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GEOLOGIC NOTES

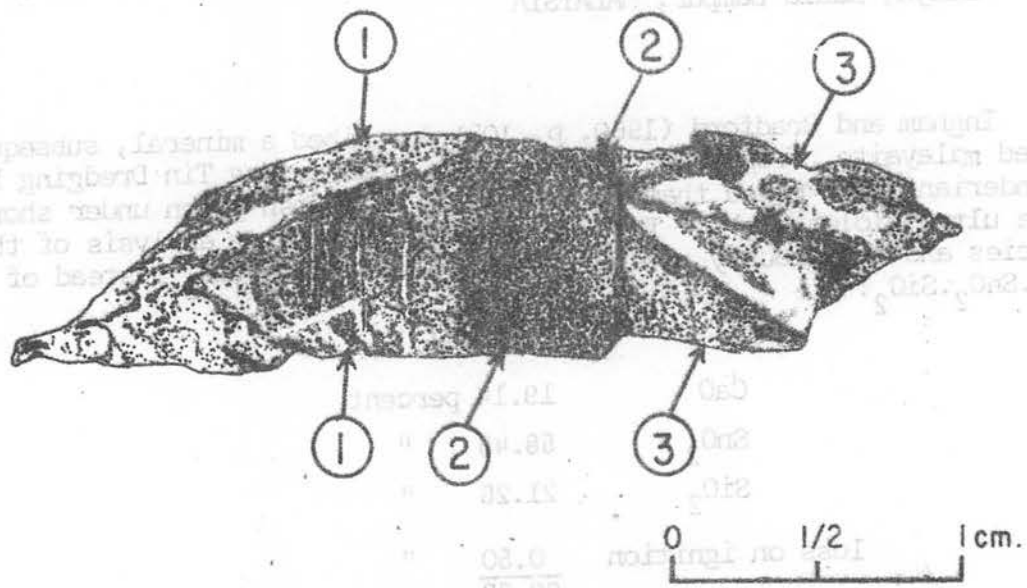
Non-fluorescent malayaite from Chenderiang, Perak, West Malaysia

E.B. Yeap & K.F.G. Hosking, Department of Geology, University of Malaya, Kuala Lumpur, MALAYSIA

Ingham and Bradford (1960, p. 105) described a mineral, subsequently named malayaite, from Sungei Lah Section, Chenderiang Tin Dredging Ltd., Chenderiang, and noted that it fluoresces yellowish-green under short-wave ultra violet light. They provided the following analysis of the species and erroneously gave its formula as $CaO.SnO.SiO_2$ instead of $CaO.SnO_2.SiO_2$:-

CaO	19.14	percent
SnO_2	58.48	"
SiO_2	21.26	"
loss on ignition	0.50	"
	99.38	

A few years ago one of us examined malayaite-bearing specimens from the same area and noted that certain lozenge-shaped crystals consisted of fluorescent and non-fluorescent zones. A photograph of this material was published and then it was tentatively concluded that the fluorescent zones consisted of malayaite whilst the non-fluorescent ones were sphene that was probably somewhat stanniferous (Hosking, 1970 p. 41), although this was not stated in the paper in question. However, in order to test this private conclusion Dr Sainsbury, then of the U.S.G.S., kindly arranged for an electron micro-probe analysis of the zoned material to be carried out. The electron probe traverse lines appear on fig. 1 whilst the analytical results of this study are shown in Figs. 2-4. These are somewhat at variance with that of Ingham and Bradford and were most surprising as they indicated that the CaO, SnO_2 and TiO_2 contents of the fluorescent and non-fluorescent zones were essentially the same. The results prompted the question, are there two structurally different forms of malayaite, the one fluorescing under short-wave ultra-violet light and the other not? To answer this question X-ray diffraction data for the fluorescing and non-fluorescing material from Chenderiang were obtained, together with those for two reference samples namely fluorescing malayaite from Salak South, Selangor, West Malaysia, and sphene from a Canadian source. These data appear in Table 1 and may be compared with similar data (Table 2) presented by Takenouchi



— Cracks or Voids

— Non fluorescent part.

— Strong to intensely fluorescent.

Fig. 1. Malayaite specimen from Chendriang drawn from photograph taken of polished section under short wave ultraviolet light. Arrows indicate traverses along which electron micro-probe analysis were carried out. Starting points are at the points of the upper arrows.

