

PERSATUAN GEOLOGI MALAYSIA

WARTA GEOLOGI

NEWSLETTER OF THE GEOLOGICAL SOCIETY OF MALAYSIA

Jil. 15, No. 3 (Vol. 15, No. 3)

Mei-Jun 1989

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DIKELUARKAN DWIBULANAN
ISSUED BIMONTHLY

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(GEOLOGICAL SOCIETY OF MALAYSIA)

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*Published by the Geological Society of Malaysia, Department of Geology,
University of Malaya, 59100 Kuala Lumpur (Tel. 03-7577036).*

Printed by Art Printing Works Sdn. Bhd., 29 Jalan Riong, 59100 Kuala Lumpur.

CATATAN GEOLOGI
(GEOLOGICAL NOTES)

THE DISTRIBUTION AND DEVELOPMENT OF ARSENOLITE (As_2O_3) CRYSTALS
ON A POLISHED SECTION OF NATIVE ARSENIC FROM THE BAU GOLD-FIELD,
SARAWAK

K.F.G. Hosking,
1-B, Penlu Tuckingmill, Camborne, Cornwall, TR148NL, U.K.

Of the mineral deposits at Bau only the auriferous ones have proved themselves to be of considerable economic importance. However, other deposits occur there that are primarily of interest to those concerned with one aspect or another of mineralogy and/or ore-genesis. Antimony deposits, in which stibnite (Sb_2S_3) is the dominant, or sole Sb species, are found in limestone and some have been subjected to limited, but almost certainly unprofitable, exploitation. Cinnabar (HgS)-bearing deposits have been investigated but not mined. From some of the mineralised areas native arsenic, sometimes associated with orpiment (As_2S_3) and realgar (AsS) have been noted, and I found the three species in the walls of an abandoned trench that had been dug to work a stibnite vein. Some of the native arsenic that was locally projecting from the wall of the trench was approximately hemispherical and up to c. 10 cm in diameter. It was coated with a dark-brown to black substance and according to Palache *et al.* (1944, p. 129) such substances consist of a mixture of exceedingly fine particles of arsenic oxide and native arsenic. The coated body which I collected was ornamented by concentric lines which reflected its colloform character and which caused the body to resemble a hemisphere of wood.

A freshly polished section of the hemispherical body, noted above, was left on the unilluminated stage of a microscope, in a small air-conditioned and darkened room when I left for lunch. On returning, about one hour later, I was surprised to find that much of the surface of the arsenic was covered with small colourless crystals of what, beyond reasonable doubt, were arsenious oxide (As_2O_3) (Fig. 1). As_2O_3 , when occurring naturally, is termed arsenolite. Whether the crystals on the polished section should be called arsenolite or simply arsenious oxide is, perhaps, a topic for debate.

A number of localities are known where arsenolite, often as minute octahedra, is found investing native arsenic and which have developed as a result of oxidation of the element (see Palache *et al.*, op. cit., p. 543). However, I have found no record in the literature of easily observed crystals of the oxide investing a polished section of the element. Ramdohr (1980), when discussing polished sections of native arsenic, makes the following observations:

"After a few days the sections tarnish to a dull brownish grey" (P. 366);

CATATAN GEOLOGI
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ON A POLISHED SECTION OF NATIVE ARSENIC FROM THE BAU GOLD-FIELD,
SARAWAK

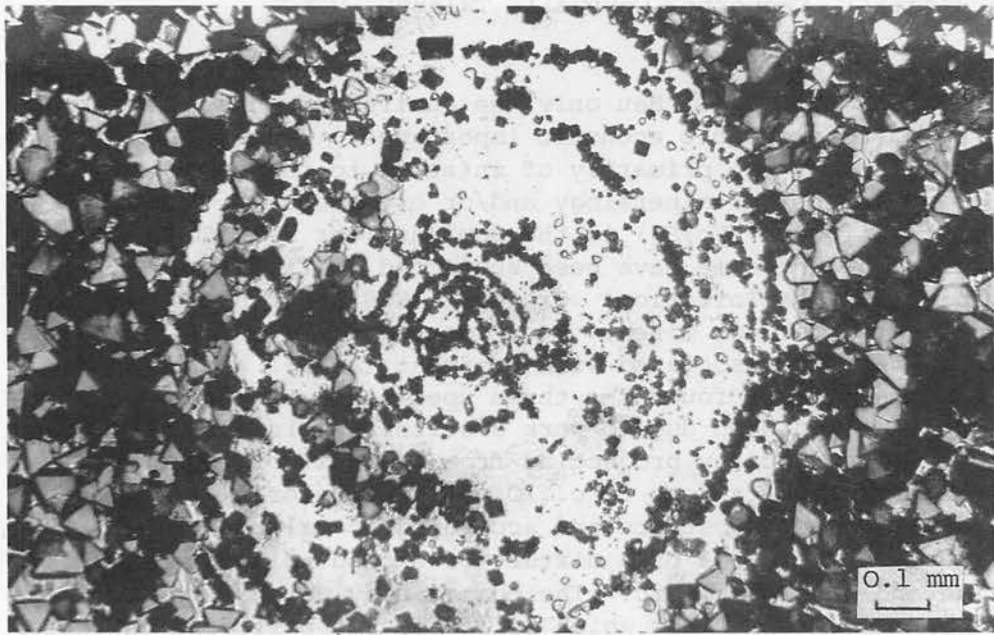


Fig. 1. As_2O_3 crystals investing parts of a polished section of native arsenic from the Bau area, Sarawak. The crudely concentric distribution of the oxide crystals, in the middle of the illustration, is thought to be due to gaps between a given shell of arsenic and its neighbour. These gaps were the sites of preferred oxide development during the initial stages of encrustation. Later, spots on the shells' surface became sites of oxide development and finally, should the process of oxidation continue, doubtless the whole surface of the arsenic would be covered by oxide crystals in the manner shown by the right- and left-hand parts of the photomicrograph.

"Air etching of only two or three days usually develops the structure well." (P. 366);

"Rapid tarnishing in air is usually quite characteristic" (P. 369)

The differences in behaviour between the arsenic studied by Ramdohr and the Bau material provide speculations that need to be examined and questions that require answers. For example, did my oxide crystals owe their existence, to some extent, to a veneer of 'water' on the section which was a condensate from my expelled breath as I was using the microscope? Was the temperature of my Malaysian room more conducive to crystal growth than that of Ramdohr's laboratory. Are variations in minor and/or trace elements in the arsenic determining factors? Does the degree of perfection of the polish play an important role?

It is, however, important to note that the concentric texture of my arsenic section was emphasised by the disposition of the oxide crystals along crudely concentric paths. Whilst this pattern may reflect compositional variations between adjacent arsenic shells, I think it is much more likely that it indicates the disposition of local gaps between neighbouring shells and these were preferred sites for oxide crystals to develop. Should solutions play a key role in the development of the oxide crystals, then it is in the inter-shell gaps where maximum thicknesses would accumulate. However, the most chemically reactive parts of crystalline bodies are corners and edges. So, in my view, the concentric disposition of the oxide crystals may well be determined primarily by the positions of the edges of the gaps between an arsenic shell and its immediate neighbour. The observed dense packing of crystals in these situations might be expected if oxide crystals developed along each of two parallel and close edges of adjacent arsenic shells.

Hopefully what I have written will persuade somebody to continue this barely started investigation.

References

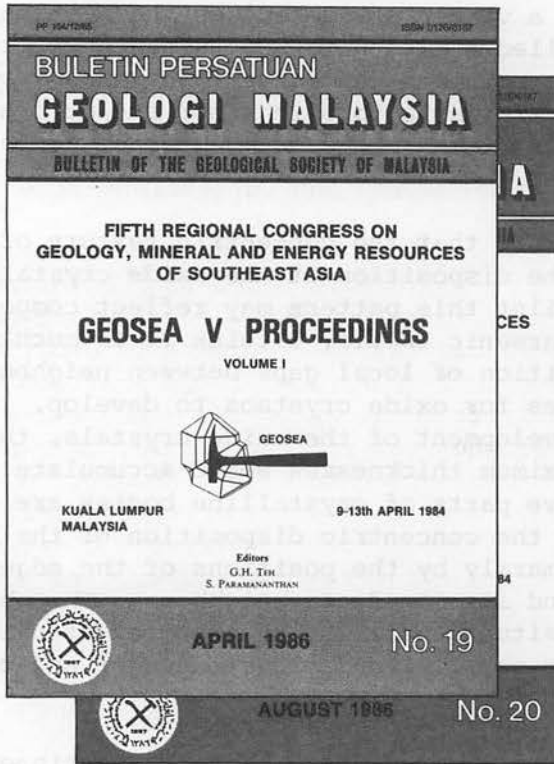
- Palache, C., Berman, H. and Frondel, C., 1944. *Dana's system of mineralogy*, 7th edn., vol. I. John Wiley and Sons, Inc., N. York.
- Ramdohr, P., 1980. *The ore minerals and their intergrowths*, vol. I. Pergamon Press, Oxford.

Manuscript received 22 May 1989.

GEOLOGICAL SOCIETY OF MALAYSIA

GEOSEA V PROCEEDINGS

VOLUMES I & II
(Bulletin Geological Society of Malaysia Nos. 19 & 20)



Some of the articles appearing include:-

Massive sulphide deposits and their possible significance to other ores — R.W. Hutchinson; Palaeogeographic development of west Sarawak — Denis N.K. Tan; Geological evolution of the Southern Philippines — C.K. Burton; Southeast Asia as a part of an early Palaeozoic Australian Gondwanaland — C. Burnett & B. Stait; Tertiary basins of S.E. Asia — their disparate tectonic origins and eustatic stratigraphical similarities — C.S. Hutchison; Late Palaeozoic palaeogeography of Southeast Asia: some stratigraphical, palaeontological and palaeomagnetic constraints — I. Metcalfe; The REE geochemistry of Lingshan W-Sn-bearing granites and their applications to petrogenesis of the granites — Yuan Zhongxing *et al.*; Chromite deposits of Papua New Guinea — P.M. Afenya; Recent advances in exploration modelling for tin deposits and their application to the SE Asian environment — R.G. Taylor & P.J. Pollard; Some thoughts on the development of the alluvial tinfields of the Malay-Thai Peninsula — D. Taylor; Base metal exploration in Sabah — David T.C. Lee & H.S. Weber; The nature and potential of gold mineralisation in Kelantan — L.H. Chu & D. Santokh Singh; Quaternary deposits of Thailand — P. Dheeradiok & W. Kaewyana; Soil landscapes in Peninsular Malaysia — S. Paramanathan & S. Zauyah; Aspects of the geochemistry of Malaysian cassiterites — W. Fuad Hassan; Geological evolution of the Indonesian Archipelago — H.M.S. Hartono & S. Tjokrosapetro; The nature, distribution and genesis of certain authigenic minerals in the stanniferous alluvial deposits of S.E. Asia — K.F.G. Hosking; Global tectonics and resources — W.S. Fyfe; Tin/tungsten-bearing granites in S. China and their metallogenetic relations — Xu Keqin & Zhu Jinchu; Hydrogeological activities in Peninsular Malaysia and Sarawak — F.S. Chong & Denis N.K. Tan; Status of uranium exploration in Peninsular Malaysia — L.H. Chu & F. Chand; Directions of geologic transport in Peninsular Malaysia — H.D. Tjia; Cathaysia, Gondwanaland and the Palaeotethys in the evolution of Continental S.E. Asia — Y.G. Gatinsky & C.S. Hutchison; Marginal sea formation by rifting of the Chinese and Australian Continental Margins and implications for Borneo — C.S. Hutchison; Mesozoic and Cenozoic regional tectonics and metallogenesis in Mainland S.E. Asia — A.H.G. Mitchell; Coal potential and exploration in Sarawak — S.P. Chen; The succession of vertebrate faunas in the continental Mesozoic of Thailand — E. Buffetaut & R. Ingavat; Regional controls of hydrothermal ore localization in northern Thailand — P. Asnanchinda & S. Chantarammee; Late Palaeozoic glacial marine facies in S.E. Asia and its implications — P.H. Stauffer & C.P. Lee; Cretaceous melange in West Kalimantan and its tectonic implications — P.R. Williams *et al.*; Recent advances in the knowledge of geology, mineral and energy resources of Singapore since 1981 — Ansafur Rahman & P.P. Wong; The integration of remote sensing, terrain evaluation and engineering geology in Southeast Asia — Beaumont, T.E. & Hunt, T.; Recent advances in the knowledge of geology and mineral resources of Vietnam since 1981 — Le Thai Xinh & Nguyen Xuan An.

