Geological Society of Malaysia

KESATUAN KAJIBUMI MALAYSIA

# NEWSLETTER

Number 25 July 1970

CONTENTS



Issued bimonthly by the Geological Society of Malaysia,
c/o Department of Geology, University of Malaya, Kuala Lumpur,
Price to non-members: M$1/copy. Back issues M$0·50 to members.

GEOLOGICAL SOCIETY OF MALAYSIA

Officers - 1970

| | | |
|---|---|---|
| President | : | K.F.G. Hosking<br>University of Malaya<br>Kuala Lumpur |
| Vice-President | : | D. Taylor<br>Conzinc-Riotinto<br>Kuala Lumpur |
| Secr./Treas. | : | K.J. Pocock<br>University of Malaya<br>Kuala Lumpur |
| Asst. Secretary | : | B.K. Tan<br>University of Malaya<br>Kuala Lumpur |
| Editor | : | P.H. Stauffer<br>University of Malaya<br>Kuala Lumpur |
| Councillors | : | Ja'afar bin Ahmad<br>Geol. Survey Malaysia<br>Ipoh, Perak |
| | | K.M. Leong<br>Geol. Survey Malaysia<br>Kota Kinabalu, Sabah |
| | | S.P. Sivam (co-opted)<br>University of Malaya<br>Kuala Lumpur |
| | | A. Spykerman (co-opted)<br>Associated Mines<br>Kuala Lumpur |
| | | F.E. Haser (co-opted)<br>University of Malaya<br>Kuala Lumpur |

Address of the Society:

Geological Society of Malaysia
c/o Department of Geology
University of Malaya
Kuala Lumpur, MALAYSIA.

GEOLOGIC NOTES:

## TRACES OF URANIUM AT BUKIT TAKUN, SELANGOR, WEST MALAYSIA.

K.F.G. Hosking and S.K.P. Loganathan, University of Malaya.

During a routine examination, under short-wave ultraviolet light, of samples collected across the granite/skarn contact at the northern side of Bukit Takun (a prominent, essentially limestone, roof-pendant on the granite at Templar Park, Selangor) it was observed that brilliant yellowish-green fluorescent areas occurred on some of the joint-faces of the skarn. Only one of these areas, however, also fluoresced under long-wave ultraviolet light.

The joint faces in question were coated with a thin veneer of dark and light encrustations but only portions of the latter fluoresced, and under the binocular microscope these appeared to be opaline silica. This provisional identification of the mineral was supported by its hardness and its refractive index (which was in the range 1.53 - 1.55).

Opaline silica possessing the fluorescent property noted above has been recorded from many countries. It has a particular penchant for the joint faces of granitic rocks but may also occur in the joints of rocks near 'granite' contacts. One of us (K.H.) has, for example, noted it on joint faces of the granite at Carris Mine (tin, tungsten, molybdenum), north Portugal. The fluorescent property of the silica is due to traces of uranyl compounds in it (Frondel, 1962, p.135).

In order to check that the fluorescence of the material under review was, indeed, due to 'uranium', the following specimens from the study area, were subject to radiometric analyses:- 'clean' granite, unweathered skarn, limestone (marble) collected about 5 ft. from the granite contact, and a skarn joint face coated with the fluorescent material. After 24 hours the counts due to these specimens were as follows:-

| | |
|---|---|
| granite | 1809 |
| skarn | 1488 |
| marble | 757 |
| fluorescent joint face | 2[illegible]2 |

The same four specimens were scanned for uranium by means of the x-ray fluorescence spectrometer. The fluorescent joint face and the granite both yielded uranium peaks but the one due to the former was only slightly more marked than that of the latter. Neither of the other specimens gave any evidence of the presence of uranium during this test.

The results of the study, therefore, give strong evidence for believing that the material under review is, indeed, opaline silica which fluoresces under short-wave ultraviolet light and in some instances under long-wave ultraviolet light because of the effect of contained traces of 'uranium'. As far as the writers are aware this is the first record of such material from southeast Asia.

It is not a little interesting to note that this great and rich tin province is, from the point of view of the mining man, a distinctly poor uranium one. Pitchblende, apparently, has never been reported from any of the hundreds of known mineral deposits there, and on only a few occasions have secondary uranium species been recorded. Ingham (1928) noted that a little torbernite occurred on some of the joints of the Gunong Bakau Lower Lode (Perak): this was the first record of a secondary uranium mineral from Malaya. Now a few other torbernite 'showings' are known, particular to officers of the Geological Survey of Malaysia, and recently one of us (K.H.) identified the species on a joint face of a specimen of granite from South Thailand.

