included setting a conservative policy spelled out in the Third Malaysia Plan under Objective (v) which states that the objectives are to:-

**The formation of Petronas for the petroleum industry included setting a conservative policy spelled out in the Third Malaysia Plan under Objective (v) which states that the objectives are to:**

- effect an optimal social and economic pace of exploration of the nation's endowment of exhaustible oil and natural gas resources, taking into account the need for conservation of these depletable assets and the protection of the environment. This is an example to be followed for other non-renewable resources exploitation.

The country should not be over-eager for foreign exchange arising from the exploitation of its non-renewable resources when it has other means of obtaining foreign exchange such as through the sale of its rubber, palm oil and timber. Industrial minerals left unexploited can only increase in their value with time as we are living in a world of diminishing non-renewable resources. To enable better coordination at a national level, there is a need to invest more power over land matters in the Federal Authorities rather than leaving it with the states as defined in the National Land Code 1965.

In the course of utilising our industrial minerals, it is important that each mineral be put to appropriate use. Limestone should not be used for road surfacing or for the bulking of concrete; instead it should be used for cement manufacture, the making of quick-lime, as a source of calcium in animal feed and as ornamental stone in the case of marble. Good quality clay should be used for pottery rather than for bricks.

To maximise the use of our industrial minerals mined, they should at least be smelted in the country and better still finished products be made from them before they are exported. The smelting of tin in the country is the right thing to do, coupled with tin-plating or pewter work. The export of ore from the Mamut Copper Mine to Japan would be better dealt with in the manner of our tin ore.

The protection of the environment in the course of mining and exploiting our industrial minerals resources is equally important to the well being of the country. If damage to the environment is unavoidable it should be minimised. The pollution of padi fields in Sabah by the Mamut Copper Mine could have been avoided through the set up of anti-pollution devices as has now been done after damages was caused. Siltation of streams and rivers is still common in Peninsular Malaysia despite the Land Conservation Act which contains clauses against such activities. Needless to say thousands of acres of top soil valuable to agriculture are being washed away by tin mining activities. The Environmental Policy for the country spelled out in the Third Malaysia Plan is one of which we could be proud. The laws of the country have adequately covered most aspects needed in the conservation of the country. What is badly needed here in conservation is the will to follow the policies laid down and not to over-rule the need of conservation with the need of
development. Malaysia does need development with its increasing population but not at any cost. What is the use of increasing the standard of living alone with material well being if the quality of life at large has to be drastically lowered. Modern man does not live by money alone. He needs a sustaining ecosystem and a healthy environment to live in and not just exist in. These he is unfortunately capable of destroying.

In conclusion, Malaysia needs a national conservation policy for its industrial minerals which will allow for the prevention of wastage, regulation of exploitation and the protection of the environment and neighbouring renewable resources in the course of mineral exploitation. The Federal Authorities should be given more control over mining and mineral exploitation than they have at present under the National Land Code.

PERTEMUAN PERSATUAN
(MEETINGS OF THE SOCIETY)

TECHNICAL TALKS

STEPHEN HANCOCK: Groundwater Resources of the Malaysian Environment

"There has been quantitative evolution of groundwater investigations in Malaysia since the 60s." This introductory remark was made by Mr. Stephen Hancock, President, National Water Well Association of Australia, and Consultant to the Australian Groundwater Consultants Pty. Limited, in his talk given to members of the Society. The talk took place on Friday, 15th January 1982 at the Department of Geology, University of Malaya and attracted about 25 members.

The speaker commenced by comparing hydrological parameters of Australia and Malaysia, and proceeded to discuss the role of groundwater in the Malaysian environment. To the speaker, the role of groundwater in Malaysia is a function of water availability (especially surface water) and exploitation of groundwater depends a great deal on the economics and availability of groundwater. He then gave illustrative accounts on the requirements and locations for good groundwater resources, which are very dependent on recharge. Mr. Hancock also suggested a 'working philosophy' as a form of low chart for practicing groundwater engineers/hydrologists in groundwater investigations. Lastly, the problems and future of groundwater exploitation in Malaysia were discussed. Among the problems suggested were those with regard to expertise (manpower), good data bank, trained drillers and proper registration. He viewed that in future, computer models will be widely used and the environmental impact of tin mining activities will need to be considered in the exploitation of groundwater resources.

Mr. Stephen Hancock is back in Malaysia, after having successfully convened the International Groundwater Conference (Groundwater '81) held in Kuala Lumpur in June last year, to initiate a study into groundwater resources of the Klang Valley. This study is being funded jointly by the Australian and Malaysian Governments.

Mohamad Ali Hj. Hasan

*****

W.S. MOORE: Isotope dating of corals

Professor Moore lectured on absolute chronology based upon U-series isotopes and its application in establishing the sea level history of the past few hundred thousand years.

The audience was introduced to various aspects of this dating method that almost exclusively uses aragonitic coralline material. This method coupled with oxygen isotope stratigraphy of deep-sea sediments and the Milankovitch insolation curves have been used to extrapolate the behaviour of sea-level into the Late Pleistocene. The established sea-level curve is based on many samples from the western Pacific and from the Caribbean region with certain data from other regions and suggests that the two latest seas stand higher than the present datum occurred 120,000 and 135,000 years ago.
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Many questions arose from the floor, which consisted of 15 members. The meeting was held on 3rd February 1982, at the Department of Geology, University of Malaya.