This 2-volume GEOSEA V PROCEEDINGS of about 500 pages each contains 95 articles presented at the Fifth Regional Congress on Geology, Mineral and Energy Resources of Southeast Asia held in Kuala Lumpur, April 1984.

To: Hon. Assist. Secretary
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SUBSURFACE GEOLOGY OF THE KUALA LUMPUR LIMESTONE

Lim Tow Ho,
4 Solok Scott, Penang.

Subsurface geology

The subsurface geology of the Kuala Lumpur Limestone means geology near the surface. The geological information was extracted from borehole logs from a site investigation. The depth of the study from the surface depends on the depth of the borehole logs and the value ranges from a few meters to fifty meters. Because the information from the borehole logs were obtained from reports only, interpretation and corrections were necessary.

The classification of the earth materials is based on the International Association of Engineering Geology Report (IAEG, 1981). Subsurface geological profiles were prepared from borehole data to increase information and understanding of subsurface conditions. Preparation of the profiles was assisted by surface geology especially from cut areas and mines where stratigraphy, bedrock topography, thickness of residual soils, thickness of alluvial layer and geological boundaries can be seen. However, problems in interpreting subsurface geological conditions still exist especially where the grade of weathering is high and rock characteristics changed or disintegrated. Preparation of subsurface profiles can assist site investigation operations in that the operations can be meaningfully carried out.

Kuala Lumpur Limestone

The limestone rocks in the Kuala Lumpur area are covered by a layer of alluvial deposits. Geology below the surface is shown by a close relationship between the alluvial deposits and limestone bedrock. The subsurface profile of the Limestone Formation at Jalan Perumahan Gurney can be seen in Figure 1. The subsurface topography of the Limestone Formation is interpreted as pinnacled with a limestone boulder left behind from the weathering processes. Solution weathering of the limestone have resulted in some of the characteristics. In this profile the thickness of the alluvium changes from 21 m to 26 m. Because the weathering profile of the limestone is not clearly defined the entire soil material is classified as alluvial material. The alluvial deposit is characterised by three soil groups, that is sandy clay, sand and gravel. The alluvial layers are well formed and have boundaries that are nearly horizontal. The alluvial deposit near the limestone bedrock is sandy, probably because it has mixed with weathered material from the limestone.

The subsurface profile of the Limestone Formation at Jalan Padang Tembak can be seen in Figure 2. The subsurface topography of the Limestone Formation is very pinnacled as evidenced by the varying depths of the limestone bedrock in boreholes. The unusually deep subsurface topography of the limestone at A-15 resembles a sinkhole as a result of solution

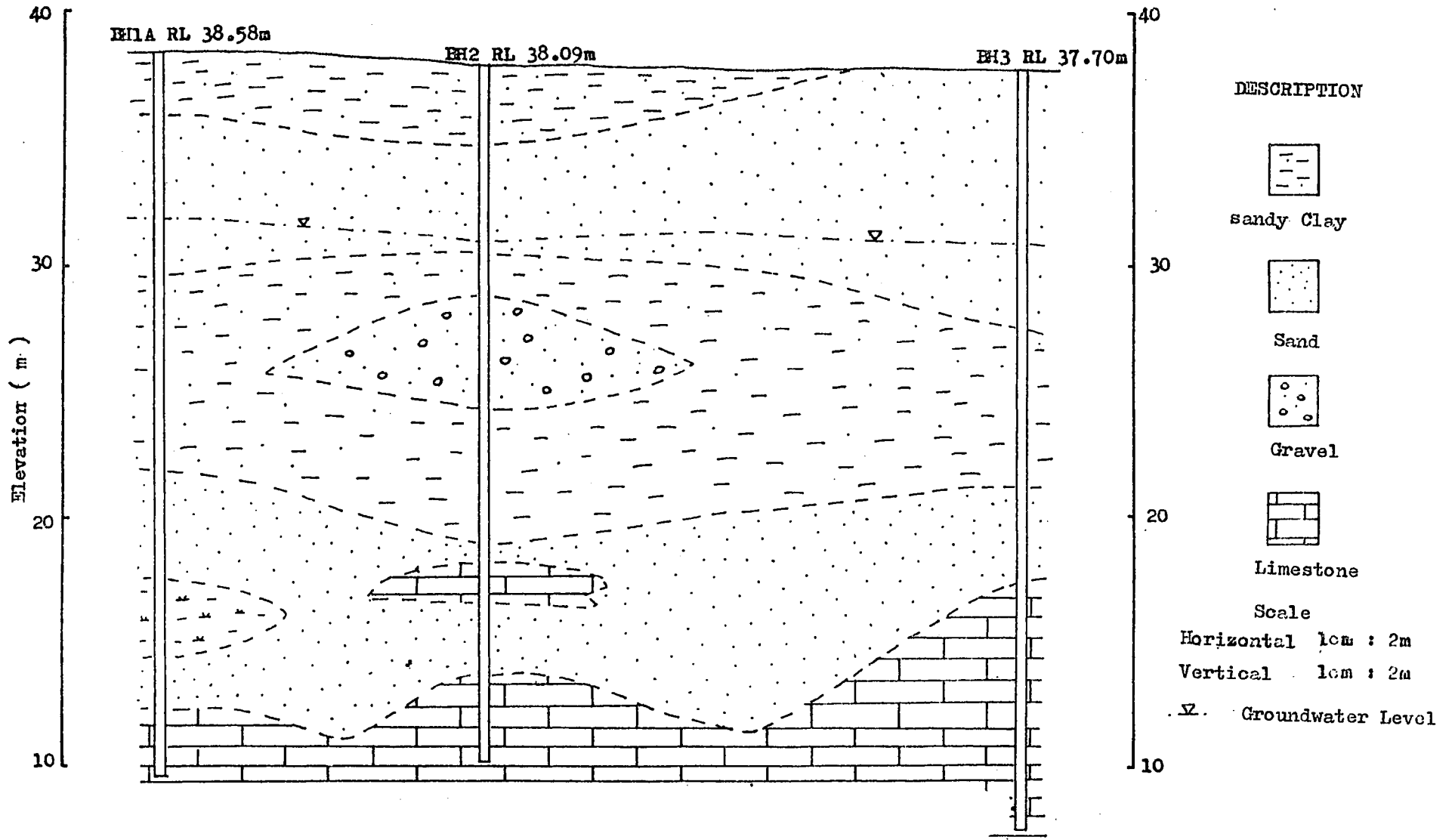


Fig. 1. Subsurface profile of the Kuala Lumpur Limestone at Jalan Perumahan Gurney (Ass Sealand Drillers, 1982).

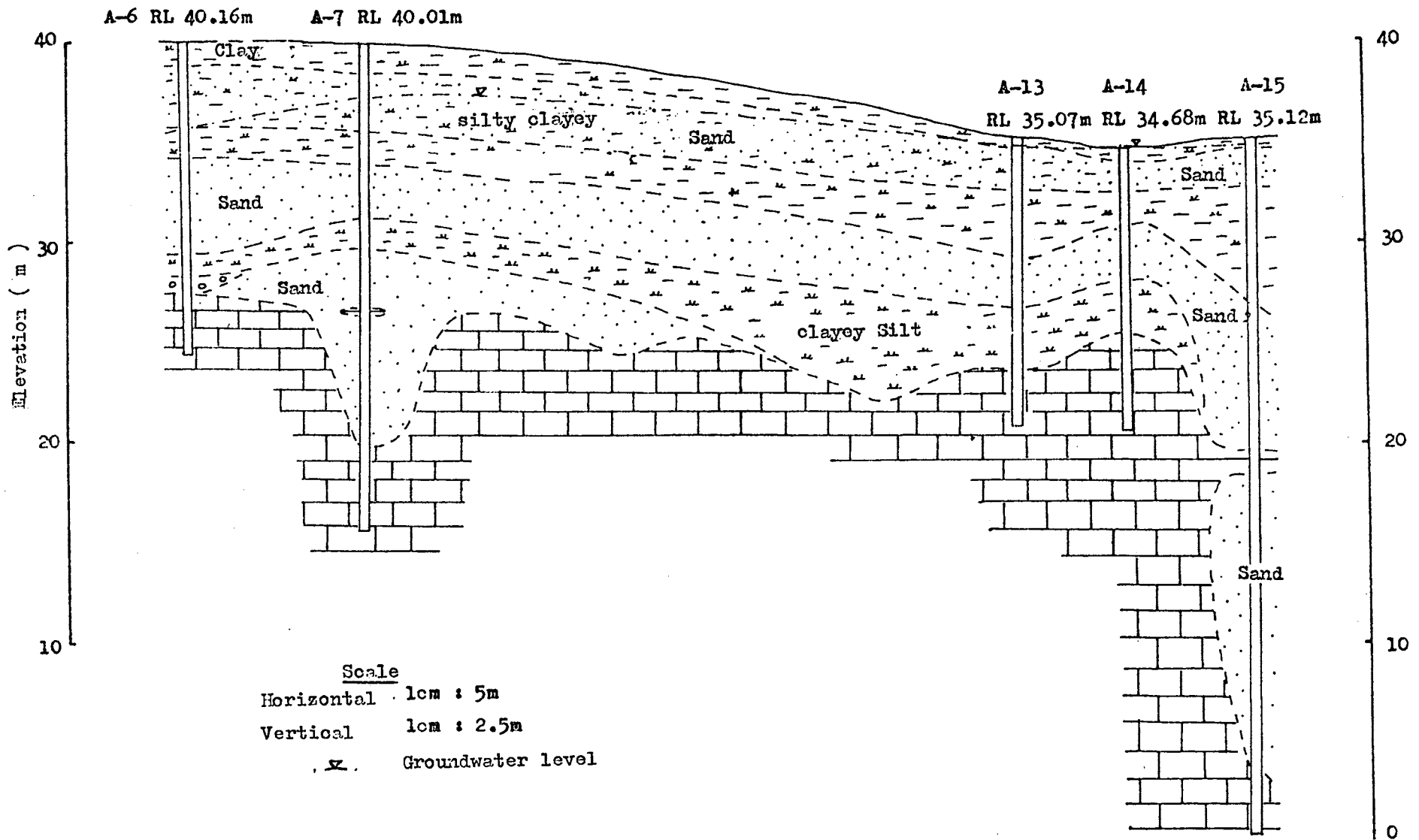


Fig. 2. Subsurface profile of the Kuala Lumpur Limestone at Jalan Padang Tembak (Soils & Foundation, 1981).

weathering and alluvial deposits have later filled the sinkhole. From A-14 to A-15 the distance is 12.5 m but the difference in depth of the limestone bedrock is 22 m. The alluvial layers have clear boundaries and are nearly horizontal. The arrangement of the alluvial layers is clay near the surface and below it silty clayey sand, silty clay, sand, clayey silt and sand. The inclination of the alluvial deposits near A-15 indicates that the alluvial material have collapsed into the limestone sinkhole.

References

- Ass (d) Sealand Drillers S.B., 1982. *Soil Investigation for proposed 3 storey apartment building on Lot. 49, Section 87A, Jalan Perumahan Gurney, Kuala Lumpur.* Site Investigation Report (unpublished).
- International Association of Engineering Geology (IAEG), 1981. Rock and soil description for engineering geological mapping. Report by the IAEG Commission on engineering geological mapping. *Bull. Int. Ass. Engng. Geol.*, 24: 235-274.
- Soils & Foundation S.B., 1981. *Soil Investigation for 3 block, 11 Storey Class 'G' Quarter, Jalan Padang Tembak, Kuala Lumpur.* Site Investigation Report (unpublished).

Manuscript received 28 June 1989.

PERTEMUAN PERSATUAN (MEETINGS OF THE SOCIETY)

WORKSHOP ON "GEOSCIENTIFIC WRITING AND EDITING" - MALAYSIA

This intensive 3-day workshop was aimed at instructing young geoscientists on how to set about writing geoscientific reports or research papers. Young geoscientists often have considerable difficulty in writing up for publication the results of their field and laboratory studies, and sometimes are at a loss as to how to proceed with putting into a coherent, clear and readable form the results of their work. As there is no formal instruction in report-writing in the undergraduate geoscience programmes, the Workshop was held in an attempt to remedy this deficiency in some small way.

The Workshop was conducted at 3 venues, namely SEATRAD Centre Ipoh (18-20 May, 1989), Bumiputra Trade Centre (SEDC) Kuching (22-24 May, 1989) and Geology Department, University of Malaya, Kuala Lumpur (26-29 May, 1989). A total of 67 participants registered for the Workshops.

Organised by the Society, the Workshop was jointly sponsored by SEATRAD Centre, Geology Department, University of Malaya, IDRC (International Development Research Centre of Canada) and AGID (Association of Geoscientists for International Development).