ELECTRON MICRO-PROBE ANALYSIS OF CHENDRIANG MALAYITE

(Sample interval, all traverses = 100 μmm)

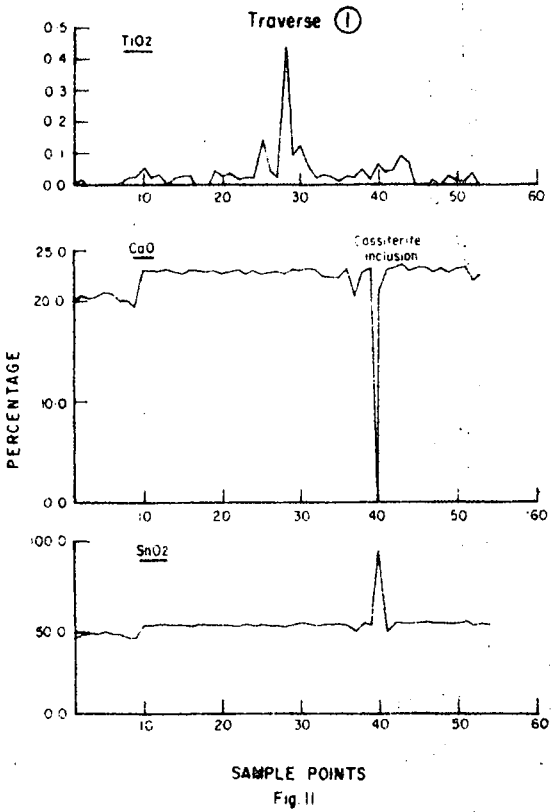


Fig. II

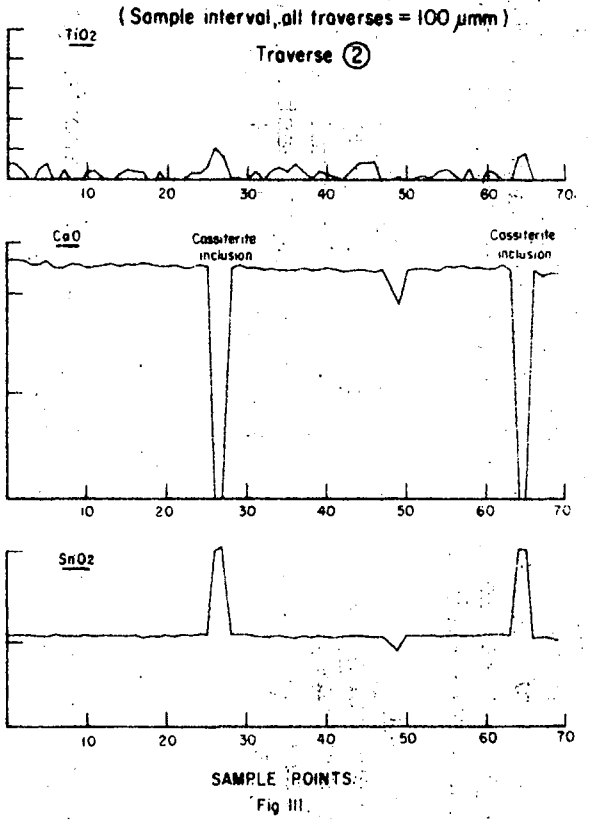


Fig III

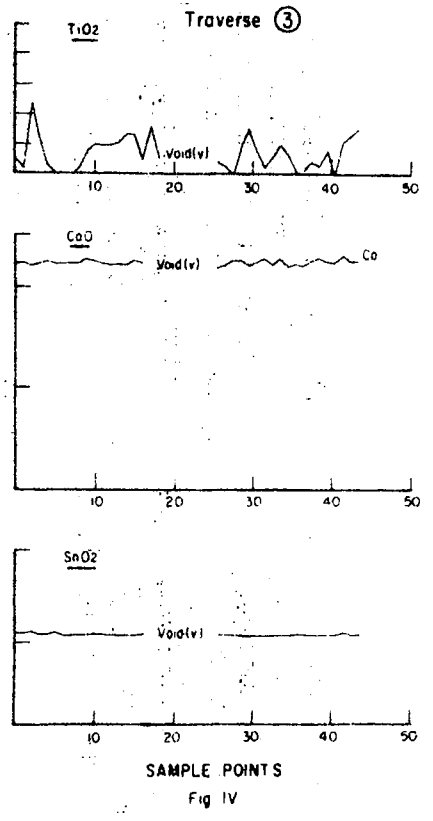


Fig IV

(1971) for synthetic malayaite and sphene. Inspection of these data demonstrate that there is no marked difference between any of the "malayaites", fluorescent or non-fluorescent, natural or synthetic. However, a peak due to the interplanar spacing of 3.348A, appearing at c. 26.6° when the data are obtained as noted in Table 1, is prominent in the traces of the three natural malayaites but is missing from Takenouchi's trace of his synthetic material. The precise cause of this difference is not yet established.

The study, as far as it has been taken, has demonstrated that both fluorescing and non-fluorescing malayaite do exist. It now remains to discover what is the cause of the difference. As Takenouchi's synthetic malayaites fluoresced it seems likely that the failure of some of the Chenderiang malayaite to do is due to the presence of a suppressor. To test this supposition it is hoped to arrange a trace-element study of the two Chenderiang varieties of the species in question.

It is also now necessary to consider the possibility that non-fluorescent malayaite may not be any less common than the fluorescent variety and that some of the lozenge-shaped crystals which have been identified as sphene in the skarns of the South-east Asian tin province, and in other similar provinces, may be, in fact, malayaite.