Professor Moore is presently the Chairman of the Department of Geology, University of South Carolina, USA.

H.D. Tjia

****

MALAM PERLUHUAWAAN (WEATHERING EVENING)

There was again a large turnout, about 30, for this third in the series of geologic evenings at the Department of Geology, University of Malaya, Kuala Lumpur, on 11 Feb. 1982.

Tea was served at 7.00 p.m. and at 7.30 p.m. the 'Malam' started off, featuring three speakers delivering talks on matters related to weathering:

1) Dr. S. Paramananthan: Lateritic soils of Peninsular Malaysia
2) Dr. B.K. Tan: A chromium-nickel laterite in Bukit Punggor, Malacca, Peninsular Malaysia
3) Mr. J.K. Raj: Residual soils over granite.

The speakers have promised to submit their papers for publication in the near future.

G.H. Teh
Malam Perluluhaaan
11 Jan 1982

S. Paramanathan

B. K. Tan

J. K. Raj
Malam Perluluhawaan - Abstracts of Papers

S. Paramanathan: Lateritic soils of Peninsular Malaysia

The term 'laterite' was first introduced by Buchanan in 1807 to describe a variegated material which occurred in South India. This material when exposed hardens irreversibly. Today, however, the terms 'laterite' and 'lateritic soils', have very varied definitions. In fact any red coloured material rich in iron-oxides has been described as 'laterite', resulting in a lot of confusion in the literature. In order to overcome this, new terms such as plinthite, petroplinthite, pallid zone and iron-coated materials are defined as used by Soil Scientists.

Two types of 'lateritic soils' are found in Malaysia. Iron-coated materials are formed by the intense weathering, leaching and accumulation of iron further down the weathering profile. Such ferruginous materials are often red-coloured and retain their original rock structure - at least in part. The second type of 'lateritic soils' found in Peninsular Malaysia consists of rounded ferruginous gravels overlying the weathered saprolite, often unconformably. These types of soils often form cappings on hills. The erosion of these materials and dissection of the landscape result in two distinct catenal relationships between the materials and erosion products. There is some disagreement among soil scientists as to the processes which gave rise to the resultant landscapes.

It is believed that, intensive tropical weathering during the Tertiary resulted in the formation of the reddish-coloured soils with their iron-coated materials and their underlying plinthite (or laterite as defined by Buchanan). Subsequent dissection and erosion of the iron-coated materials gave rise to three geomorphic surfaces. These surfaces are probably related to the changes in sea-levels during the Pleistocene.

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B.K. Tan: A chromium-nickel laterite in Bukit Punggor, Malacca, Peninsular Malaysia

Analysed geochemical samples of the lateritic soil from Bukit Punggor showed the presence of chromium and nickel, giving a good indication of the ultramafic nature of the parent material. This might also infer the possible concentration of a leached nickeliferous deposit under the thick soil cover.

This discovery of laterite originating from an ultramafic source rock throws new light on some aspects of the geology of the region concerned and calls for closer examination of laterites elsewhere before indicating the nature of the parent material.

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J.K. Raj: Residual soils over granite

Residual soils over granitic rocks in Peninsular Malaysia are characterised by a vertical morphological sonation of weathered material that allows recognition of an upper Zone I of pedochemically and geochemically weathered bedrock and a lower Zone II of in situ geochemically
weathered bedrock. Zone II weathered material preserves to varying degrees, the original bedrock minerals, textures and structures, while Zone I material preserves few of these features. These zones of weathered material overlie the bedrock Zone III which entirely requires the use of explosives for its economical excavation. The material of Zones I and II can, however, be excavated without the use of explosives excepting for the longer core boulders (found in the lower part of Zone II) that sometimes require the use of explosives for their economical excavation.

*****

BERITA PERSATUAN (NEWS OF THE SOCIETY)

GSM COUNCIL 1982/83 ELECTION - RESULTS

The following have been elected to serve as the four 2-year Councillors in the 1982/83 Council:

Abdul Aziz Hussein (Universiti Teknologi Malaysia)
Khoo Kay Khean (Geological Survey Malaysia)
Michael Leong (Petromas)
Yeoh Gaik Chooi (Esso Production Malaysia).

The result of the election was announced on 7th Jan. 1982 by Dr. S. Paramananthan, the Election Officer, with J.K. Raj and S. Chandra Kumar as Scrutineers.

On the other hand, the other members of the 1982/83 Council have been returned unopposed at the close of nominations.

G.H. Teh

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GEOSCIENCE EDUCATION WORKSHOP

The Geoscience Education Workshop will be held on 27 April 1982 in conjunction with the Annual General Meeting at the same venue (Abbey Room 1, Hotel Merlin, Kuala Lumpur).

Tentative Programme

<table>
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<tr>
<th>Time</th>
<th>Activity</th>
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<tr>
<td>8.30 - 9.00</td>
<td>Registration</td>
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<tr>
<td>9.00 - 9.20</td>
<td>Welcoming address and opening speech by the President</td>
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<td>9.20 - 9.40</td>
<td>Tea</td>
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<td>9.40 - 11.00</td>
<td>Geoscience curriculum (paper presentation)</td>
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<td>11.00 - 12.00</td>
<td>Cooperation between local university and other sectors + types of graduates (Forum)</td>
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<tr>
<td>12.00 - 1.30</td>
<td>Lunch</td>
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<td>1.30 - 2.30</td>
<td>Role of local geoscience societies and institutes (Forum)</td>
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<tr>
<td>2.30 - 3.30</td>
<td>Geoscience education in secondary schools (Pre-University level) + in-service training (open discussion)</td>
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<tr>
<td>3.30 - 3.40</td>
<td>Closing remarks.</td>
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</table>
Further information on the Workshop is obtainable from:
Mr. Mohd. Ali Hasan, Organising Chairman, Geoscience Education Workshop,
Geological Society of Malaysia, c/o Dept. of Geology, University of
Malaya, Kuala Lumpur 22-11, Malaysia.