Professor P.G. Cooray, who conducted the Workshop, has since 1986 conducted similar workshops in Sri Lanka, Pakistan, India and Thailand. Prof. Cooray served on the Scientific Committee of IGCP (International Geological Correlation Programme) from 1980 to 1985 and was President of AGID from 1984-1988. He is presently a Senior Research Scientist in the prestigious Institute of Fundamental Studies at Kandy, Sri Lanka.

G.H. Teh

WORKSHOP ON "GEOSCIENTIFIC WRITING AND EDITING" AT KUALA LUMPUR - SPEECH BY PRESIDENT, GEOLOGICAL SOCIETY OF MALAYSIA, ASSOC. PROF. HAMZAH MOHAMAD

Bagi pihak Persatuan Geologi Malaysia, saya ingin mengalu-alukan tuan-tuan dan puan-puan ke "Workshop on Geoscientific Writing and Editing" ini, khususnya kepada Prof. Cooray yang menjadi pemimpin bengkel ini. Di kesempatan ini juga saya ingin mengucapkan terima kasih kepada Dr. Teh Guan Hoe yang mengambil inisiatif menganjurkan bengkel ini, serta memberi jalan kepada penganjuran bengkel yang sama di Ipoh, dan Kuching. Penghargaan Persatuan juga ditujukan kepada AGID, IDRC of Canada, SEATRAD Centre, Ipoh dan Jabatan Geologi Universiti Malaya yang memberikan kerjasama menyediakan tempat bengkel ini diadakan.

Ladies and Gentlemen,

It always occurs to us that after going through a few pages of a scientific report, our instinct and impression tell us either the report is "very readable", or "difficult to follow". What actually makes a scientific report very readable? Is it because the report is short? Well illustrated? Or because of its simplified presentation? Could it be the choice of catchy words or flair of the author? Obviously more than one factor is involved in making a report readable, almost certainly, the size is not likely one of them. Some papers, even though long, manage to retain the readers' full attention, while others, even though short, need several repeated readings to reasonably understand them. In my opinion, a clear and readable paper has the quality of tuning the readers' frequencies to match that of the author. The emphasis of the problems, state of the art, the choice of the topic and reasons to do further research on them, the methods utilised, the results, the full discussions and their relation to the author's initial intentions, are clearly sensed and could be followed in a predicted manner. In addition, a good scientific report contains suitable illustrations and extensive compilation of related publications. The tool is, of course, the choice of proper words, concise and meaningful sentences which utilise full punctuation marks, proper choice of illustration at the right context, and not forgetting quality editorial works.

Writing a report, particularly a scientific report, is a blend of art and skill. An art usually has something to do with talent, and it is gifted to an individual. Talent cannot be brought into existence, no matter how extensive the exercise is. In contrast, skill is acquired through know how and long practice. In this aspect, I cannot help stopping myself from quoting here a self-explaining saying in Bahasa, "alah bisa tegal biasa", which literally means, "familiarity overcomes difficulty". That is precisely why we organise this workshop. Our aim is to provide the participants with the "must" and the right ingredients of making a clear and readable report, and of how to arrange and present the materials in the best set up, in accordance with the format generally accepted by the modern geoscientist community. Even though I myself do not believe that skill can be developed in two or three days, tutorial-style sessions following each lecture-type session, and the use of the participants' own material, will encourage and initiate the development of the skill.

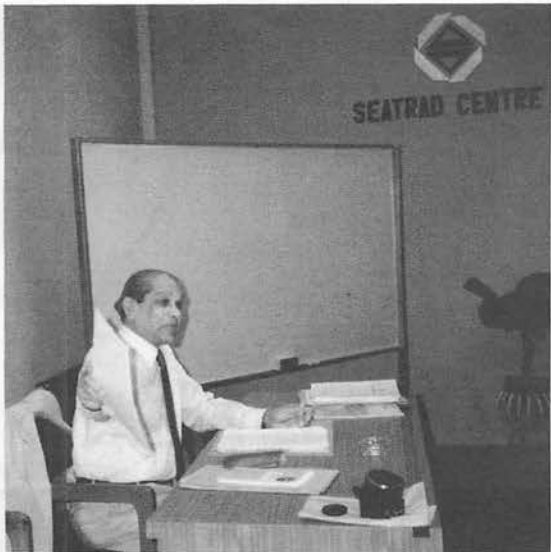
Writing reports can be considered as routine work for most of us here. But it is interesting to note that not many geoscientists choose the skill of report writing as one of their field of interest, as what Prof. Cooray has done. Thus I advise all participants to grab this rare opportunity of gaining as much knowledge as you can from Prof. Cooray. The Society and every one of us here are greatly indebted and grateful to Prof. Cooray, who is ever willing to share his decades of experiences with us here in Malaysia.

With that, I declare the workshop on "Geoscientific Writing and Editing" open and wish you all a successful workshop. Thank you.

GEOSCIENTIFIC WRITING & EDITING WORKSHOP

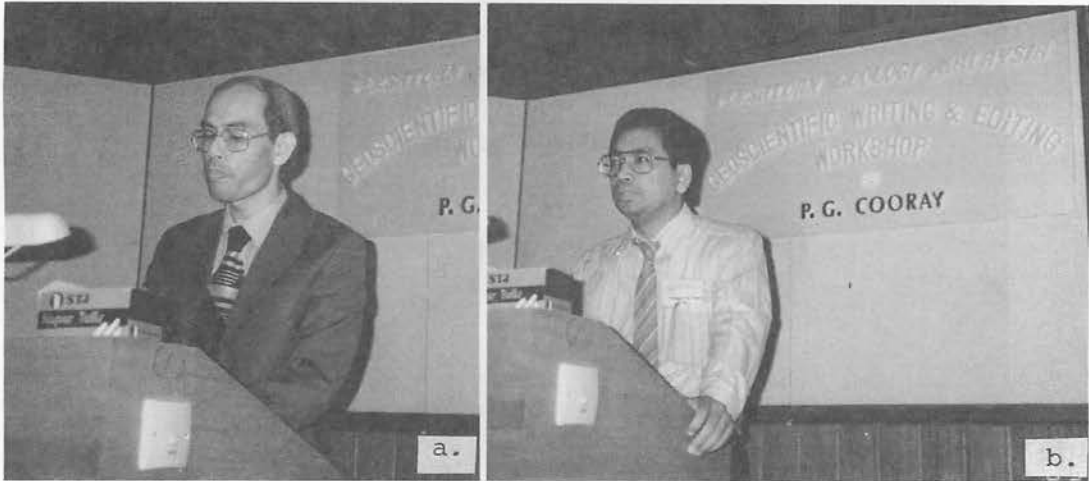


SEATRAD Centre Director, Mr. M.J. Siahaan with his speech.



Prof. G.C. Cooray conducting the workshop at SEATRAD Centre, Ipoh.

GEOSCIENTIFIC WRITING & EDITING WORKSHOP

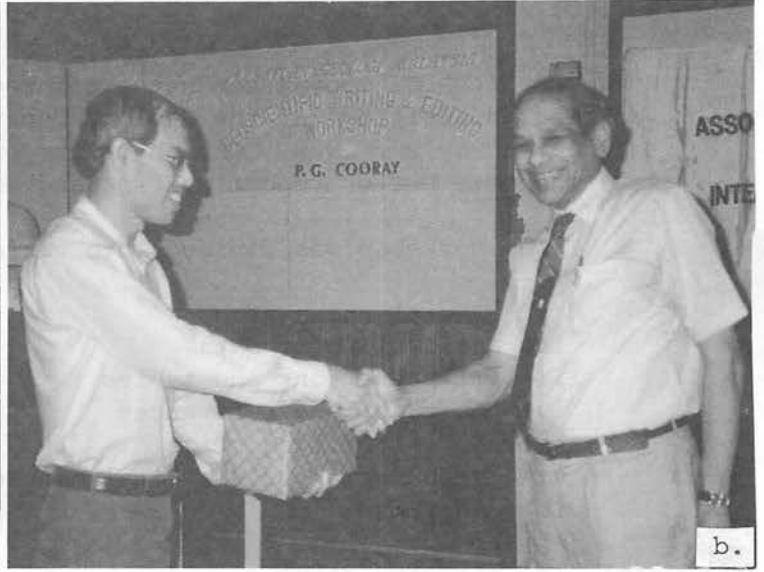


- a. Assoc. Prof. Hāmzah Mohamad, GSM President, with his welcoming address.
- b. Mr. Mohd. Ali Hasan, Acting Head, Geology Department, Universiti Malaya, with his speech.



Prof. G.C. Cooray conducting the workshop at the Geology Department, Universiti Malaya, K.L.

GEOSCIENTIFIC WRITING & EDITING WORKSHOP



- a. GSM President, presenting certificates to participants.
- b. Assoc. Prof. Hamzah Mohamad presenting a token of appreciation to Prof. Cooray.

TECHNICAL TALKS



Prof. P.G. Cooray presenting his talks at the Geological Survey, Ipoh (Pix by P.C. Aw).

WORKSHOP ON "GEOSCIENTIFIC WRITING AND EDITING" AT KUALA LUMPUR - REPORT

Prof. P.G. Cooray conducted a three-day "Workshop on Geoscientific Writing and Editing" at the Geology Department, University of Malaya, from May 26 to May 29, 1989. The objective of this workshop was to provide an awareness to better report writing and editing.

The workshop was divided into various stages, namely:

- i) The planning stage
- ii) Assembling of data
- iii) Illustrations and tables
- iv) Abstract and references
- v) Actual writing stage
- vi) Preparation of the final manuscript
- vii) Editing

(i) The planning stage

In the planning stage, the importance of structure or the order in which the data is to be presented was stressed upon. Two examples were cited depending on the nature of the report. For a technical report, the order is: Introduction, main results and conclusions, detailed findings, methods, background, and evaluation. Whereas the more common form is: Introduction, objectives, background, methods, results and conclusions.

The first step in laying out the structure is putting down the main headings, sub-headings and sub-sectional headings. This is followed by giving an appropriate title which should be brief and clear to explain the objective of the report.

(ii) Assembling the data

The data collected should be assembled into proper order. This involves classification and tabulation of data into different parts. For example, the data collected can be classified into General Characteristics, Field Relations, Petrography and Geochemistry.

(iii) Illustrations and tables

He emphasized that only relevant illustrations and tables are to be included into the report proper. Illustrations can be in the form of maps, line drawings and photographs. For maps and line drawings, letterings used must be large enough to withstand reduction. Photographs should be of good quality prints on glossy paper illustrating geological interest.

Tables that are only relevant to text should be included in the report proper; otherwise they are to be included in the appendix. Tables can also be summarized as graph and diagrams.

Captions should be included in illustrations and tables as a form of explanation. Thus captions should be clear and meaningful. For tables the caption should be at the head of the table; while for figures, the caption should be at the bottom of the figure.

(iv) Abstract and references

The abstract which form the most important part of the report was given full attention by Prof. Cooray. He also gave us an exercise on abstract writing for a report on "Petrographic studies of the anorthosite of the Perinthata massif".

He pointed out that only the essence of what is in the report should be presented and abstracts must not be a statement of intent. Abstracts should be in three parts:

- a) telling what the investigation is all about, that is, what, where and how.
- b) actual factual data
- c) conclusion or evaluation, that is, discussion of the investigation

He also illustrated some examples of badly written abstracts and well-written ones.

An exception is given to abstracts written when a deadline for submitting an abstract for a conference approaches and the report is written. Then, the abstract can be a statement of intent. In this case, the structure of the report should be written.

For References, he cited two ways of presenting them in report writing. One is references in text and the other List of References at the end of a report.

As a general rule, References in the text are given as:

Author's surname, comma, year of publication.

The List of References at the end of the report follows certain rules. The order given is:

Author's name, initials, year of publication: title, name of journal, volume no., pages.

For example:

Oliver, R.L. (1957). The Geological Structure of Ceylon. *Ceylon Geographer* 11, 9-16.

The general form is that serials and title of books are to be in italics.

(v) Actual writing stage

The writing stage was subdivided into 'Style and Form' and 'Aids to Writing'.

In 'Style and Form', he covered the importance of accuracy of content, clearness and simplicity of expression, conciseness, coherence, and logical sequential presentation.

In 'Aids to Writing' he pointed out the usage of words and phrases in respect of grammar, capitals, abbreviations, italics, punctuation, spelling and numerical expressions.

(vi) Preparation of the final manuscript

In the final preparations of the manuscript, all typing errors should be corrected and tables and figures checked carefully.

(vii) Editing

Editing is also the essential part of report writing. In correcting proofs, standard symbols can be used whereby correction marks are made in the text and the corrections shown in the margin. Prof. Cooray illustrated a few examples of the corrected proofs with all the standard symbols used and at the end of the session he gave us an exercise on proof-reading and editing.