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TAKENOUCHI, S., 1971. Hydrothermal synthesis and consideration of the genesis of malayaite. Mineral Deposita, 6, 335-347, Berlin.

Table 1. X-ray diffraction data of malayaite and sphene. Only the 10 strongest lines indexed are presented.

Cu target, Ni filter, 40 kV and 26 mA. Scanning speed of ½ deg./minute: chart speed of 2 cm./minute: time constant of 2 sec.. Calibrated by potassium bromate ($KBrO_3$) as an internal standard.

Malayaite					Sphene		
d (measured)			I (meas.)		d (meas.)	I (meas.)	hkl
1	2	3	(Average of 1,2, and 3)	hkl	4	4	4
5.04	5.04	5.04	100	011	4.93	15	0.11
4.44(5)	4.44	4.44	25	020	-	-	-
3.348(5)	3.346	3.349	30	111?	-	-	-
3.283	3.283	3.283	80	200	3.240(5)	100	200
3.060	3.060	3.061	85	002	3.001	55	002
2.667	2.667	2.667	40	$\bar{1}22$	-	-	$\bar{1}22$
-	-	-	-	-	2.612	30	031
2.641	2.640	2.640(5)	45	220	2.597	50	220
2.415	2.415	2.415	35	211	2.368	30	211
2.098	2.097	2.098	25	140	-	-	-
1.765	1.766	1.767	15	$\bar{2}42$	-	-	-
-	-	-	-	-	2.062	15	140
-	-	-	-	-	1.705	15	222
-	-	-	-	-	1.648	10	033
-	-	-	-	-	1.499	10	004

1. Malayaite. Fluorescence strong to intense. Salak South, Selangor.
2. Malayaite. Fluorescence strong to intense. Chenderiang, Perak.
3. Malayaite. Non-fluorescent. Chenderiang, Perak.
4. Sphene. Non-fluorescent. Torry Hill, Ontario, Canada.

Table 2. X-ray diffraction data for synthetic malayaite and sphene (after Takenouchi, 1971)

The 10 lines corresponding to those presented in Table 1 are quoted here. The d cal. values were obtained by Takenouchi from lattice constants which were reduced from his data by means of Appleman's computer programme.