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PRESIDENTIAL ADDRESS

The Presidential Address by Dr. Mohd. Ayob will be on Petroleum Exploration in Malaysia, and will be delivered from 3.45 - 4.45 p.m. on 27th April 1982 in Abbey Room 1, Hotel Merlin, Kuala Lumpur.

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ANNUAL GENERAL MEETING

All members are reminded that the Annual General Meeting will be held at 5.00 p.m. on 27th April 1982 at Abbey Room 1, Hotel Merlin, Kuala Lumpur.

Agenda
1. Confirmation of minutes of last Annual General Meeting
2. Matters arising
3. President's Report
4. Hon. Secretary's Report
5. Hon. Asst. Secretary's Report
6. Editor's Report
8. Election of Hon. Auditor
9. Other business.

Members who have matters for discussion to be included in the AGENDA should inform the Hon. Secretary in writing not later than 7 days before the AGM.

Tan Boon Kong

*****

ANNUAL DINNER

The Annual Dinner of the Society will be held at the Lotus Room, Hotel Merlin, Kuala Lumpur, commencing 7.00 p.m. on 27th April 1982, following the AGM.

Cost for dinner is M$25.00 per person. The dinner is open to all members and their spouses, friends, etc.

Please confirm your attendance by sending in the appropriate payment to: The Treasurer, Geological Society of Malaysia, c/o Dept. of Geology, University of Malaya, Kuala Lumpur 22-11, Malaysia.

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EDITOR'S NOTE - ADVERTISING IN WARTA, DELAY OF WARTA

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To start off this new feature in our Newsletter we are indeed grateful to Schlumberger Overseas S.A. for their valuable contribution of $1,600 and Datuk Keramat Smelting for $200. We look forward eagerly to further contributions from other companies and organisations who are unaware of the offer and those who have yet to make up their minds. An advertising space order form is available on page 17.

We apologise for the slight delay in the Nov-Dec 1981 and this issue of the WARTA due to the change in printer, KDW number and unforeseen circumstances beyond our control.

G.H. Teh

*****

KEAHLIAN PROFESIONAL (PROFESSIONAL MEMBERSHIP)

The following have been elected as Professional Members of the Society:

(1) Mr. Chong Nai Hooi
(2) Mr. Lye Yue Hong
(3) Dr. Glenn L. Shepherd.

*****

KEAHLIAN (MEMBERSHIP)

The following persons have join the Society:

Full Membership

1. Ho Kheng Hong, P.O. Box 30, Mukah, Sarawak
2. Hans G. Oesterle, P. O. Box 2283, MCC, Makati Metro. Manila, Philippines.
3. J. Garrett Minke, P.O. Box 27/JKWK, Jakarta, Indonesia
4. G.V. Bowler, Keplerger and Associates Intern., 29 Goldhill Plaza (Podium Block), Singapore 1130.
7. Sabar b. Bauk, 210, P.P. Sains Fizik, USM, Penang
8. Gomes-Silva, Michel, SNEA (P), 26 Avenue des Lilas, 64018 Pau Cedex, France
10. Indarjit Singh, EPMI, P.O. Box 857, Kuala Lumpur.

Associate Membership

1. John McGhee, Promet Energy Ltd., c/o 21 Pandan Road, Jurong Industrial Estate, Singapore 2260

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1. Poh Seng Kui, IKM Kampus Sabah, Beg Berkunci no. 62, Kota Kinabalu, Sabah.
3. Ho Soon Nan, UKM Kampus Sabah, Beg Berkunci 62, Kota Kinabalu, Sabah.
4. Ahmad Anwar Adnan, Geology Dept., University of Malaya, Kuala Lumpur.

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Malaysia.
PERTUKARAN ALAMAT (CHANGE OF ADDRESS)

The following members have informed the Society of their new addresses:
1. S.A.A. Grodynski, Gearhart Geodata Services Ltd., Unit 904, 9th Floor, Orchard Towers, 400 Orchard Road, Singapore 0923.
2. D.G. Newton, --- ditto ------.
3. Nik Nasruddin Mahmood, Fundamental Research Division, MARDI, UPN P.O. Box 202, Serdang, Selangor.
4. Yongyut Trangcotchasan, Mineral Fuelds Division, Dept. of Mineral Resources, Phram 6 Road, Bangkok 4, Thailand.
5. Rudy A. Voys, c/- AGIP Australia, P.O. Box 1805, Darwin, NT. 5794, Australia.
6. Wong Pak Kheong, 43 Woodmont Drive S.W., Calgary, Canada T2W 4L3.
7. A.L. Scholtens, c/o Shell Co. of Thailand, 140 Wireless Road, Bangkok, P.O. B. 345, Thailand.
8. Brian C. Batchelor, 57 Cremin Street, Upper Mt. Gravatt, Brisbane, Australia 4122.
9. P.C. Cranfield, Endeavour Resources Ltd., GPO Box 524 J, Melbourne, Australia 3001.
10. Bruce Reed, U.S. Geological Survey, Gould Hall - APU Campus, University Drive, Anchorage, Alaska 99504, USA.
11. Dale F. Wetherbee, MAPCO Production Co., Inc., 705 South Elgin, P.O. Box 2115, Tulsa, Oklahoma 74101, USA.