Conclusion

In general the workshop proved to be beneficial especially to students who are preparing for their thesis and dissertation and to writers who wish to write scientific reports. The workshop proved to be an eye-opener to a more practical approach of report writing and the correct ways to approach it.

Lili Sulastri

CERAMAH TEKNIK (TECHNICAL TALK)

- P.G. Cooray: 1) Metamorphism, Structure and Stratigraphy of the Precambrian of Sri Lanka.
2) The Geoscientific Contribution to Third World Development.

Laporan (Report)

Besides conducting his very exhaustive "Workshop on Geoscientific Writing and Editing" at Ipoh, Kuching and Kuala Lumpur, Prof. Cooray also obliged Society members at these venues with the two above-mentioned talks.

The first talk on "Metamorphism, Structure and Stratigraphy of the Precambrian of Sri Lanka" proved to be a very comprehensive account of the geology and structure of Sri Lanka as the Precambrian metamorphic rocks occupy almost 90% of the island. The metamorphic rocks are divided into 2 main groups, namely, the Vijayan Complex (predominantly amphibolite facies rocks) and the Highland Series (predominantly granulite facies rocks). The Vijayan Complex occupy the NW and SE portions of the island. The Highland Series outcrop in a NE-SW direction between the 2 portions of the Vijayan Complex.

The rocks that belong to the Vijayan Complex include augen gneiss, granitic gneiss, charnockitic gneiss, biotite gneiss, quartzite, calciphyre while the Highland Series comprises garnet-sillimanite schist and gneiss, marble, quartzite, hornblende gneiss, charnockitic gneiss, cordierite-garnet granulite and gneiss and leucocratic garnetiferous gneiss.

Being the author of the Geological Survey of Sri Lanka's memoir on "An Introduction to the Geology of Ceylon", which is now in its 2nd Revised Edition with a specially compiled Geological Map in colour (1:500,000), Prof. Cooray was very much at home with the subject of the talk. However, he also commented on areas of complexities in both mapping and interpretation.

In his second talk on "The geoscientific contribution to Third World Development", Prof. Cooray highlighted the important factors that geosciences affect the quality of life directly or indirectly and these include among others, safety of slopes, minimization of risks from natural hazards, conservation of environment and the local processing and use of mineral and other natural resources within the country of origin.

In the case of mineral exploration and exploitation, the geoscientific contribution should be more on the search of and evaluation of industrial rocks and minerals and their use within the country with the view of a wider spectrum of activities to raise living standards.

On groundwater, proper management of supply will lead to greater personal and domestic cleanliness and reduction of water-borne diseases.

Environmental geochemistry and medical geology have vital roles to play in areas of environmental pollution, especially by industrial waste, in tracing cause-and-effect relationships and in monitoring them over the years.

In the new area of geoscientific activity of agrogeology, the extensive use of chemical fertilisers may, in the long run, do more harm than good, and alternatives such as local rock materials, including limestone, dolomite or rock phosphates, can be applied directly to soils to improve them in various ways.

On urban geology, it is envisaged that most of the growth will be in Third World countries. Many problems associated with urbanization are related to geological factors, for example, over-extraction of groundwater has led to subsidence of Bangkok and population pressure in Hong Kong has led to extensive construction of unsuitable slopes resulting in earthslips. Geoscientific activity can be channelled in the form of preparation of earth science maps for development and planning, for land-use management, for prevention or minimization of natural hazard damage, and other aspects of urbanization.

On risks from natural hazards through volcanic eruption, earth slips or coastal erosion, the attention of the geoscientist can be directed towards understanding their causes, and devise ways of prediction in order to minimise damage and loss of life.

In conclusion, Prof. Cooray stressed the importance of geoscience education in schools and universities and the need to educate and inform the general public on the vital necessities of careful use of resources, and the preservation and conservation of the environment.

G.H. Teh

BERITA - BERITA PERSATUAN (NEWS OF THE SOCIETY)

KEAHLIAN (MEMBERSHIP)

The following applications for membership were approved:

Full Members

1. Thomas R. Turner, P.O. Box 28231, Lakewood, Co. 80228, U.S.A.
2. Philip Gerald Sta. Maria, 24, Jalan SS25/21, Taman Plaza, 47301 Petaling Jaya.
3. Kamal Roslan Mohamed, Jabatan Geologi, UKM, 43600 Bangi.

Student Members

1. Chan Kiang Chee, P.S. 420, 90007 Sandakan, Sabah.
2. Lee Choon Yong, MT 358 - Sinn Garden, Semabok, 75050 Malacca.
3. Michael Lau, Lot 727, Pulau Gadong, Klebang Besar, 75200 Melaka.
4. Aziz Ariffin, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.
5. Abdul Halim Abdul, Jabatan Geologi, Universiti Malaya, 59100 Kuala Lumpur.

PERTUKARAN ALAMAT (CHANGE OF ADDRESS)

The following members have informed the Society of their new addresses:

1. David Wong, c/o Petronas-Production Dept., P.O. Box 12444, 50778 Kuala Lumpur.
2. C.K. Burton, Jalan Taman Parra II no. 21, Patra Jasa Kuningan II, Jakarta 12950, Indonesia.

PERTAMBAHAN BARU PERPUSTAKAAN (NEW LIBRARY ADDITIONS)

The Society has received the following publications:

1. Science Reports of the Institute of Geoscience, University of Tsukuba Section B, vol. 10, 1989.
2. Annual Report, Institute of Geoscience, The University of Tsukuba, no. 14, 1988.
3. Metallogenic studies of the Broken Hill & Euriowie Blocks, New South Wales by Robert G. Barnes, 1988.
4. International Seminar: Super-deep continental drilling and deep geophysical research: abstracts. 1988.

5. Earthquakes & volcanoes, vol. 20, no. 2, 1988
6. Seatrads Bulletin, vol. X, no. 1, 1989
7. U.S. Geological Survey Prof. Paper 1463, 1988.
8. United States Geological Survey Yearbook Fiscal Year 1987, 1988.
9. U.S. Geological Survey Professional Paper 1408-E, & 1443 (1988).
10. AAPG Explorer March, April & May, 1989.
11. U.S. Geological Survey Circular 969, 1988.
12. IMM Bulletin 987 & 988, 1989.
13. Chronique de la recherche miniere, 494, 1989.
14. Episodes, vol. 12, no. 1, 1989.
15. Berliner Geowissenschaftliche Abhandlungen, 13 and 79-92, 93, 94, 95, 96, 97.
16. Commonwealth Science Council, Jan-Feb, 1989.
17. An introduction to the geology of Taiwan, Explanatory text of the geologic map of Taiwan 2nd ed. 1988.
18. Petromin, April 1989.

PERSATUAN GEOLOGI MALAYSIA
GEOLOGICAL SOCIETY OF MALAYSIA

PETROLEUM GEOLOGY
SEMINAR '89



Shangri-La Hotel, Kuala Lumpur
4-5th December, 1989

GEOLOGICAL SOCIETY OF MALAYSIA PUBLICATIONS

BULLETIN OF THE GEOLOGICAL SOCIETY OF MALAYSIA
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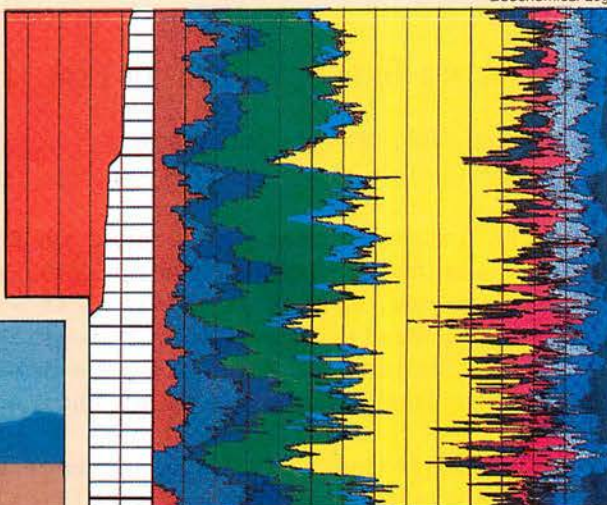
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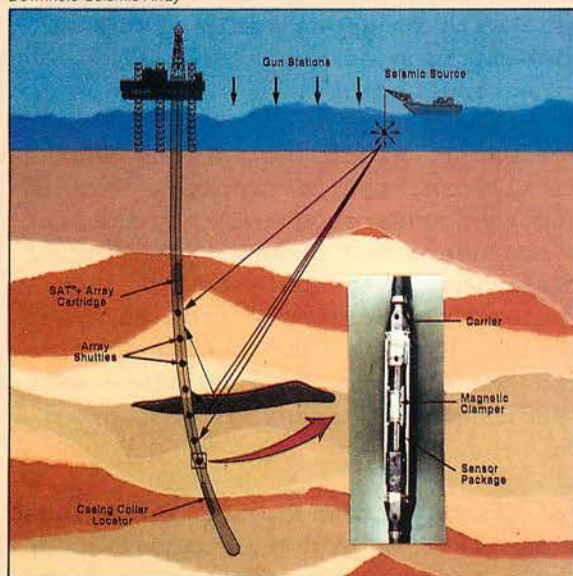
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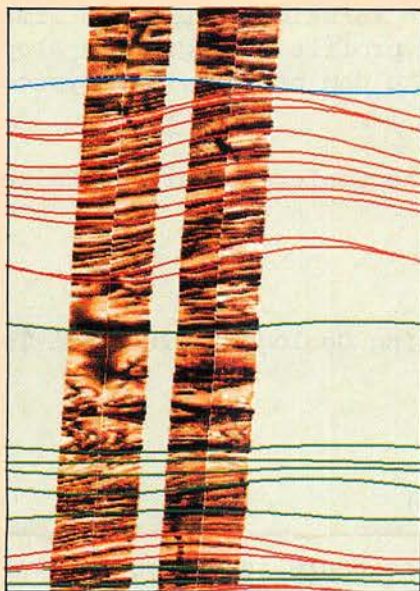
Geochemical Log



Downhole Seismic Array

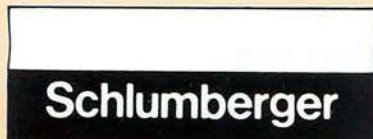


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Tel: 03-2485533/2485621/2485947. Telex: SCHLUM MA 31335.
Cable: SCHLUMEAD. Fax: 03-2421291.

BERITA - BERITA LAIN
(OTHER NEWS)

ENGINEERING GEOLOGY IN TROPICAL TERRAINS - CONFERENCE REPORT

26-29 June '89, Bangi, Malaysia.

The International Conference on Engineering Geology in Tropical Terrains was held on 26-29 June, 1989, at the Universiti Kebangsaan Malaysia campus, Bangi, Malaysia. It was organised by the Department of Geology, Universiti Kebangsaan Malaysia with co-sponsorship from the Geological Society of Malaysia, the Institution of Engineers Malaysia and the International Association of Engineering Geology.

The objective of the conference was to highlight various engineering geologic aspects and problems specifically related to tropical terrains. Some one hundred participants attended the conference and they consist of engineering geologists, geotechnical engineers and others. A total of 31 working papers relating to tropical terrains were submitted for the Conference, and they include case studies or experiences from Malaysia, China, India, Papua New Guinea, Sri Lanka, Nigeria, Indonesia, Thailand, Brasil and Fiji. Aspects discussed in these papers covered slope stability, weathering and residual soils, soft sediments, engineering geological mapping and environmental plannings.

A one-day field excursion was also well attended, and it included visits to a quarry or mining site, a dam site, a highway roadcut as well as a limestone hill/cave, all within the Kuala Lumpur area. The site visits allowed the participants to view the karstic features of limestone bedrock and limestone hill, the weathering profile of a granite slope and the site geology and construction of the dam project, all typically of this tropical terrain.

The technical papers submitted for the Conference are contained in the Proceedings, available from:

Mr. Tan, Boon Kong,
Conference Secretary,
International Conference on Engineering Geology in Tropical Terrains,
Department of Geology,
Universiti Kebangsaan Malaysia,
43600 Bangi, MALAYSIA.

Price: US\$25 per copy (Surface-mail)
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Tan Boon Kong

ENGINEERING GEOLOGY IN TROPICAL TERRAINS



Visit to mine, showing karstic feature of bedrock.



Visit to dam site.

GEOLOGY AND PETROLEUM RESOURCES OF PHANEROZOIC RIVER DELTAS - PROPOSAL OF THE PROJECT

This project is supposed to be accomplished in 1990-1994 within the International Program IGCP/UNESCO.