Malayaite				Sphene			
d (meas.)	I (meas.)	d (cal.)	hkl	d (meas.)	I (meas.)	d (cal.)	hkl
5.05	50	5.040	011	4.95	11	4.938	011
4.45	15	4.437	020	-	-	-	-
3.52	6	3.480	111	-	-	-	-
3.283	100	3.284	200	3.238	100	3.229	200
3.060	37	3.062	002	2.996	32	2.998	002
2.665	30	2.666	$\bar{1}22$	-	-	-	-
-	-	-	-	2.612	32	2.612	031
2.639	45	2.640	220	2.593	31	2.593	220
2.412	22	2.410	211	2.366	2	2.365	211
2.099	20	2.102	140	-	-	-	-
1.760	15	1.761	$\bar{2}42$	-	-	-	-
-	-	-	-	2.064	13	2.062	140
-	-	-	-	1.706	8	1.706	222
-	-	-	-	1.647	8	1.646	033
-	-	-	-	1.496	10	1.499	004

Note on Differentiation of Columbite/Tantalite from Wolframite/Ferberite

Leong Pak Cheong, Geological Survey, MALAYSIA

A method is described in Textbook of Mineralogy (E.S. Dana revised W.E. Ford) for identifying tantalite/columbite where the mineral is fused with potassium bisulphate and potassium hydroxide respectively and fusions treated with dilute hydrochloric acid followed by zinc to give a blue colour. It has been found that the colour obtained is usually more grey than blue, and frequently fleeting. Moreover, the test is completely misleading should wolframite/ferberite be present, when a blue colour due to the lower oxide of tungsten is produced.

The method I give below serves to identify columbite/tantalite and will differentiate these minerals from wolframite:

Crush a few grains in an agate mortar and fuse over a flame with a pinch of potassium bisulphate or potassium pyrosulphate on a porcelain or 'vitreosil' crucible lid. Place the lid containing the melt in a 50 ml beaker. Add 20 ml 1:2 diluted hydrochloric acid and bring to the boil on a hot plate. A white precipitate will be seen in both cases. Add between 5-10 drops of concentrated nitric acid and boil. Decant supernatent liquid when a white precipitate of earth acids will be seen in the case of columbite/tantalite and a yellow precipitate of tungstic oxide will be seen in the case of wolframite/ferberite. The precipitate may be washed with water if necessary. If further confirmation is required, add dilute hydrochloric acid followed by a pellet of zinc. Earth acids stay white, tungstic acid is turned blue.

It is suspected that the light blue colour obtained in the method described by Dana may actually be due to some tungsten being present. Malayan columbite/tantalite invariably contains some tungsten.

GEOHISTORICAL NOTES

Early geochemical and allied aids to the search for Mineral Deposits

K.F.G. Hosking, Department of Geology, University of Malaya, Kuala Lumpur, MALAYSIA

It is commonly believed that geochemical, biogeochemical and geobotanical aids to the search for mineral deposits are all comparatively new 'weapons' of the prospector. Indeed, Fersman (1940, p. 17) suggested this when he wrote "there must be a fundamental change in prospecting methods, for unless the new ideas of geochemistry are assimilated, we will be unable to respond quickly enough to the growing needs of socialist economy". Fersman was far too good a scientist not to know that prospectors, and others, had thought of using, and had used, geochemical aids long before 1940! It is also all too often thought that such aids were first employed by the Russians, Finns and Swedes in the years immediately preceeding the Second World War: for confirmation of this see Ginzburg (1960, pp. I-XVIII). It is true that during this period these peoples demonstrated that applied geochemistry and its associated sciences had much to offer those concerned with the search for ore. It is also certain that the present common inclusion of geochemical surveys in mineral exploration programmes stems largely from the fact that in the nineteen forties it was appreciated, that by virtue of the unique properties of dithizone, concentrations of 'heavy metals' (particularly Zn, Cu and Pb) in trace amounts in natural waters, stream sediments and soils, could be established simply, rapidly and cheaply - if necessary, at the sample collection points.

However, if it is accepted that geochemical biogeochemical and geobotanical aids to mineral exploration are those that facilitate the search for hidden ore by the establishment of anomalous concentration patterns of one or more of the ore components in accessible material (water, soil, etc.), then the possible and actual applications of such aids have been the concern of prospectors and miners for centuries. When it all started is unknown. It must, of course,be appreciated that the anomalous concentrations referred to above may be established by whatever means are the most appropriate or convenient and not solely by methods involving the use of chemical reagents. On occasion, for example, anomalous concentrations of tin in stream sediments may be more conveniently and better established by panning than by a chemical method such as the one involving the use of gallein.