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PERTAMBAHAN BARU PERPUSTAKAAN (NEW LIBRARY ADDITIONS)

The following publications were added to the Library:
27. Memoirs of the Faculty of Science, Kyushu Univ., vol. xxiv, no. 4, 1981.
41. Studies of the weathering crust by large scale geological survey by V.S. Pevzner (in Russian).
42. Precambrian geology and mineral resources, 1975 (in Russian).
43. Metallogeny of eastern part of Baltic shield (1 text + 7 maps) (in Russian).

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BERITA-BERITA LAIN
(OTHER NEWS)

Course on 'THE ORIGIN AND EVOLUTION OF SEDIMENTARY BASINS'

Date: June 1-3, 1982; 9.00 a.m. - 5.00 p.m.
Location: Royal Lancaster Hotel, Lancaster Terrace, London W2 (262-6737)
Lecturers: John F. Dewey, Walter C. Pitman III
Fee: £425 includes a detailed set of notes, diagrams and references, all course materials, lunch, coffee and tea.

Summary: An intensive advanced short course for those with a background in exploration geology and/or geophysics, designed to provide a fundamental in-depth understanding of the frontier areas in current thinking in the physics and geology of sedimentary basins in a plate tectonic framework and the role of plate tectonics as an exploration framework and critical tool in basin analysis for the petroleum industry and those concerned with regional tectonic/structural analysis. Emphasis will be placed throughout on the mechanical/thermal evolution and hydrocarbon maturation and migration.
The topics covered will be:

1. Mechanical and thermal properties of the lithosphere
2. Finite plate motion and plate kinematics
3. Eustasy, continental margins and stratigraphy
4. The evolution of rift systems with particular reference to Atlantic borderlands
5. Subduction systems with particular reference to Southeast Asia

For further information please contact:
John F. Dewey
University College
The Castle

Walter C. Pitman III
Lamont-Doherty Geological Observatory
of Columbia University
Palisades, N.Y. 10964, USA.

Please note that the course will also be given in Denver, Colorado, USA during November, 1982 and in Houston, Texas, USA during February, 1983.

ELEVENTH ANNUAL CONVENTION, INDONESIAN PETROLEUM ASSOCIATION

The Indonesian Petroleum Association will hold its 11th Annual Convention on June 8 and 9, 1982. The Convention will be held at the Jakarta Borobudur Intercontinental Hotel. An interesting variety of technical and social events is planned. Technical sessions will be held on June 8 and 9. In addition, there will be a golf tournament on June 7. Details of the technical and social programs are as follows:

Opening ceremonies
The Opening Day Ceremonies will be held on Tuesday, June 8, 1982. All participants are kindly requested to wear a coat and tie at these ceremonies. Sport shirts without tie are acceptable for attending regular technical sessions.

Technical Program
The Technical Program will follow the opening day ceremonies and continue through to the closing ceremony on the second day of the Convention.

Representatives of government and industry will present their views on the petroleum industry. The various lecture sessions will provide a wide range of topics covering techniques and tools used in the exploration, production, refining, transportation and marketing of hydrocarbons. Each participant will be entitled to receive a copy of the Convention Proceedings.

A booklet containing a schedule of the lecture presentations for the technical program will be issued prior to the Convention.

Copies of technical papers presented during the Convention will also be available at cost.

Sport and Social Events
IPA-Gold Tournament: Monday, June 7, 1982: The 1982 IPA Gold Tournament will be held on Monday, June 7, 1982, at the PONDOK INDAH Gold Course. Golfers will be divided into AM and PM groups, with tee off times (Short Gun Start) at 7.00 a.m. and 12.00 noon. Maximum allowable handicap is 24 for men and 28 for ladies.
Pertamina Ice Breaker Cocktail Party: Monday, June 7, 1982: A cocktail party, hosted by the President Director of Pertamina and Mrs. Joedo Sumbono, for all registrants and wives will be held on Monday evening June 7, 1982 at the Indonesia Petroleum Club, between 8.00 p.m. and 10.00 p.m. Dress: Batik/Lounge suit.

Dinner/Dance: Wednesday, June 9, 1982: The IPA Convention Dinner/Dance will be held in the Jakarta Borobudur Intercontinental Hotel at 8.00 p.m. on Wednesday, June 9, 1982. Dress: Batik/Lounge suit.

Ladies Program: 2 days: June 8-9, 1982: A tour of Pasar Seni - Ancol to observe the manufacture of traditional Indonesian handicrafts, after which a luncheon will be held at the Horison Hotel. Prior to lunch there will be Batik and Silver craft demonstration and during lunch there will be a Batik Show from the well known designer, Iwan Tirta.

On the second day, a guided tour to Bogor will take place, visiting the Presidential Palace where lunch will be served along with a performance of cultural dances from West Java, Batavia, Aceh and Bali.

Registration: Registration will be at the Jakarta Borobudur Intercontinental Hotel from 10.00 a.m. to 4.00 p.m. on Sunday, June 6, 1982 and from 8.00 am to 4.00 p.m. on Monday, June 7, 1982.