I. Natural factors, which define the development of river mouth regions, are greatly various, and variants of their interaction are countless.

The basic geological and geophysical/first, seismic/models of Phanerozoic deltas may be established after having studied specific buried deltas as numerous as it is possible.

A temporal and spatial disproportion has been formed historically in the exploration of paleodeltas. Mesozoic and Cenozoic river deltas of low latitudes are explored best of all. Knowledge about Paleozoic river deltas and deltas of middle and high latitudes are rather scrappy.

Thus, sine qua non of the success of this project is a large international cooperation.

II. Accumulative sedimentary bodies of Phanerozoic river deltas form a natural laboratory of generation, migration and accumulation of hydrocarbon.

In the USA, the USSR, France, GB, China and other countries a considerable progress is attained in the exploration of paleodelta petroleum resources, especially in their national territories.

Important deposits of the petroleum are discovered in Tertiary deltas of Nigeria and Indonesia.

Petroleum resources in the majority of developing countries in south eastern Asia and in Africa are not yet evaluated properly.

Phanerozoic river deltas, containing great petroleum deposits, are confined not only to the margins of continental plates. They are discovered within the limits of new and ancient platforms, foredeeps and intermountain troughs.

III. Improvement of searches, exploration and development of Phanerozoic delta petroleum deposits is possible providing some methodological problems are solved. It means to work up the methods of:

1. stratigraphic correlation and paleogeological reconstruction for diachronous lithofacies of prograding deltas;
2. detailed prognostication of oil reservoirs, cap rocks and stratigraphic traps;
3. prognostication of anomalous high bed pressure;
4. prognostication of character of bed fluids;

is necessary to emphasize the importance of methods, concerning ecological protection of recent river deltas in connection with their exploitation.

IV. To resolve the above mentioned problems it is suggested to work in four trends:

1. Geologic-geophysical modelling of Mesozoic and Cenozoic river deltas.
2. Geologic-geophysical modelling of Paleozoic river deltas.
3. Improvement of prospecting, exploration and exploitation of petroleum deposits.
4. Ecological protection of recent river deltas being under exploitation.

V. Annual meetings are supposed to review the progress in the work:

1990: Kiev, the USSR. Objects of field trips:

- (a) Tertiary gas-bearing Miocenus deltas of the Precarpathian foredeep and the Indolo-Kuban depression;
- (b) Cretaceous petrol-containing deltas of West Siberia;
- (c) Early-Carboniferous petrol-containing deltas of the Dnieper-Donetz graben and the north-western board of the Precaspian syncline;
- (d) Ecological protection of the recent estuary of the Arctic coast in West Siberia.

1991-1994: Places of meetings and objects of field trips will be defined when discussing the program of the project.

Conjectural objectives of the study are:

1. Mesozoic and Tertiary petrol-containing deltas of Alaska. Ecological protection of the Mackenzie delta.
2. Jurassic petrol-containing deltas of the North Sea. Namurian deltas of North England. Devonian deltas of Norway.
3. Jurassic and Early-Cretaceous petrol-containing deltas of Alberta, Canada. Early-Cretaceous petrol-containing deltas of Athabaska, Canada.
4. Early-Paleozoic/ordovician, devonian/deltas of West Libya.
5. Tertiary petrol-containing delta of the Mahakam, Kalimantan, Indonesia.
6. Tertiary petrol-containing delta of the Niger, Nigeria. Ecological protection of the recent delta of the Niger.
7. Tertiary deltas of Punjab, India.

VI. The fulfilling of the project will allow to:

- elaborate the basic geologic-geophysical models of Phanerozoic river deltas;
- improve the methods of researches, exploration and exploitation of oil and gas deposits in Phanerozoic deltas.
- make evaluation of petroleum resources in Phanerozoic river deltas in the territory of the states, participating in this project.

Letters of support

The organizers of this project need formal letters of support to accompany the application from national IGCP committees, organizations and individuals. Should you wish to support the establishment of this project, please send your letter of support to the address below:

Prof. V.A. Babadagly,
Ukrainian SSR Academy of Sciences,
Institute of Geological Sciences,
Chkalov Str., 55-b,
252054 Kiev,
USSR.

RTZ BURSARIES

Royal School of Mines,
Imperial College of Science, Technology and Medicine (University of London)

RTZ Research Bursary

Normally one award will be made each year for postgraduate research in some subject connected with the discovery, mining and beneficiation of minerals, such as: applied geochemistry, geophysics, mineral exploration, mining geology, mining mineral technology or extraction metallurgy.

The Bursary will have a basic value of £4690* per annum (with additional allowances according to qualifications and experience) plus College fees. A limited amount of money will be made available towards field work expenses. It will be tenable for one year in the first instance, and renewable normally for a second year and a third year. Applicants must hold a degree with honours in a subject appropriate to the proposed research.

The Bursar will be required to submit to RTZ a short report annually and a full report on the conclusion of this research.

It is intended that the results of the research work should normally be published freely in accordance with scientific practice, subject always to such University and College regulations regarding publication as may be in force at the time.

If in a particular case after consultation between RTZ and the College it is decided that a patent is advisable. RTZ Services Limited will file the application. If a patent is awarded, the Company will grant a licence under conditions agreed by the College and the Company in consultation.

RTZ Advanced Course Bursary

There will normally be one award each year, for a full-time post-graduate course of advanced study of one session leading to the award for suitably qualified candidates of the MSc degree of the University of London, and the Diploma of the Imperial College (DIC).

The Bursary will be available for the following courses, and applicants must hold a first degree in the subject stated below. It is also desirable that they should have had some industrial experience.

<u>Course</u>	<u>First Degree requirement</u>
Chemical Engineering (Mineral Processing Eng. option)	Chemical Engineering
Engineering Rock Mechanics	Engineering; or any branch of Geology together with Mathematics to at least GCE A-level.
Exploration Geophysics	Physics or Geology with Mathematics and Physics as ancillary subjects.
Mineral Exploration	Geology, Mining Geology or Mining.
Mineral Production Management	Mining or some other branch of engineering or applied science.

The Bursaries will have a basic value of £4690* per session (with additional allowances according to qualifications and experience) plus College fees. A limited amount of money will be made available towards field work expenses.

On completion of the course, Bursars will be required to make a report, through the Head of their Department, to RTZ.

Application forms are obtainable from the Registrar, Imperial College of Science, Technology and Medicine, London SW7 2AZ, and must be returned not later than 15 March 1990. The Selection Committee will meet in May and candidates required to attend for interview will be notified about two weeks beforehand.

* subject to review.

PERSIDANGAN SAINS BUMI DAN MASYARAKAT - SUMBANGAN PENYELIDIKAN GEOLOGI DALAM PEMBANGUNAN NEGARA

Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor Darul Ehsan.
9-10 Julai, 1990.

Anjuran: Jabatan Geologi, Universiti Kebangsaan Malaysia, Sempena sambutan
20 tahun UKM

Pendahuluan

Geologi ialah cabang ilmu yang mengkaji kejadian, perkembangan dan kandungan bumi. Seperti bidang ilmu yang lain, geologi juga menyumbang kepada pembangunan negara dan tamadun manusia. Di samping menyingkap rahsia bumi dan alam, geologi memainkan peranannya dalam mencari serta mengeluarkan hasil mahsul bumi bagi kegunaan manusia. Ahli-ahli geologi hari ini berganding bahu dengan pakar-pakar lain dalam menyediakan maklumat mengenai bumi supaya projek-projek besar seperti perlombongan, pengeluaran petroleum, pembinaan lebuh raya, empangan, landasan, kawalan banjir dan carigali air tanah dapat dijayakan dengan selamat dan berkesan.

Tujuan

Persidangan ini bertujuan:-

- menjadi forum pembentangan hasil penyelidikan geologi semasa yang menyumbang kepada pembangunan negara.
- untuk mengumpul dan menggalakkan interaksi di kalangan ahli-ahli penyelidik geologi.
- untuk meninjau sejauh mana kemajuan dan keberkesanan penggunaan Bahasa Melayu dalam penyelidikan geologi.
- untuk menonjolkan peranan, sumbangan, dan faedah penyelidikan geologi kepada masyarakat.

Penyertaan

Ahli-ahli geologi dan bidang berkaitan di institusi pengajian tinggi, badan-badan penyelidikan kerajaan, dan swasta; pelajar ijazah dan pelajar peringkat tinggi prasiswazah; para pendidik dan perancangan dasar pendidikan di Malaysia dan negara serantau.

Kertaskerja

Kertaskerja haruslah memuatkan hasil penyelidikan asli yang belum dibentang atau diterbitkan di mana-mana, dan dibentangkan dalam Bahasa Melayu. Abstrak sepanjang 150-200 perkataan, serta tajuk kertaskerja perlu ditulis dalam Bahasa Melayu dan Bahasa Inggeris.

Yuran pendaftaran

Peserta/Pembentang: M\$70.00 (meliputi prosiding, makan tengahari dan minuman sepanjang persidangan).

Pelajar: M\$20.00 (meliputi prosiding dan minuman sepanjang persidangan sahaja.

Tarikh-tarikh

Peserta dan pembentang yang berhasrat menyertai persidangan ini ditarik perhatian kepada tarikh-tarikh berikut:-

Persetujuan penyertaan/tajuk kertaskerja	31 Jul., 1989.
Menghantar abstrak	30 Sept., 1989.
Pengesahan penerimaan kertaskerja	15 Nov., 1989.
Kertas penuh	31 Mac., 1990.

Pengumuman kedua dan program akan dihantar kepada peserta dan pembentang pada 2 Jan., 1990.

Penginapan

Boleh diuruskan atas permintaan.

Rumah tamu UKM (terhad)	M\$18.00
Hilton K.L.	M\$140.00
Merlin K.L.	M\$85.00

Pertanyaan

Untuk keterangan lanjut sila hubungi:

Jabatan Geologi,
Universiti Kebangsaan Malaysia,
43600 Bangi, Selangor Darul Ehsan.

(u.p. Dr. Mohamad Md. Tan)
Tel: 03-8250001 samb. 2393/2494

atau

(Dr. Abd. Ghani Rafek)
Tel: 03-8250001 samb. 2393/2668

TUNNELLING '91 - SIXTH INTERNATIONAL SYMPOSIUM

14-18 April 1991

London England

Organized by The Institution of Mining and Metallurgy,
with the cooperation of the British Tunnelling Society, the International
Tunnelling Association and the Transport and Road Research Laboratory,
Department of Transport.

Theme

The theme of the symposium is the design and construction of tunnels
in the fields of civil and mining engineering worldwide.

Papers

Papers are invited on practical developments in safety, technology and cost-effectiveness of all types of tunnelling. The programme of technical sessions will include the following topics:

Machines and methods - shields, roadheaders, full-facers, drill/blast, automation and robotics, pipe-jacking, cut and core, immersed tube and research and development.

Geotechnical topics - site investigation, ground treatment (e.g. by dewatering, grouting or freezing), lining and support, ground movements and measurements.

Services - planning, surveying contractual and legal aspects, materials supply and handling, safety and health.

Complete projects - design and construction of underground excavations for mining and civil purposes; management and control of time, cost and quality.

Abstracts (250-300 words) should be submitted to the Conference Office, Tunnelling '91, The Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, England, before 1 March, 1990. Complete manuscripts will be required in October, 1990.

Tunnelling '91, the preprinted volume of papers selected for presentation at the symposium, will be distributed to all registrants in April, 1991.

Technical tour

On the occasion of the symposium a technical visit to the Channel Tunnel and its related operations will be arranged. Those who may wish to participate in the tour, full details of which will be given in the Second Circular, are asked to complete the appropriate section of the Reply Form.

Enquiries

All enquiries in connection with Tunnelling '91 should be addressed to the Conference Office, The Institution of Mining and Metallurgy, 44 Portland Place, London W1B 4BR, England (telephone, 01-580 3802; telex, 261410; fax, 01-436 5388).

KURSUS-KURSUS LATIHAN & BENGKEL-BENGKEL (TRAINING COURSES & WORKSHOPS)

1989

September - October, 1989

GROUNDWATER TRACING TECHNIQUES (Graz, Austria). Five-week course organized every other year by the Institute of Technical Geology, Petrography and Mineralogy and sponsored by Unesco. Language: English. For Information: Institute of Technical Geology, Petrography and Mineralogy of the University of Technology, Rechbauerstrasse 12, A-8010 Graz, Austria.

September - October, 1989

REMOTE SENSING AND DIGITAL IMAGE ANALYSIS (Sioux Falls, South Dakota, U.S.A.). U.S. Geological Survey training course for non-U.S. natural scientists on manual interpretation and digital analysis of remotely sensed data. For Information: Training Section, Office of International Geology, U.S. Geological Survey, 917 National Center, Reston, VA 20092, U.S.A.