There is little doubt that the recovery of dense resistate species such as native gold and cassiterite, from stream sediments, is a very ancient practice and one that ultimately led to the realisation that study of the distribution patterns of such minerals in stream sediments could point to the likely location of the primary source. In course of time Man learned to locate even the soil-buried primary sources by following the dispersion trains of ore components exposed at the surface or located in pits and trenches. Long ago Pryce (1778), writing of the Cornish prospector, noted that "when the tinners meet with a loose single stone of tin ore, either in a valley, or in plowing, or in hedging, though at a hundred fathoms distance from the vein it came from, those who are accustomed to this work will not fail to fine it out".

Long ago the presence of gozzan was known to be an indication of the possible presence of hidden valuable primary deposits, and what is this but the recognition, by visual means, of an iron anomaly, and of the use of iron as a path-finder element for such minerals as cassiterite and copper-bearing sulphides? The significance of gozzan long ago prompted the Cornish prospector to coin the proverb "a good lode has an iron capping" (Collins, 1912, p.102). It has also been said that, on occasion, this same prospector located ore because of the smell of arsenious oxide during the burning of moorland vegetation and by the visible deposit of this oxide on the ground after the fire had burnt itself out.

Certainly, in the last century, the Cornish miner sometimes employed simple chemical aids during his search for ore. Thus, Jenkin (1927, p. 225) relates that "many years ago" in the mine known as Wheal Towan the adventurers had for many years been following a string of quartz accompanied by a small quantity of rich copper ore. The walls of the lode, however, were so hard as to deter them from cross-cutting into them, till at length, one day, a man, to preserve his tobacco pipe, made a small hole in which to place it, when, to his great surprise, a quantity of water of a black colour issued - which he tried by the usual miner's test, viz. wetting his fingers in the substance and applying them to his candle. The colour immediately gave unmistakable indications of copper. This discovery laid the foundations of two of the largest fortunes Cornwall has ever boasted, and it came just at the very time when the proprietary had determined to stop the mine, having long worked it 'hoping against hope'. Surely this must be a case-history of the best-ever hydrogeochemical search for ore: the whole operation was carried out in a few minutes at no expense, and it resulted in the discovery of a major ore-body!

It was also appreciated, at least in the last century (and probably much earlier) in Cornwall, that water that had traversed oxidising sulphide mineral deposits was acidic and that such acidic water could be detected simply by tasting it. Whether or not acidic waters emerging from oxidising copper deposits possessed a flavour that would enable the discerning taster to differentiate between them and acidic waters deriving from a copper-barren oxidising pyritic deposit is not known to the writer although a note by Thomas (1950, p. 11) suggests that this might be so. According to Thomas, "in the Transactions of the Penzance, N.H.A. Society, 1891, it is stated that at Levant (a famous and until recently long-abandoned Cornish copper and tin mine (K.H.)) the members were told of an event some years beforehand, when Captain Joe Odgers (one of Camborne's older mine captains) and some other gentlemen visited Levant Mine to look at the prospects. Captain Joe Odgers would kneal down and say, 'I can taste the copper, though we can't find any'. The copper was later found!" Here, then, is yet another record of a primitive, but, apparently, effective, hydrogeochemical survey!

It may well be that the exploration methods noted above, and others which cannot be termed geochemical ones, were largely, or entirely introduced by German mining experts. Jenkin (1927, p. 53) states that "during the fifteenth century .... considerable numbers of German miners were finding their way into England, where, an account of their superior knowledge of ore extraction and metallurgy, their presence was encouraged by English mine-owners. By the sixteenth century, at any rate, several of these men had come to Cornwall". With these facts in mind it is clear that one might find data relating to early theory and practice of applied geochemistry in sixteenth century German mining literature and, indeed, one finds such data in Agricola's De Re Metallica, which was first published in 1556. The following relevant extracts are taken from the Hoovers' translation (1950 edition).

Re hydrogeochemistry:- "The waters of springs taste according to the juice they contain, and they differ greatly in this respect. There are six kinds of these tastes which the worker especially observes and examines; there is the salty kind, which shows that salt may be obtained by evaporation; the nitrous, which indicates soda; the aluminous, which indicates alum; the vitrioline, which indicates vitriol; the sulphurous kind, which indicates sulphur; and as for the bituminous juice, out of which bitumen is melted down, the colour itself proclaims it to the worker who is evaporating it". (p. 34).