Companies having a large number of participants are requested to pre-register and to pick up their Convention Folders on Friday, June 4, 1982 at the IPA Secretariat Office. All are urged to pre-register if at all possible. Pre-registration forms are obtainable from the IPA Secretariat Jl. Menteng Raya 3, Jakarta.

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XI INTERNATIONAL UNION FOR QUATERNARY RESEARCH (INQUA)

The XI INQUA Congress will open on Sunday, August 1, 1982 and close on Monday, August 9, 1982. Activities of the Congress will include sessions of the INQUA General Assembly, meetings of the INQUA International Council, plenary scientific sessions, section scientific meetings, business and scientific meetings of INQUA Commissions and Subcommissions and relevant IGCP project groups, symposia, and local one-day excursions which will be organized on Sunday, August 8, 1982. Field scientific excursions will be organized before (July 23 to 31) and after the Congress (August 10 to 19).

The official languages of the Congress are English, French, German, Russian, and Spanish.

Scientific Program

The scientific program of the Congress will be designed to encourage the exchange of new information and ideas and to further international interdisciplinary contacts. Papers are suggested to be discussed in 33 sections united in six groups.

Group 1. Quaternary stratigraphy
1. Volume of the Quaternary and principles of its subdivision
2. Pliocene to Quaternary stratigraphy of offshore and deep-sea sediments.
3. Regional bio- and climatostratigraphy
4. Interregional, intercontinental, and global correlation
5. Methods of geochronology and geochronological correlation (isotopic geochronology, paleomagnetism, tephrochronology, dendrochronology, etc.).
Group II. Lithology and genesis of Quaternary deposits
6. Quaternary sedimentation in oceans
7. Accumulation processes and constitution of glacial, glaciofluvial, and glaciomarine deposits; glacial geomorphology
8. Lithogenesis of the cryogenic zone
9. Quaternary sedimentation in periglacial environment
10. Arid lithogenesis in the Quaternary
11. Alluvial sediments of various geomorphological environments and zones
12. Quaternary volcanism and continental and marine sedimentation
13. Problems of geochemistry of Quaternary formation

Group III. Quaternary fauna and flora
14. Paleontology of vertebrates and invertebrates and their stratigraphic significance
15. Paleobotany including palynology
16. Paleoecology

Group IV. Quaternary Paleogeography
17. Regularities and causes of changes of natural environments in the late Cenozoic
18. Neotectonics and geomorphology
19. Shorelines
20. Paleoglaciology
21. Paleopedology
22. Paleolimnology
23. Paleobiogeography
24. Periglacial phenomena and permafrost history
25. Quaternary history of major river valleys
26. Complex paleogeographic reconstruction
27. General regularities of the evolution of the biosphere in the Quaternary

Group V. Prehistoric Man and his material culture
28. Problems of the anthropogenesis
29. Archaeology of the Stone Age

Group VI. Natural resources of Quaternary deposits and their utilization; protection of the natural environment
30. Quaternary mineral deposits
31. Remote sensing
32. Problems of engineering geology
33. Protection of the natural environment.

All correspondence and requests for information concerning the Congress should be addressed to:
Dr. Ismail P. Kartashov
Secretary-General of the XI INQUA Congress
Geological Institute of the U.S.S.R. Academy of Sciences
Pyzhevsky 7
Moscow 109017, USSR.

6TH INTERNATIONAL ASSOCIATION ON THE GENESIS OF ORE DEPOSITS (IAGOD) QUADRENNIAL SYMPOSIUM

The International Association on the Genesis of Ore Deposits announces the holding of its Sixth Quadrennial Symposium in Tbilisi in the Georgian SSR of the USSR on September 7 - 12, 1982.
The topics of the Symposium will be: (1) ore-bearing hydrothermal systems (sources of ore material, conditions of migration and deposition, and geo-chemical parameters of the ore-forming process); (2) the relationship between ore formation and granite magmatism; and (3) mathematical methods of analysis of geological information in the study of ore deposits.

Abstracts of papers for presentation at the Symposium should be written in either English or Russian and should be forwarded to: Dr. A.G. Tvalchrelidze, Scientific Secretary of the Organizing Committee at the Caucasian Institute of Mineral Resources, 85 Paliashvili St., 380030 Tbilisi, USSR. Abstracts should be postmarked prior to July 1, and should be sent by air.

The text of any abstract should not exceed two typewritten pages and should be enclosed within a frame 16.5 cm by 23 cm; lines of text should be 1.5 spaces apart. The title of the report should be in capital letters at the top of the first page. The name of the author(s), preceded by initials of his (their) given names should be centered under the title and separated from it by a double space. After another double space should be the complete name of the author(s) organization(s), and the city and country in which it (they) is (are) located. Each new paragraph in the abstract should be indented five spaces. Two copies of each abstract should be sent to Tbilisi.

The Symposium will be preceded and followed by field excursions. Those before the Symposium will be: A-1 that will visit ore deposits in the Greater Caucasus (6 days); A-II deposits in the Transcaucasus (5 days); and A-III geological museums in Moscow and Leningrad (5 days). All excursions will begin in Moscow and end in Tbilisi. The excursions after the Symposium will be C-1 that will visit ore deposits in the Ukraine (6 days); C-II deposits in Uzbekistan (5 days); and C-III deposits in Kirghizia (5 days). All C excursions will begin in Tbilisi on September 13, and all will end in Moscow.