September 1989 - July 1990

PETROLEUM EXPLORATION GEOLOGY (Headington, Oxford, U.K.). An annual diploma course designed by Oxford Polytechnic to prepare post-graduate geologists for the duties of geologists in oil exploration teams. For Information: M. Hoggins, Dept. of Geology and Physical Sciences, Oxford Polytechnic, Headington, Oxford OX3 0BP, U.K.

September 1989 - August 1990

MINERAL EXPLORATION AND EXPLORATION GEOPHYSICS (Delft, The Netherlands). Annual diploma courses organized by the International Institute for Aerospace Survey and Earth Sciences with Unesco. Language: English. For Information: ITC Student Registration Office (ME), P.O. Box 6, 7500 AA Enschede, The Netherlands.

October 1989 - August 1990

HYDROLOGY AND HYDROGEOLOGY (Belgium). Language: French. For Information: Professeur Dr. ir. A. Monjoie, Directeur des Laboratoires de Géologie de l'Ingénieur, d'Hydrogéologie et de Prospection géophysique - Batiment B19, Faculté des Sciences Appliquées, Université de Liège - SART TILMAN, B-4000 Liege, Belgium.

October 1989 - July 1990

ENGINEERING HYDROLOGY (Galway, Ireland). Annual diploma and post-graduate courses organized by the Department of Engineering Hydrology, University College, Galway, Ireland. Sponsored by Unesco-IHP and the World Meteorological Organization. For Information: Prof. J.E. Nash, Department of Engineering Hydrology, University College Galway, Galway, Ireland.

October 1989 - September 1991

FUNDAMENTAL AND APPLIED QUATERNARY GEOLOGY (Brussels, Belgium). Annually organized training course leading to a Master's degree in Quaternary Geology by the Vrije Universiteit Brussel (IFAQ) and sponsored by Unesco. Language: English. For Information: Prof. Dr. R. Paepe, Director of IFAQ, Kwartairgeologie, Vrije Universiteit Brussel, Pleinlaan 2, B-1050, Brussels, Belgium.

November 1989 - December 1989

REMOTE SENSING APPLICATIONS FOR EARTH SCIENCES (Enschede, The Netherlands). Annual short course organized by International Institute for Aerospace Survey and Earth Sciences (ITC), with Unesco. Language: English. For Information: ITC Student Registration Office, P.O. Box 6, 7500 AA Enschede, The Netherlands.

1990

January - July, 1990

GENERAL AND APPLIED HYDROLOGY (Madrid, Spain). An annual, 6-month course sponsored by Unesco. Language: Spanish. For Information: Centro de Estudios y Experimentacion de Obras Publicas y Urbanismo, Alfonso XII, Num. 3, Madrid 7, Spain.

January - July, 1990

GROUNDWATER HYDROLOGY (Barcelona, Spain). An annual 6-month, post-graduate course sponsored by Unesco. Language: Spanish. For Information: Curso Internacional de Hidrologia Subterranea, Calle Beethoven, 15, 3º, 08021 Barcelona, Spain.

February 1990

METALLOGENY (Quito, Ecuador). Annual 3-week training course for Latin Americans organized by Central University of Quito, the Autonomous University of Madrid (Spain), and Unesco. Language: Spanish. For Information: Director, Curso Internacional de Metalogenia, Escuela de Geologia, Minas y Petroleos, Division de Post-grado, Universidad Central, Apartado Postal 8779, Quito, Ecuador.

February - March 1990

GEOCHEMICAL PROSPECTING TECHNIQUES (Tervuren, Belgium). Annual course sponsored by the Royal Museum of Central Africa and UNDP. Language: French. For Information: Musée royal de l'Afrique centrale, Steenvogel op Leuven, 13, B-1980 Tervuren, Belgium.

February - July, 1990

HYDROLOGY (Budapest, Hungary). An annual six-month, post-graduate course organized by the Research Centre for Water Resources Development (Budapest) and sponsored by Unesco. Language: English. For Information: VITUKI International Post-Graduate Course on Hydrology, 11-1453 Budapest, Pf. 227 Hungary.

February - August, 1990

HYDROLOGY (Padova, Italy). An annual, 6-month, postgraduate course sponsored by Unesco. Language: English. For Information: Professor A. Ghetti, Centro Internazionale di Idrologia "Dino Tonini," via sette Chiese, 35043 Monselice, Italy.

February - November, 1990

PHOTOINTERPRETATION APPLIED TO GEOLOGY AND GEOTECHNICS (Bogota, Colombia). Forty-week course organized by the Government of Colombia, the Interamerican Centre of Photointerpretation (CIAF), International Institute for Aerial Survey and Earth Sciences (The Netherlands) and Unesco. Language: Spanish. For Information: Academic Secretariat of the CIAF, Apartado Aereo 53754, Bogota 2, Colombia.

March - April, 1990

MINERAL EXPLORATION (Paris, France). A 4-week annual course organized by the Ecole Nationale Supérieure des Mines and sponsored by Unesco. Language: French. For Information: Prof. K.D. Khan, Ecole des Mines, 35 rue St. Honoré, 77305 Fontainebleau Cedex, France.

March - November, 1990

PHOTOINTERPRETATION APPLIED TO GEOLOGY AND GEOTECHNICS (Bogota, Colombia). Annual post-graduate diploma courses organized by the Government of Colombia, Centro Interamericano de Fotointerpretación, International Institute for Aerial Survey and Earth Sciences and Unesco. Language: Spanish. For Information: Academic Secretariat of the CIAF, Apartado Aereo 53754, Bogota 2, Colombia.

June - August, 1990.

TECHNIQUES OF HYDROLOGIC INVESTIGATIONS (Washington, D.C. and Denver, Colorado, U.S.A.). Annual training course for international participants. For Information: Office of International Hydrology, Water Resources Division, U.S. Geological Survey, 470 National Center, Reston, VA 22092, U.S.A.

July - August, 1990

CRYSTALLOGRAPHY, MINERALOGY, METALLOGENY (Madrid, Spain). Annual course organized by the Department of Geology and Geochemistry of the Universidad Autónoma de Madrid and sponsored by Unesco. Language: Spanish. For Information: Departamento de Geología y Geoquímica, Facultad de Ciencias, Universidad Autónoma de Madrid, Canto Blanco, Madrid 34, Spain.

October 1990 - September 1992

GEOLOGICAL EXPLORATION METHODS (Nottingham, U.K.). Two-year MSc course starting every other year with emphasis on applied methodology, data acquisition and interpretations). For Information: Dr. M.A. Lovell, Department of Geology, University of Nottingham NG7 2RD, U.K.

December 1990 - January 1991

METHODS AND TECHNIQUES IN EXPLORATION GEOPHYSICS (Hyderabad, India). Diploma course organized every second year by the National Geophysical Research Institute of the Council of Scientific and Industrial Research, Hyderabad, India, and sponsored by Unesco. Language: English. For Information: The Director, International Training Course on Methods and Techniques in Geophysical Exploration, National Geophysical Research Institute, Hyderabad, 500 007 (A.P.) India.

1991

February - March, 1991

STRUCTURAL GEOLOGY (Dehra Dun, India). A six weeks training course organized every second year by the Wadia Institute of Himalayan Geology, sponsored by the Government of India and Unesco. Language: English. For Information: The Organizer of the Regional Training Course in Structural Geology, Wadia Institute of Himalayan Geology, 33 General Mahadev Singh Road, Dehra Dun 24 8001, India.

May - November 1991

GENERAL HYDROLOGY with emphasis on groundwater (Buenos Aires, Argentina). A six-month post-graduate diploma course organized every other year and sponsored by Unesco. Language: Spanish. For Information: Comité Nacional para el Programa Hidrológico Internacional de la República Argentina, Av. 9 de Julio 1925 - 15^o piso, 1332 Buenos Aires, Argentina.

August - October, 1991

GEOCHEMICAL PROSPECTING METHODS (Prague, Czechoslovakia). Certificate course organized every second year by the Geological Survey of Czechoslovakia and sponsored by Unesco, IAGC and Czechoslovakia. Language: English. For Information: GEOCHIM Unesco CSSR, Geological Survey of Prague, Malostranské nám. 19, 11821 Prague 1, Czechoslovakia.

KALENDAR (CALENDAR)

1989

August 1-3, 1989

PLATINUM (5th International Symposium), Espoo, Finland. Co-sponsored by IAGOD. (Prof. H. Papunen, Department of Geology, University of Turku, SF-20500 Turku, Finland).

August 3-12, 1989

WATER-ROCK INTERACTION (6th IAGC International Symposium), Malvern, England. (Dr. W.M. Edmunds, British Geological Survey, Wallingford, Oxon OX10 8BB, U.K.).

August 13-18, 1989

SOIL MECHANICS AND FOUNDATION ENGINEERING (12th International Conference), Rio de Janeiro, Brazil. (Organizing Committee, XII ICSMFE, Caixa Postal 1559, 2000 Rio de Janeiro, RJ, Brazil).

August 14-17, 1989

PRECAMBRIAN GRANITOIDS: Petrogenesis, Geochemistry, and Metallogeny (IGCP-217 and IGCP-247 Symposium), Helsinki, Finland. (Precambrian Granitoids Symposium, Department of Geology, University of Helsinki, P.O. Box 115, SF-00171 Helsinki, Finland).

August 14-29, 1989

SPELEOLOGY (10th International Congress), Budapest, Hungary. (10th International Congress of Speleology, c/o Magyar Karszt -es Barlangkutatas Tarsulat, Anker köz 1, H-1061 Budapest, Hungary).

August 22-25, 1989

CLASTIC TIDAL DEPOSITS (2nd International Research Symposium), Calgary, Alberta, Canada. (Ray Rahmani, Canadian Hunter Exploration Ltd., 435 - 4th Avenue SW, Calgary, Alberta, Canada T2P 3A8).

August 28-31, 1989

ROCK AT GREAT DEPTH (Symposium), Pau, France. (Symposium, Elf Aquitaine, CSTCS, Bat. L5, 64018 Pau Cedex, France).

August 28 - September 2, 1989

AIPEA (9th International Clay Conference), Strasbourg. (Y. Tardy, Institut de Géologie, 1 rue Blessig, 67084 Strasbourg, France).

September 3-9, 1989

GEOMORPHOLOGY (2nd International Conference), Frankfurt/Main, F.R.G. (A. Semmel, Institut für Physische Geographie, Universität Frankfurt, Senckenberganlage 36, Postfach 11 19 32, D-6000 Frankfurt/Main, F.R.G.).

September 4-7, 1989

CHALK (International Symposium), Brighton, U.K. (Dr. R.N. Mortimore, Department of Civil Engineering, Brighton Polytechnic, Moulsecoomb, Brighton BN2 4GJ, U.K.).

September 4-8, 1989

NON-METALLIC MINERALS (2nd World Congress), Beijing, China. (Prof. Xu Changyou, Wuhan University of Technology, Wuhan, Hubei Province, P.R. China).

September 4-8, 1989

COASTAL EVOLUTION, MANAGEMENT AND EXPLORATION IN SOUTHEAST ASIA (IGCP-274 International Symposium), Ipoh, Malaysia. (Dr. H.D. Tjia, Jabatan Geologi, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor, Malaysia).

September 4-13, 1989

MICROPALAEONTOLOGICAL COLLOQUIUM (26th), Budapest, Hungary. IPA. (Dr. A. Nagymarosy, Department of Geology, "Eötvös L." University, Budapest VIII, Muzeum krt. 4/A H-1088, Hungary).

September 10-14, 1989

QUATERNARY ENGINEERING GEOLOGY (Conference), Edinburgh, U.K. Co-sponsored by IAEG. (Dr. J.A. Little, Dept. of Civil Engineering, Heriot-Watt University, Riccarton, Edinburgh EH14 4AS, Scotland, U.K.).

September 10-15, 1989

CRUSTAL GEOCHEMICAL CYCLES (American Chemical Society Division of Geochemistry Meeting), Miami Beach, U.S.A. (James Herring, U.S. Geological Survey, MS 939, Box 25406, Denver, Federal Center, Denver, CO 80225, U.S.A.).

September 11-22, 1989

ARCHEAN - PROTEROZOIC TRANSITION (Field Conference), Harare, Zimbabwe. Co-sponsored by IGCP and IUGS. (Apt. 89, Geological Society of Zimbabwe, P.O. Box 8427, Causeway, Harare, Zimbabwe).

September 12-15, 1989

COAL: Formation, Occurrence and Related Properties (International Meeting), Orléans, France. (P. Bertrand, Unité de Recherche en Pétrologie, Organique, Université d'Orléans, 45067 Orléans Cedex 2, France).