Re hydrogeochemistry, dispersion trains and fans:- "But by skill we can also investigate hidden and concealed veins, by observing in the first place the bubbling waters of springs, which cannot be very far distant from the veins because the source of the water is from them; secondly, by examining the fragments of the veins which the torrents break off from the earth, for after a long time some of these fragments are again buried in the ground. ..... The soil should also be considered, for this is often the cause of veins being buried more or less deeply under the earth .....". (p. 37)

Re hydrogeochemistry:- "If the springs (in mineralised areas (K.H.)) discharge water containing some juice, this also should be collected; the further such a stream has flowed from the source, the more it receives plain water and the more diluted does it become, ... If the stream receives no water of another kind, or scarecely any, not only the rivers, but likewise the lakes which receive these waters, are of the same nature as the springs, and serve the same uses ..... " (p. 33)

Re geothermetry and geobotany:- "Therefore in places where the grass has a dampness that is not congealed into frost, there is a vein beneath (footnote); also if the exhalation be excessively hot, the soil will produce only small and pale-coloured plants. Lastly, there are trees whose foliage in spring-time has a bluish or leaden tint, the upper branches more especially being tinged with black or with any other unnatural colour ....." There phenomena are caused by the intensely hot and dry exhalations which do not spare even the roots, but scorching them, render the trees sickly- wherefore the wind will more frequently uproot trees of this kind than any others. ..... Therefore, in a place where there is a multitude of trees, if a long row of them at an unusual time lose their verdure and become black and discoloured, and frequently fall by the force of the wind, beneath this spot there is a vein. Likewise along a course where a vein extends, there grows a certain herb or fungus which is absent from the adjacent space, or sometimes even from the neighbourhood of the veins. By these signs of Nature a vein can be discovered." (p. 38). What a beautiful description of physiologic and specific indicators of sub-outcropping mineral deposits!

Footnote:- About 15 years ago, during the search for further deposits in the vicinity of Castle-an-Dinas wolframite mine, mid-Cornwall, the writer was advised by a local miner to pay particular attention to a certain area which tended to be frost-free when frost occurred elsewhere in the neighbourhood, and on which the snow melted the most rapidly!

CONCLUSION

From the foregoing it must be obvious that applied geochemistry (using the expression in the widest sense) has a long history of development. Much of its potential was appreciated long ago, but the fulfillment of its promise was not realised until well into the twentieth century because chemistry, in particular, had not, until that time, provided the necessary 'tools', and because the necessary economic pressure to search the four couners of the Earth for hidden ore-deposits had not before been brought to bear on Man.

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GINZBURG, I.I. 1960. Principles of geochemical prospecting. Trans. by Sokoloff, U.P. Pergamon Press, Oxford.

JENKIN, A.K.H. 1927. The Cornish miner. Allen and Unwin, Ltd., London.

THOMAS, A.C. 1950. Some notes on the folk-lore of the Camborne District. The Printing and Stationery Co. Ltd., Camborne.

NEWS OF THE SOCIETY

CANCELLATION OF MEETING

The discussion meeting which was planned and announced for the 8th and 9th of December 1972 has been cancelled. The field excursion planned for Sunday 10th in the Taiping area has also been cancelled.

The three essential features which are necessary for a Discussion Meeting are:

a) a venue with suitable facilities

b) a good audience, and

c) an optimum number of members prepared to present good quality papers or lead discussion.

a) and b) have been fulfilled to the best expectation of the organizing committee. The Geological Survey Headquarters in Ipoh provides an excellent venue, and it is the policy of the Society's Council to encourage meetings to be held at centres outside of Kuala Lumpur for the convenience of the membership. The response from members to participate as an audience at the proposed meeting was good. The organizing committee received 31 confirmations of intention to attend, and in addition it is known that most of the members, who belong to the Geological Survey of Malaysia, would be certain to be at the meeting.

However the disappointment lies in the poor response to the appeal for presentation of papers. The organizing committee is grateful to the few loyal members who have offered to present papers, but 'one swallow does not a summer make', and so the Council has regretfully had to cancel the meeting.

The Society and its activities can be organized by the Council and its committees, but no amount of planning will be effective without the active participation of a wider membership.