The registration fee for the Symposium will be $US45, and this sum should be sent to the Scientific Secretary in Tbilisi not later than May 15, 1982.

Registration in Tbilisi will be accomplished on Sunday, September 5, 1982 from 0800 to 2400 and on Monday, September 6 from 0800 to 1300.

Anyone attending the Symposium is urged to make their travel arrangements through INTOURIST or have their travel agency, if it has connections with INTOURIST, do so for them. Travel in the USSR is greatly facilitated for non-Russian speakers by so doing. Visas also may be obtained through INTOURIST. (Tourist firm cooperating with INTOURIST: Harpers Travel, 38 Jalan Ampang, P.O. Box 247, Kuala Lumpur). Single rooms, with bath and meals, will cost about 40 roubles (some US$60) per day. These sums also include transport to and from all airports and certain sightseeing tours. Programs will be organized for accompanying members. Be sure that all money changed in the USSR is done according to rules clearly stated on your entering customs declaration.

Registration forms can be obtained by writing to: Dr. G.B. Leech, Associate Secretary General, IAGOD, Geological Survey of Canada, 601 Booth St., Ottawa, Ontario, K1A 0E8, Canada. Anyone requesting the registration form will be sent the Second Circular.

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AUTUMN COURSE ON GEOMAGNETISM, THE IONOSPHERE AND MAGNETOSPHERE
21 September - 12 November 1982

The International Centre for Theoretical Physics, Trieste, Italy, will organize a Course on the theory of the Earth's magnetic field, the ionosphere and the magnetosphere, and radio propagation in the surroundings of the Earth, together with a Workshop on radio propagation in the tropics, from 21 September to 12 November 1982. The programme is sponsored by the Italian Dipartimento per la Cooperaione allo Sviluppo, the International Union of Geodesy and Geophysics, the International Union for Scientific Radio and the Kuwait Foundation for the Advancement of Sciences.

Purpose and Nature

The Course is intended to develop the mathematical and physical basis of the phenomena of the geomagnetic field and the plasmas around the Earth, and participants should have completed several years of study and research after a first degree.

The Workshop is intended for those particularly interested in the special problems of radio propagation in the tropics, and familiarity with the material of the preceding courses will be assumed.

The Course and Workshop are open to scholars from all countries of the world that are members of the United Nations, IAEA or UNESCO. While it is the main purpose of the Centre to help scientists from developing countries, graduate students and postdoctoral scientists from other countries are welcome to attend the Course and Workshop. Preference will be given to candidates involved in teaching, research or service activity in a university or research institute.

The programme will be conducted in English and every participant must have a working knowledge of that language. Each participant will have his own desk at the Centre, which is situated a few kilometres from the city of Trieste, and arrangements will be made for discussions, study groups and tutorials outside the formal programme.

Tentative Programme

Weeks 1-6 (21 September - 29 October)
Courses on - Geomagnetism (description analysis of the Earth's field, dynamo theory, electromagnetic induction)
- Ionosphere (nature, origin and control of the ionosphere, plasma physics, radio propagation)
- Magnetosphere (nature, origin, electrodynamics, magnetic storms)
- Interactions between the solar wind, terrestrial plasmas and neutral atmosphere
- Radio propagation in the regions around the Earth.

Weeks 7 - 8 (2 - 12 November)
WORKSHOP on radio propagation in the tropics.

Throughout the Autumn Course there will be a Resident Director in charge.

Participation

Candidates can request for participation forms from:
International Centre for Theoretical Physics
P.O. Box 586
I-34100 Trieste
Italy.
As a rule, travel costs to and from Trieste, as well as subsistence expenses of the participants, are borne by the home institutions. However, funds are available which will permit the Centre to grant an allowance to a limited number of participants from developing countries who will be selected by the Organizing Committee. In exceptional cases this allowance will also cover travel expenses, but preference will be given to those candidates who can obtain their fare (or half fare) from their home country. Such financial support is available only to those attending the entire Course.

Deadlines for the receipt of request for participation forms:
- Candidates requesting financial support from ICTP: 31 March 1982
- Candidates not requesting financial support from ICTP: 30 June 1982.

The decision of the Organizing Committee will be communicated to all candidates as soon as possible after the selection.

**Visas**

Participants requiring a visa to enter Italy to attend the Course should apply to the nearest Italian Consular Office and present the letter they will receive from the Centre informing them of their acceptance.

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SEMINAR ON BENEFICIATION OF TIN AND ASSOCIATED MINERALS
BANGKOK, OCTOBER 1982

The Southeast Asia Tin Research and Development (SEATRAD) Centre in cooperation with the Department of Mineral Resources, Thailand, is organising a seminar entitled "Beneficiation of Tin and Associated Minerals". The Seminar will be held in October 1982 in Bangkok, Thailand.

The objective of the Seminar is to provide a forum for discussion on the beneficiation of tin and associated minerals, with the view towards promoting exchange of information and collection of data on the practices in different tin-producing countries of the region and the world. It is hoped that the Seminar will cover not only the existing technologies but also the new technologies as well as to identify areas where further research need to be done.

A two-day field trip to visit the mines, treatment plants and smelter at Phuket, Thailand, will be organised following the Seminar.

The Seminar is open to participants from all countries.