September 12-15, 1989

HYDROTHERMAL REACTIONS (3rd International Symposium), Frunze, U.S.S.R. (Symposium on Hydrothermal Reactions, Vernadsky Institute of Geochemistry and Analytical Chemistry, Academy of Sciences, Kosygin Street 19, Moscow 117 334, U.S.S.R.).

September 14-15, 1989

PETROLEUM MIGRATION (Meeting), London, U.K. (W. England, Exploration and Production Division, BP Research International, Chertsey Road, Sunbury-on-Thames, Middlesex TW16 7LN, U.K.).

September 14-19, 1989

EDITING INTO THE 90's (Joint CBE, EASE, AESE Meeting), Ottawa, Canada. (Conference Office, National Research Council of Canada, Ottawa, Ontario, Canada K1A 0R6).

September 17-24, 1989

AGGLUTINATED FORAMINIFERA (3rd International Workshop), Tübingen, F.R.G. (Dr. C.H. Leben, Geologisches Institut der Universität, Sigwartstrasse 10, D-7400 Tübingen, Federal Republic of Germany).

September 17-24, 1989

ENERGY (14th World Congress), Montreal, Quebec, Canada. (World Energy Conf., 34th St. James's Street, London SW1A 1HD, U.K.).

September 18-22, 1989

ORGANIC GEOCHEMISTRY (14th International Congress). Paris, France. (Ms. Yolande Rondot, Institut Francais du Petrole, B.P. 311, 92506 Ruell-Malmaison Cedex, France).

September 24-30, 1989

CARBONIFEROUS STRATIGRAPHY (IUGS Subcommittee Biennial Field and General Meeting), Utah/Nevada, U.S.A. (Walter L. Manger, Department of Geology, University of Arkansas, Fayetteville, AK 72701, U.S.A.).

September 25-28, 1989

MINING LATIN AMERICA (IMM Conference and Exhibition), Rio de Janeiro, Brazil. (The Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, U.K.).

September 28-30, 1989

GEOENGINEERING (International Congress), Turin, Italy. (Suolosottosuolo, Associazione Mineraria Subalpina, c/o Dipartimento di Georisorse e Territorio del Politecnico, corso Duca degli Abruzzi 24, I-10129 Torino, Italy).

October 1989

MINERAL EXPLORATION PROGRAMMES '89 (International Symposium), Madrid, Spain. (Derek Morris, MEP '89, c/o International Mining, 4 Branden Road, London N7 9TR, U.K.).

October 1989

GEODESY AND SEISMOLOGY: DEFORMATION AND PROGNOSIS (Meeting), Erevan, Armenian S.S.R., U.S.S.R. (V.A. Sidorov, Soviet Geophysical Committee, Molodezhnaya 3, Moscow 117 296, U.S.S.R.).

October 1-4, 1989

SINKHOLES AND THE ENGINEERING AND ENVIRONMENTAL IMPACTS OF KARST (3rd Multidisciplinary Conference), St. Petersburg, Florida, U.S.A. (Conference, Florida Sinkhole Research Institute, University of Central Florida, Orlando, FL 32816, U.S.A.).

October 1-6, 1989

GEOCHEMICAL EXPLORATION (13th International Symposium) and BRAZILIAN GEOCHEMICAL CONGRESS (2nd), Rio de Janeiro, Brazil. Co-sponsored by AEG. Languages: Symposium - English; Congress - Portuguese. (D.C. Bruni, 13th IGES, P.O. Box 2432, 20010, Rio de Janeiro, R.J., Brazil).

October 2-4, 1989

FLUVIAL SEDIMENTOLOGY (4th International Conference), Barcelona, Spain. (C. Puigdefàbregas, Servei Geologic de Catalunya, carrer Diputació 92, 08015 Barcelona, Spain).

October 2-5, 1989

BOREHOLE GEOPHYSICS FOR MINERALS, GEOTECHNICAL, AND GROUNDWATER APPLICATIONS (3rd International Symposium), Las Vegas, Nevada. (Mark Mathews, c/o Las Alamos National Laboratory, P.O. Box 1663, MS C335, Las Alamos, NM 87545, U.S.A.).

October 2-5, 1989

GROUNDWATER MANAGEMENT: Quantity and Quality (International Symposium), Benidorm, Alicante, Spain. Language: English. (Secretary General, IARS, Institute of Hydrology, Wallingford, Oxon, OX10 8BB, U.K.).

October 2-6, 1989

REMOTE SENSING FOR EXPLORATION GEOLOGY (7th Thematic Conference), Calgary, Alberta, Canada. (Robert H. Rogers, ERIM, P.O. Box 8618, Ann Arbor, MI 48107-8618, U.S.A.).

October 13-14, 1989

MINERAL-RESOURCE ASSESSMENT (18th Geochautauqua), Newark, Delaware. Co-sponsored by IAMG. (J.H. Schuenemeyer, Dept. Mathematical Sciences, University of Delaware, Newark, DE 19716, U.S.A.).

October 13-15, 1989

INSTITUTE FOR TERTIARY-QUATERNARY STUDIES (Meeting), Fort Collins, Colorado. (Frank G. Etheridge, Department of Earth Resources, Colorado State University, Fort Collins, CO 80523, U.S.A.).

October 16-20, 1989

MATHEMATICAL METHODS IN GEOLOGY (IAMG Symposium), Pribram, Czechoslovakia. Sekretariat symposia, Hornická Pribram ve Vede a Technice, post. schr. 41,261 02 Pribram, Czechoslovakia).

October 16-27, 1989

REGIONAL MINERAL RESOURCE ASSESSMENTS (Workshop for international participants), Reston, Virginia. (U.S. Geological Survey, Office of International Geology, 917 National Center, Reston, VA 22092, U.S.A.).

October 18-20, 1989

STRUCTURAL AND TECTONIC MODELLING AND ITS APPLICATION TO PETROLEUM GEOLOGY (Meeting), Stavanger, Norway. (Norwegian Petroleum Society, P.O. Box 1897 - Vika, 0124 Oslo, Norway).

October 22-25, 1989

WORLD GOLD '89 (Meeting), Reno, Nevada, U.S.A. (Society of Mining Engineers, P.O. Box 625002, Littleton, CO 80162, U.S.A.),

October 23-27, 1989

COAL SCIENCE (International Conference), Tokyo, Japan. Language: English. (Secretariat for ICCS, Coal Conversion Department, New Energy Development Organization (NEDO), Sunshine 60 Building, 1-1, Higashi-Ikebukuro 3-chome, Toshima-ku, Tokyo 170, Japan).

November 10-13, 1989

RARE METAL GRANITOIDES (IGCP-282 Meeting), Nanjing, P.R. China. (Prof. Zhu Jinchu, Department of Earth Science, Nanjing University, Nanjing 210008, P.R. China).

November 13-15, 1989

MINERAL EXPLORATION PROGRAMME '89 (Symposium), Madrid, Spain. (MEP '89, 4 Brandon Road, London N7 9TR, England, U.K.).

November 14-16, 1989

ASEAN COUNCIL ON PETROLEUM (Meeting), Singapore. (Salk International, 2950 Airway Avenue, Suite D-1, Costa Mesa, CA 92626, U.S.A.).

November 14-16, 1989

WORLD WATER (Conference), Wembley, London, U.K. (World Water '89, Institution of Civil Engineers, 1-7 Great George Street, Westminster, London SW1P 3AA, U.K.).

November 20-21, 1989

MODERN EXPLORATION TECHNIQUES (Symposium), Regina, Saskatchewan. (Bob Troyer, Saskatchewan Geological Survey, P.O. Box 234, Regina, Sask., Canada S4P 2Z6).

November 23-24, 1989

MESOZOIC EUSTASY RECORD ON WESTERN TETHYAN MARGINS (Meeting), Lyon, France. (Prof. P. Cotillon and Dr. S. Ferry, Université Claude Bernard, Institut TOAEE, Centre des Sciences de la Terre, 29-43 Blvd. du 11 novembre, F-69622 Villeurbanne Cédex, France).

December 4-5, 1989

PETROLEUM GEOLOGY SEMINAR '89, Kuala Lumpur, Malaysia (c/o Organizing Chairman, Geological Society of Malaysia, Geology Department, University of Malaya, 59100 Kuala Lumpur, Malaysia).

December 18-20, 1989

GEOTHERMOMETRY AND GEOSBAROMETRY (Session in Conference, The Stability of Minerals), London, U.K. (Dr. B.W.D. Yardley, Department of Earth Sciences, University of Leeds, Leeds LS2 9JT, U.K.).

1990

January 29-30, 1990

ADVANCES IN RESERVOIR GEOLOGY (Meeting), London, U.K. (Dr. Ashton, Badley, Ashton & Associates Ltd., Winceby House, Winceby, Horncastle, Lincs. LN9 6PB, U.K.).

February 4-9, 1990

GONDWANA, TERRANES AND RESOURCES (10th Australian Geological Convention), Hobart, Australia. (10th AGC, c/o P.O. Box 56, Rosny Park, Tasmania TAS 7018, Australia).

February 5-9, 1990

BRACHIOPODS (2nd International Congress), Dunedin, New Zealand. (J.D. Campbell, Geology Department, University of Otago, P.O. Box 56, Dunedin, New Zealand).

February 12-14, 1990

PNG PETROLEUM CONVENTION (Conference), Port Moresby, Papua New Guinea. (Mr. M. McWalter, First PNG Petroleum Convention, c/o PNG Chamber of Mines and Petroleum, P.O. Box 7059, Boroko, Port Moresby, Papua New Guinea).

March/April 1990

ENGINEERING GEOLOGY PROBLEMS IN RESIDUAL SOILS (International Symposium), Abidjan-Yamassoukro, Ivory Coast. Sponsored by IAEG. English and French. (G. Cougny, Laboratoire du Bâtiment et des Travaux Publics, O4BP3 Abidjan O4, Ivory Coast).

March 14-17, 1990

ASIA/PACIFIC MINING (2nd Conference), Jakarta, Indonesia. (Asia/Pacific Mining Conference Secretariat, c/o Cahners Exposition Group (S) Pte. Ltd., 1 Maritime Square, #13-02 World Trade Centre, Singapore O409).

April 4-6, 1990

THRUST TECTONICS (International Conference), Egham, U.K. (Dr. K. McClay, Department of Geology, Royal Holloway and Bedford New College, Egham, Surrey TW20 OEX, U.K.).

May 7-8, 1990

ANNUAL CONFERENCE '90, GEOLOGICAL SOCIETY OF MALAYSIA, Ipoh (Organising Chairman, Geological Society of Malaysia, c/o Geology Department, University of Malaya, 59100 Kuala Lumpur, Malaysia).

May 6-12, 1990

PACIFIC RIM 90 (International Congress), Gold Coast, Queensland, Australia. (The AusIMM-Pacrim 90, P.O. Box 731, Toowong, Qld 4066, Australia).

May 14-18, 1990

WORLD MINING (14th Congress), Beijing, P.R. China. (14th World Mining Congress, 54 Sanlihe Road, Beijing, P.R.C.).

June 1990

GEOCHEMISTRY OF WEATHERING (2nd International Symposium), Aix-en-Provence, France. Sponsored by IAGC. (B. Hitchon, Alberta Research Council, Box 8330, Station F. Edmonton, Alberta, Canada T6H 5X2).

June 2-6, 1990

GEOANALYSIS 90 (International Symposium), Muskoka area, Canada. (Dr. A. Vander Voet, Ontario Geological Survey, 77 Grenville Street, Toronto, Ontario, Canada M7A 1W4).

June 28 - July 3, 1990

INTERNATIONAL MINERALOGICAL ASSOCIATION (15th General Assembly), Beijing, P.R. China. (Prof. Huang Yunhui, c/o Institute of Mineral Deposits, Chinese Academy of Geological Sciences, Baiwan-zhuang Road 26, Fuchengmenwai, Beijing, P.R. China).

July 1990

CAMBRIAN SYSTEM (3rd International Symposium), Novosibirsk, U.S.S.R. (Dr. J.W. Cowie, Department of Geology, University of Bristol, Queen's Building, University Walk, Bristol BS8 1RJ, U.K.).

July 2-6, 1990

GEOLOGY AND MINERAL RESOURCES OF CONTINENTAL MARGINS: ANCIENT AND MODERN (23rd Earth Science Conference, Geological Society of South Africa), Cape Town, South Africa. (Dr. P.G. Gresse, Geological Survey, P.O. Box 1739, Bellville, 7530, South Africa).

July 2-6, 1990

MINERALS, MATERIALS & INDUSTRY (IMM 14th Congress), Edinburgh, Scotland, U.K. (Secretary, Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4ER, U.K.).