ANNOUNCEMENT

Alternative Plans

The Council met on the 29th November 1972 and decided that a discussion meeting will be held in February 1973, at an exact date to be announced later. Those members who kindly offered to submit papers for the now cancelled Ipoh Meeting are hereby requested to consider submitting them for the February meeting which will be held in Kuala Lumpur in conjunction with the Annual General Meeting of the Society. Papers are solicited from the membership as a whole for inclusion in the programme of this meeting. If you wish to present a paper, please contact Dr C.S. Hutchison (Chairman, Organising Committee), Department of Geology, University of Malaya, Kuala Lumpur before January 15th 1973.

In conjunction with the February meeting, it is hoped to have both Professor K. Hsu of Zurich University, and Professor G.C. Amstutz of Heidelberg University address the Society. Both of these distinguished geologists will be present in Kuala Lumpur at that time as external examiners to the Department of Geology, University of Malaya. The titles and times of their address will be announced later.

C.S. Hutchison
Chairman, Organizing Committee

International Mineralogical Association

The Society was unable to be represented at the various commission meetings which were held in Montreal in August 1972. However the following papers have been received and are now held in the Society library and may be consulted by any members upon request:

1. Minutes of the meeting of the Commission on abstracts, written by Professor Hugi (Chairman) and Professor Howie (secretary), dated October 1972. 2 pages

2. Data and classification list of New Minerals (1970 - 1972) prepared by Professor Tennyson dated August 1972. 19 pages. This list was presented to the commission on mineral data.

3. Classification of sulfosalts, prepared by Professor Tennyson, dated August 1972. 9 pages. Interested members are invited to look at this classification with the following in mind "deadline for objections, improvements, and further comments is December 1, 1972".

C.S. Hutchison (Society representative)

Geology of the Malay Peninsula: West Malaysia and Singapore edited by D.J. Gobbett and C.S. Hutchison for the Geological Society of Malaysia from the contributions of C.K. Burton, D.J. Gobbett, K.F.G. Hosking, C.S. Hutchison, C.R. Jones, P.H. Stauffer, and H.D. Tjia will be published in February 1973 by Wiley-Interscience. This book will appear as a volume in the Regional Geology Series, edited by L.U. De Sitter. The volumes in this series are:

Published:
1. Geology of the Himalayas by Augusto Gansser
2. The tectonics of the Appalachians by John Rodgers
3. The East Greenland Caledonides by J. Haller
4. Geology of the Malay Peninsula, edited by D.J. Gobbett and C.S. Hutchison

Volume in press:

The Scandinavian Caledonides by T. Strand and O. Kulling.

The Society has sponsored this book, but will not be handling its sales.

Orders should be placed with Wiley-Interscience, a division of John Wiley & Sons Inc., publishers, 605 Third Avenue, New York, N.Y. 10016, U.S.A. Att: Book Department, or through any bookseller who stocks Wiley-Interscience publications.

The book will comprise approximately 430 pages, as well as the 1:1,000,000 coloured geological map of West Malaysia. The selling price is not fixed, but can be estimated to be within the range of U.S.$26 to $30.

CSH

MEMBERSHIP

An up-to-date (October, 1972) Membership list will be sent to all members in the near future.

Members whose subscriptions are two years in arrears are not included in the list, and these memberships will be considered to have elapsed (with Council's approval) if payment is not made by the end of this year.

Several members included in the list have still to pay the 1972 subscription. If these subscriptions are not paid by the end of the year no further publications will be sent and Council will be asked to consider these memberships as lapsed.

A reminder that 1973 subscriptions are now due will be forwarded to members with the membership list. For overseas members, subscriptions posted before the end of the year can be at the $15.00 rate.

I should be grateful if members would inform me promptly of the current addresses of the following members:

1. Mr Beh Chung Aun
2. Mr D.E. Bird
3. Mr R. Campourcy
4. Mr R.H. Cook
5. Mr M.H. Derham
6. Mr S.J. Derksen
7. Mr R.H.T. Garnett
8. Mr P.L.C. Grubb
9. Mr G. Jacobson
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11. Mr Clive Nicholas
12. Mr W.P. Panton
13. Mr P. Porter
14. Mr A.R. Ratti
15. Mr Rabinder Singh
16. Mr A.A.E.A. Coffinier

GEOLOGICAL SOCIETY OF PHILIPPINES

An Appeal to GSM members

The entire records of the Geological Society of the Philippines were unfortunately destroyed in a fire at the Philippine Bureau of Mines recently. Readers who are members of the Geological Society of the Philippines are requested to verify their membership by writing directly to:

Dr E.V. Tamesis
Department of Geology
University of the Philippines
Quezon City, Luzon
PHILIPPINES

GEOLOGICAL TERMS IN BAHASA MALAYSIA & INDONESIA*

M.M. Purbo - Hadiwidjojo

Within a period of not more than three months we have received two sets of geological terms in Bahasa Malaysia, one from Universiti Kebangsaan (Tjia, GSN no. 22), and the other from Universiti Malaya (Haile, GSN no. 32).