For further information, please contact:
The Director
SEATRAD Centre
14 Tiger Lane
Ipoh, Malaysia.

Telephone: 05-517124 & 517833
Cable: TINCENTRE, IPOH.

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XIV INTERNATIONAL MINERAL PROCESSING CONGRESS

The XIV International Mineral Processing Congress will be held in Toronto, Canada, from 10 to 16 October, 1982. The theme of the congress will be 'Worldwide industrial application of mineral processing technology'. The programme will include technical sessions and numerous field trips to the different mining areas of Canada. The preliminary programme includes sessions on:

(1) Flotation - plant practice, equipment, design, simulation, control and economics
(2) Comminution - plant practice, equipment, design, simulation, control, wear, energy consideration and economics
(3) Round table seminar on large grinding mills
(4) Round table seminar on modern and future plant design
(5) Mineral processes to recover precious metals
(6) Mineral processes to recover energy minerals (coal, uranium)
(7) Mineral processes to recover industrial minerals
(8) Round table seminar on environment and ecology and how different countries cope with associated problems
(9) Materials handling, with emphasis on agglomeration techniques, pre-concentration methods, solid-liquid separation
(10) Open session to deal with topic emerging from general demand.

Prospective authors are invited to submit abstracts of fewer than 500 words before June, 1982, to Mr. Roland Le Houiller, Technical Program Chairman, 2700, Rue Einstein, Ste-Foy, Quebec, Canada, G1P 3W8 or Mr. L.L. Sirois, Ore Processing Lab CANMET, 552 Booth Street, Ottawa, Ontario, Canada K1A OEA.

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15TH PACIFIC SCIENCE CONGRESS

Dunedin, New Zealand, February 1-11, 1983

Theme: Conservation, development and utilization of the Resources of the Pacific

General symposia: 1) Energy in Agriculture  
2) High latitude resources: their assessment and development  
3) Resources, science and the law of the sea  
4) Pacific Island potentials.

Sections
A Ecology, conservation and environmental protection. To include: ecological inventories; population ecology; analysis of natural and man-induced changes; methodology; conservation and management.
B Solid Earth Sciences. To include: plate movements; arc volcanism; subduction and ophiolites; crust and upper mantle structure; temperature gradients, metamorphism, and uplift rates; paleobiogeography and stratigraphic correlation; loess and tephra soils; seismic and volcanic risk; slope stability and other geological hazards; ore deposition; energy and mineral resources; and Third International Meeting of Pacific Neogene Stratigraphy.
C Geography. To include: land use change and conservation of the environment; population policies; management of coastal environments; problems of higher latitude lands; urbanization.
D Museums in Pacific Research. To include: role of museums in Pacific region; survey of anthropological collections; discussion session.
Marine sciences. To include: resources of Southern Ocean; aquaculture; marine productivity and trace element cycles; remote sensing; effects of river inputs; forecasting and monitoring; plankton studies; living marine resources; oceanic fronts; marine parks and reserves; diseases and parasites; species interactions; mangrove ecosystems.

Coral reefs.

Botany. To include: flora of New Zealand; plant adaptation to oceanic climates; history of botany; ecological inventories; exploitation of marine algae; plant diseases.

Forestry. To include: tropical and temperate natural forest management; plantation forestry; interaction between forest and food productions in tropical regions.

Fresh-water sciences. To include: lake and river ecosystems; macrophytes; organic detritus and bacteria; phytoplankton productivity; chemical studies; fisheries; zooplankton systematics and biology.

Entomology. To include: insect vectors of human and animal diseases; insect pests in agriculture and forestry; evolution and distribution of insects; pest management systems.

Social sciences and humanities. To include: historical analysis of Pacific communities; anthropological approaches to traditional societies; contemporary problems in changing societies.

Public health and medical sciences. To include: ecology of influenza viruses; natural focus diseases; metabolic diseases; human ecology; environmental carcinogens, mutagens and teratogens.

Nutrition. To include: food resources of the Pacific; nutrition of children; trace elements; metabolic diseases.

Science education and communication. To include: education and cultural diversity; telecommunications; communication networks; technology transfer; future trends; communication in agriculture.

Various national and international scientific societies and organizations will meet in Dunedin as part of the Congress. Pre- and post-Congress tours are being provided.

Papers are invited. Further information can be obtained from:

Secretary-General
15th Pacific Science Congress
P.O. Box 6063
Dunedin, New Zealand.

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KALENDAR (CALENDAR)

A bracketed date, e.g. (Mar-Apr 1981) denotes entry in that issue carried additional information.

1982

Apr 1 – 3 : First international symposium on Soil, Geology and Landforms - impact on land use planning in developing countries, Bangkok. Contact: Dr. Prinya Nutalaya, Symposium Secretary, LANDPLAN 1, Div. of Geotechnical & Transportation Eng., AIT., P.O. Box 2754, Bangkok, Thailand (Jul-Aug 1981).

Apr 19 – 23 : First International Mine Water Congress, Budapest, Hungary. Languages: English, Hungarian, German, Russian, French, Spanish. (Hungarian Mining and


May 7 - 20: Recent crustal movements and phenomena associated with earthquakes and volcanism. (Symposium no. 3 at IAG meeting), Tokyo, Japan. (P. Vyskocil, ICRCM, CS-250 66 Zdiby, 98, Czechoslovakia).