July 2-6, 1990

BASEMENT TECTONICS (9th International Conference), Canberra, Australia. (91BT ACTS, GPO Box 2200, Canberra, ACT 2601, Australia).

July 9-13, 1990

GROUNDWATER IN LARGE SEDIMENTARY BASINS (International Conference), Perth, Western Australia. (Groundwater Conference, University of Western Australia, Nedlands, Western Australia 6009).

July 19-28, 1990

INTERNATIONAL UNION OF CRYSTALLOGRAPHY (15th Congress), Bordeaux, France. (Stefan S. Hafner, University of Marburg, 3550 Marburg, Federal Republic of Germany).

July 29 - August 3, 1990

CIRCUM-PACIFIC ENERGY AND MINERALS RESOURCES (Conference), Honolulu, Hawaii. (Mary Stewart, Circum-Pacific Council on Energy and Mineral Resources, 5100 Westheimer Road, Houston TX 77056, U.S.A.).

August 6-10, 1990

INTERNATIONAL ASSOCIATION OF ENGINEERING GEOLOGY (6th International Congress), Amsterdam, The Netherlands. English and French. (Dr. L. Primel, L.C.P.C., 58 Blvd. Lefebvre, 75732 Paris Cedex 15, France).

August 12-18, 1990

INTERNATIONAL ASSOCIATION ON THE GENESIS OF ORE DEPOSITS (8th Symposium), Ottawa, Canada. (Dr. L.M. Cumming, 601 Booth Street, Ottawa, Canada K1A 0E8).

August 12-18, 1990

MINERAL DEPOSIT MODELING (International Conference), Ottawa, Canada. Held with 8th IAGOD Symposium. Sponsored by IUGS and Unesco. (R.V. Kirkham, Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario, Canada K1A 0E8).

August 25-31, 1990

GEOCHEMICAL EXPLORATION (14th International Symposium), Prague, Czechoslovakia. (Geological Survey/UUG, Symposium on Geochemical Prospecting, Malostranske nam. 19, 118 21 Prague 1, Czechoslovakia).

August 26 - September 1, 1990

SEDIMENTOLOGY (13th International IAS Congress), Nottingham, U.K. (I.N. McCave, Dept. Earth Sciences, Cambridge University, Downing Street, Cambridge CB2 3EQ, U.K.).

August 26 - September 8, 1990

LATIN AMERICAN CONODONT SYMPOSIUM, La Paz, Bolivia and San Juan, Argentina. (M. Hunicken, Academia Nacional de Ciencias, Casilla Correo 36, 5000 Cordoba, Argentina).

September - October, 1990

IPA GRAPTOLITE WORKING GROUP (4th International Conference), Nanjing, P.R. China. (Chen Xu, Nanjing Institute of Geology and Palaeontology, Academia Sinica, Chi-Ming-Ssu, Nanjing, P.R. China).

September 17-18, 1990

GEOCHEMISTRY OF CLAY-PORE FLUID INTERACTIONS (meeting), London, U.K. (D. Savage, Fluid Processes Research Group, British Geological Survey, Keyworth, Notts. NG12 5GG, U.K.).

September 17-21, 1990

ARCHEAN (Symposium), Perth, Australia. (D.I. Groves, Department of Geology, University of Western Australia, Nedlands, Western Australia 6009).

September 18-20, 1990

HYDROGEOLOGY: Parameter Identification and Estimation for Aquifer and Reservoir Characterization (5th Canadian-American Conference), Calgary, Alberta. (S. Bachu, Alberta Research Council, Box 8330, Station F, Edmonton, Alberta, Canada T6H 5X2).

September 24-29, 1990

GEOCHRONOLOGY, COSMOCHRONOLOGY AND ISOTOPE GEOLOGY (7th International Conference), Canberra, Australia. (Organizing Committee, ICOG 7, Research School of Earth Science, Australian National University, GPO Box 4, Canberra, ACT 2601, Australia).

September 28 - October 2, 1990

BENTHIC FORAMINIFERA (4th International Symposium), Sendai, Japan. (Dr. Yokichi Takayanagi, Institute of Geology and Paleontology, Tohoku University, Sendai, 980 Japan).

1991

March 1991

ECONOMIC EVALUATION OF MINERAL RESOURCES (International Conference), Kosice, Czechoslovakia. Languages: Russian and English. (Intergeoekonomika 1991 CSSR, GEOFOND, Eng. St. Richter, Garbanova 1, 040 11 Kosice, Czechoslovakia).

April 26 - May 1, 1991

ASSOCIATION OF EXPLORATION GEOCHEMISTS (15th International Geochemical Exploration Symposium), Reno, U.S.A. (Richard B. Jones, Nevada Bureau of Mines and Geology, University of Nevada, Reno, Nevada 89557-0088, U.S.A.).

May 1991

QUANTITATIVE METHODS OF INVESTIGATION OF THE STRUCTURE OF SOILS AND ROCKS (IAEG International Symposium), Moscow. (Dr. M. Primel, LCPC, 58 Bd. Lafevvre, 75732 Paris Cedex 15, France).

August 2-9, 1991

QUATERNARY RESEARCH (13th INQUA International Congress), Beijing, P.R. China. (Secretariat, 13th INQUA Congress, Chinese Academy of Sciences, 52 Sanlihe, Beijing 100864, People's Republic of China).

September 16-20, 1991

ROCK MECHANICS (7th International Congress), Aachen, F.R. Germany. (Deutsche Gesellschaft für Erd- und Grundbau, Kronprinzenstrasse 35a, D-4300 Essen 1, F.R.G.).

September 22-27, 1991

CARBONIFEROUS-PERMIAN STRATIGRAPHY AND GEOLOGY (12th International Congress), Buenos Aires, Argentina. Language: English. (Dr. S. Archangelsky, Museo Argentino de Ciencias Naturales, Av. A. Gallardo 470, Buenos Aires 1405, Argentina).

1992

June 1992

WORLD MINING (15th Congress), Seville, Spain. (World Mining Congress, Al Ujazdowskie 1-3, PL-00583, Warsaw, Poland).

June 28 - July 1, 1992

PALEONTOLOGY (5th North American Convention), Chicago, U.S.A. (Dr. Peter R. Crane, Field Museum of Natural History, Roosevelt Road at Lake Shore Drive, Chicago, IL 60605-2496, U.S.A.).

GEOLOGICAL SOCIETY OF MALAYSIA PUBLICATIONS

Back Issues Available

- Bulletin 1** (1968). 79p. Studies in Malaysian Geology. Edited by P.H. Stauffer. A collection of papers presented at a meeting of the Geological Society on 31st January 1967. Price: M\$3.00 (US\$1.50).
- Bulletin 2** (1968). 152 p. Bibliography and Index of the Geology of West Malaysia and Singapore by D.J. Gobbett. Price: M\$10.00 (US\$5.00) — Softcover; M\$15.00 (US\$7.50).
- Bulletin 3** (1970). 146 p. Papers in Geomorphology and Stratigraphy (with Bibliography supplement). Edited by P.H. Stauffer. Price: M\$10.00 (US\$5.00).
- Bulletin 4** (1971). 100 p. Papers in Petrology, Structure and Economic Geology. Edited by P.H. Stauffer. Price: M\$10.00 (US\$5.00).
- Bulletin 5** (1973). 70 p. The Search for Tungsten Deposits by K.F.G. Hosking. Price: M\$10.00 (US\$5.00).
- Bulletin 6** (1973). 334 p. Proceedings, Regional Conference on the Geology of Southeast Asia. A collection of papers, Kuala Lumpur, March, 1972. Edited by B.K. Tan. Price: M\$22.00 (US\$11.00) — hardcover only.
- Bulletin 7** (1974). 138 p. A collection of papers on geology. Edited by B.K. Tan. Price: M\$12.00 (US\$6.00).
- Bulletin 8** (1977). 158 p. A collection of papers on geology. Edited by T.T. Khoo. Price: M\$12.00 (US\$6.00).
- Bulletin 9** (1977). 277 p. The relations between granitoids and associated ore deposits of the Circum-Pacific region. A collection of papers presented at the IGCP Circum-Pacific Plutonism Project Fifth Meeting. 12–13 November 1975, Kuala Lumpur. Edited by J.A. Roddick & T.T. Khoo. Price: M\$25.00 (US\$12.00).
- Bulletin 10** (1978). 95 p. A collection of papers on the geology of Southeast Asia. Edited by C.H. Yeap. Price: M\$10.00 (US\$5.00).
- Bulletin 11** (1979). 393 p. Geology of Tin Deposits. A collection of papers presented at the International Symposium of 'Geology of Tin Deposits', 23–25 March 1978, Kuala Lumpur. Edited by C.H. Yeap. Price: M\$50.00 (US\$22.00).
- Bulletin 12** (1980). 86 p. A collection of papers on geology. Edited by G.H. Teh. Price: M\$20.00 (US\$9.50).
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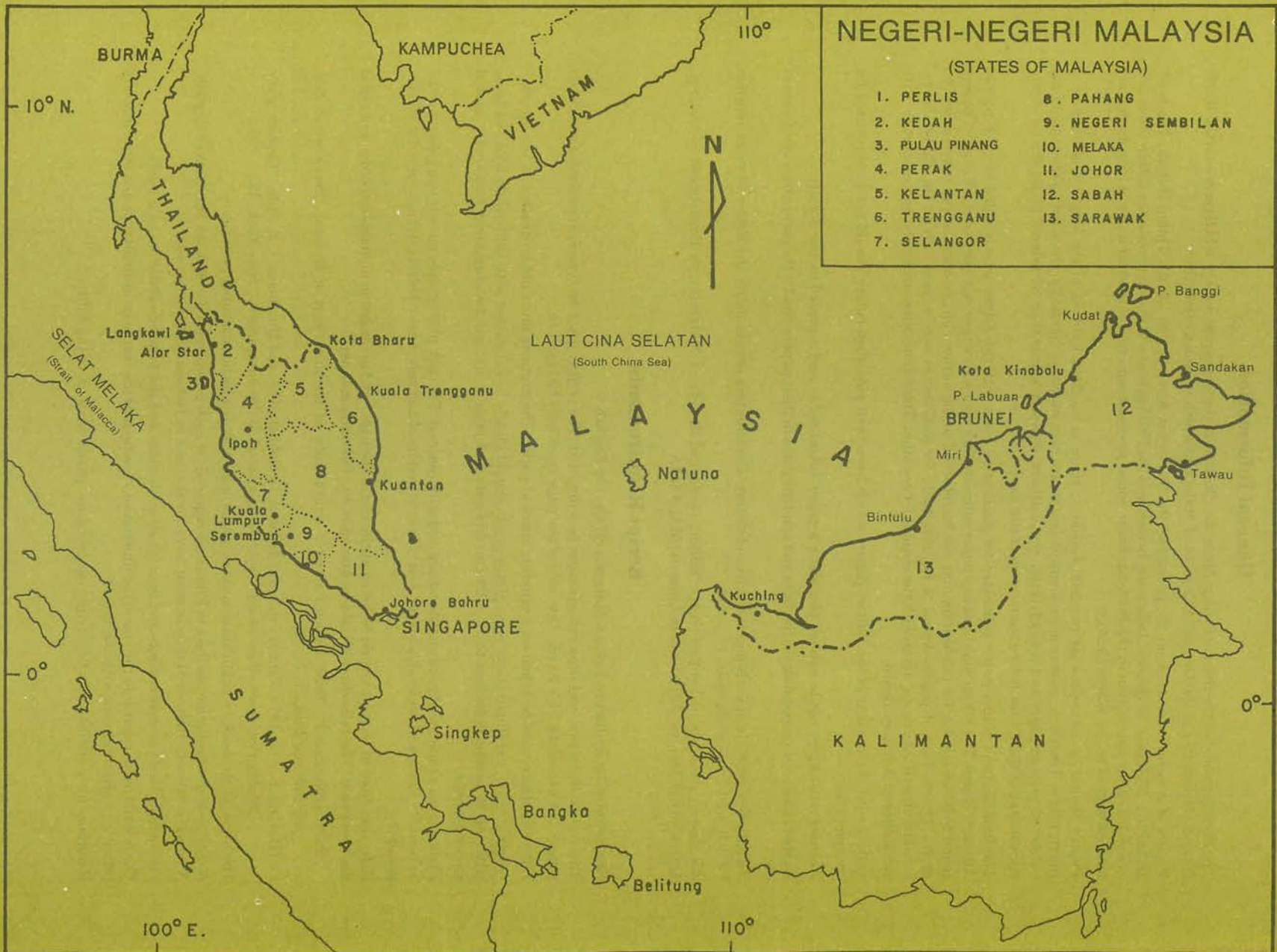
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