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* Article originally written in Indonesian and published in Berita Direktorat Geologi/Geosurvey Newsletter, IV, no. 32. Translated by the Chancellery, University of Malaya.

It is interesting to note how the Malaysians are now endeavoring to build their language so it can keep in step with the latest development in the world of knowledge and technology, for there is an objective of ultimately using it in other fields including education. The important condition for this is none other than an adequate volume of terminology.

Looking at their efforts the situation in Indonesia disappoints us: it seems as though our effort to coin terms in Bahasa Indonesia has stopped altogether. On one hand we talk of standardization of Bahasa Indonesia - including, of course, standardization of terms - in fact, we relate it further to the "formal spelling", which will be made official very soon*, but on the other hand there is no concrete effort to gather what we already have now, at least we do not know outside the realms of language.

Whatever the background of the two efforts of coining geological terms in Malaysia is, we notice that both their works reflect what we already have, or, in fact, part of them originates from us. Whatever was collected here throughout the number of years has obviously simplified their work as though a "short cut" for them.

Among the examples are:

For years we have tried to Indonesianize the word "exposure". In the beginning Alisjahbana used the word "muka terang", probably a word which reminds us of the custom in Germany. But after the word "singkapan" came in, there is no further question as to whether the word is suitable or not.

Both Universities in Malaysia also use this word. The same applies to many other words like "batuan" for rock; "sesar" for fault; "jurus" for strike; etc. We also notice that both Universiti Kebangsaan and Universiti Malaya use "undak" for terrace; "pola" for pattern; etc, these words actually originate from a local dialect (Java). We will also notice that chlorite becomes "klorit", chromite becomes "kromit"; chronology becomes "kronologi", similar to what I have often suggested.

A number of words which were introduced earlier by "Dewan Bahasa" of Malaysia, apparently were not accepted as they are. For example, "lintap lendut besar" for geosyncline, to every geologist is far too remote; thus it is not surprising that both Universiti Kebangsaan and Universiti Malaya use "geosinklin". For geology

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* (effective as of August 17, 1972)

Universiti Kebangsaan still uses "kajibumi" and does not give "geologi" as an alternative; Universiti Malaya has left out altogether the term "kajibumi". Lithosphere is translated as "jagatdarat" or "litospiar" by Universiti Kebangsaan, conforming to Dewan Bahasa, but Universiti Malaya is already using "litho-sfera" (Note! We are using "litosfera", without "h" here), atmosphere in Universiti Kebangsaan is still "udarakasa", in Universiti Malaya "atmosfera" etc. We will also meet with evolusion which in Universiti Kebangsaan is still "ubahangsur", while in Universiti Malaya "evolusi" has been used, conforming to our term (compare "televisi" in Bahasa Indonesia for "tele-vishen" in Bahasa Malaysia). This reminds me of the early times when I first started coining terms, about 20-25 years ago. I too tried to use methods such as these which later proved to be a deadlock, though not in all cases. For example "penerobosan" for intrusion which in the beginning became a laughing matter, is now being accepted by most of us, and both by Universiti Kebangsaan and Universiti Malaya.

Terminology does undergo a kind of evolusion; it is propounded, analyzed, studied, tested, altered, and finally accepted into the treasury and vocabulary of a language, becomes a public property, without the realization of its origin by many people, or ..... shoved aside, lost without trace.

Finally, let us be aware that it is we who should build our language, our terminology, we the daily users. The field of geology is still small, but it will continue to flourish. Publications of terminology will only be possible if there is an apparent direction. Coordination of Indonesian and Malaysian geological terms is not impossible. The arrogant, indifferent, persistent characteristics towards change should be discarded. The field of education and practice should work hand in hand towards this objective.