May 12 - 14: 9th International Geochemical Exploration Symposium, Saskatoon, Canada. (V.J. Sopuck, Organizing Committee, 9th IGES, Box 432, Sub. P.O. 6, Saskatoon, Saskatchewan, Canada S7N OWO).


May 14 - 16: Granitic Pegmatites - MAC Short Course. Contact: Dr. P. Cerny, Department of Earth Sciences, University of Manitoba, Winnipeg, Manitoba, Canada R3T 2N2. (Sep-Oct 1981).


May 24 - 28: Gold '82 Symposium, University of Zimbabwe. Dr. R.P. Foster, Organising Secretary, GOLD '82, Institute of
May 24 - 28: Geological Information, (2nd International Conference), Golden, Colorado, USA. Co-sponsored by IUGS and AGID. (C.C. Ward, University of Illinois at Urbana-Champaign, 232 Natural History Bldg., Urbana, Illinois 61801, USA/A.P. Harvey, Dept. of Library Services, British Museum (Natural History), Cromwell Road, London SW7 5BD, U.K.).


May 31 - Jun 4: World Mining (11th International Congress), Belgrade, Yugoslavia, Pre- and post-congress tours. (Organizing Committee, 11th World Mining Congress, Sava Centar, 11070 Belgrade, Yugoslavia).


Jun 7 - Jul 2: Geochronology, Cosmochronology and Isotope Geology (Conference), Nikko National Park, Japan. (K. Shibata, Geological Survey of Japan, Higashi 1-1-3, Yatabe, Ibaraki 305, Japan).


Aug 1 - 9: Xlth INQUA Congress, Moscow, U.S.S.R. Fiftieth anniversary of founding of INQUA in Leningrad. Pre-


Sep : International Symposium on Archean and Early Proterozoic Geologic Evolution and Metallogenesis (ISAP), Salvador, Brazil. Symposium will precede the 32nd Brazilian Geological Congress. Presymposium field trips. (Augusto J. Pedreira, ISAP Coordinator, CPRM - Rua Barros Falcão, 21, 40,000 Salvador, Bahia, Brazil).

Sep 2 - 10: Kimberlite, (3rd International Conference), Clermont-Ferrand, France. (F. Boudier, Universite de Nantes, Laboratoire de Tectonophysique, 2 rue de la Houssiniere, 44072 Nantes, France).


Sep 19 - 25: International Mineralogical Association (13th General Meeting and field excursions), Varna, Bulgaria. (Secretary General, 13th IMA Meeting, University of Sofia, Chair of Mineralogy, Boulev. Russki 15, Sofia, 1000 Bulgaria).

Sep 21 - Nov 12: Autumn Course on Geomagnetism, the Ionosphere and Magnetosphere, 21 Sept - 12 Nov 1982, Trieste, Italy. Contact: International Centre for Theoretical Physics, P.O. Box 586, I-34100 Trieste, Italy (Jan-Feb 1982).

Oct: SEATRAD Centre - Seminar on Beneficiation of Tin and associated minerals, October 1982, Bangkok. Contact: The Director, SEATRAD Centre, 14 Tiger Lane, Ipoh, Malaysia. (Jan-Feb 1982).


Oct 4 - 8: Applied Ore Microscopy, (12th Annual Short Course), Rolla, Missouri, USA. To precede International Conference on Mississippi Valley-type Lead-Zinc Deposits in Rolla. (R.D. Hagni, Dept. of Geology and Geophysics, University of Missouri, Rolla, Missouri 65401, USA).


Nov: 1st International Short Course on Small Scale Mining, (Sponsored by AGID and includes lectures, lab work, seminars and field tours), Bangalore, India. (Prof. C. Naganna, Director, School of Earth Sciences, Bangalore University, Jnana Bharathi, Bangalore 560 056, India).


1983
Feb 1 - 11: XV Pacific Science Congress, Dunedin, New Zealand. (Secretary-General, 15th Pacific Science Congress, P.O. Box 6063, Dunedin, New Zealand) (Jan-Feb 1982).


Mar 6 - 10: 3rd International Symposium on Hydrometallurgy, Atlanta, Georgia, USA. K. Osseo-Asare, Dept. of Materials, Science and Engineering, 202A Steidle Building, the Pennsylvania State University, University Park, Pennsylvania 16802, USA.


Sep: 10th International Geochemical Exploration Symposium, Helsinki, Finland. Sponsored by the Association of Exploration Geochemistry. (L.K. Kauranne, Organizing
Committee, 10th IGES., The Geological Survey of Finland, Kivimiehentie 1, 02150 Espoo 15, Finland).


Sep 12 - 17: Carboniferous Stratigraphy and Geology (10th International Congress), Madrid, Spain. Languages: English, French, German, and Spanish; English and Spanish preferred for oral presentations. (Comite organizador del X Congreso Internacional de Estratigrafia y Geologia del Carbonifero, Instituto Geologico Minero de Espana, Rios Rosas, 23-Madrid-3, España).


Dec: Groundwater 1983, (IAH Symposium), Sydney, Australia. (W. Williamson, Ibis House, 201/211 Miller St., P.O. Box 952, North Sydney, N.S.W. 2060, Australia).

1984 Aug 4 - 14: 27th International Geological Congress, Moscow, USSR. (N. Bogdanov, Secretary General, 27th IGC Secretariat, Lithosphere Institute, 22 Staromonetny per., 109180, USSR. Tel. 238-8588).

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PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)


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

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