Such 'showings' are, of course, only of academic interest. In our view it is most unlikely that their uranium was derived from 'lode' pitchblende. It is much more likely that the uranium of the secondary minerals under review was released from radioactive micro-centres in the granites (which are common in such rocks and can be easily demonstrated by the application of nuclear emulsion techniques) during their weathering. Mobilisation of uranium is most likely to occur in highly acidic environments such as are found in the vicinity of actively oxidizing sulphidic deposits.

---

Footnote: The following relevant passage has come to light since the writing of this note:-
"Uranium leaches from the detritus of granite at a much greater rate than from any of the other magmatic rocks." (Szalay, S. and Samsoni, Z., 1969, p.622)

---

REFERENCES:

FRONDEL, C. 1962. The System of Mineralogy, 7th. edn., III. John Wiley and Sons, Inc., N. York.

INGHAM, F.T. 1928. Ann. Rep. Geol. Surv. Malaya, paras. 35 and 40.

SZALAY, S. and SAMSONI, Z. 1969. Investigation of the leaching of uranium from crushed magmatic rock. Geochemical International, 6, no. 3, 613-623.

## SCHEELITE FROM WEST MALAYSIA WHICH FLUORESCES WHITE UNDER SHORT-WAVE ULTRAVIOLET LIGHT

K.F.G. Hosking and Yeap Ee Beng, University of Malaya.

Recently one of us (Y.E.B.) obtained a number of white crystals which were thought to be scheelite from Ban Hock Hin Mine, Kampong Seavoy, Setapak, Selangor. These crystals which were somewhat worn, ranged in weight from about 3 g. to about 15.5 g. Their hardness was between 4 and 5.

Under short-wave ultraviolet light one of the crystals fluoresced a very pale blue whilst all the others fluoresced white.

That all the crystals were, indeed, scheelite was in part confirmed by the following tungsten test which was devised by one of us (Hosking, 1956, p.10.). This test involves making a heavy streak of the mineral under examination on a portion of unglazed tile, covering the latter with a little zinc dust then adding a few drops of concentrated hydrochloric acid to the latter in such a way that a violent reaction takes place, and finally removing the surplus zinc with a jet of water. The presence of tungsten in all species in which the element is a major component, excepting members of the ferberite-wolframite-hübnerite series, is indicated by the strong blue colour of the treated streak.

Further confirmation was obtained by determining the specific gravities of three of the crystals which fluoresced white together with the one which fluoresced pale blue. The results were 6.12, 6.09 and 6.10 (white) and 6.12 (blue) and these figures fall within the scheelite range of 6.10 ± 0.02 recorded by Palache et al. (1966, p.1075).

The fluorescence colour of scheelite varies from strong blue, via pale blue and white to yellow with an increasing amount of the ($MoO_4$) ion in the lattice. Warren (1944 p.343) notes that "0.05% of molybdenum in the calcium tungstate changes the (fluorescence) colour to a faint blue; 0.48% gives a white fluorescence, and from 0.96% to 4.8% gives an increasing yellow appearance, Amounts above 4.8% do not show an appreciable variation in colour".

The material under review is, in the weiters' opinion, worth recording because scheelite which fluoresces white is rather rare, and although one of us (K.H.) has examined numerous specimens of scheelite from many different countries he has only once before seen material which displays this particular fluorescent 'colour': that specimen was collected at Zinwald, Saxony. Furthermore, as far as the writers are aware scheelite which fluoresces white has not hitherto been recorded from South-east Asia.

Scheelite specimens from the additional West Malaysian areas (which do not include all the known scheelite localities there) have been examined by one of us (K.H.), and in all cases they fluoresced a strong blue:- Pelepah Kanan (Johore); Seng Mines (Selangor); Sungei Besi Mines (Selangor); several mines in Salak South (Selangor); Ulu Langat (Selangor); mines in Templar Park (Selangor); Rawang limestone quarry (Selangor); Bidor (concentrate from dredged ore) (Perak); Chenderiang (Perak); Kramat Pulai (Perak); Tambun area (Perak); Tekka (Perak); Sungei Gow (Pahang); Raub Gold Mine (Pahang); Bukit Lentor Wolfram Mine (Trengganu).

REFERENCES

HOSKING, K.F.G. 1956: Chemical tests on streaks as a rapid aid to mineral identification. Camborne School of Mines Mag., 56, 5-11.

PALACHE, C., BERMAN, H. and FRONDEL, C. 1966: The System of Mineralogy, II, Wiley and Sons., Inc., N. York.

WARREN, T.S. 1944: List of fluorescent minerals. The Mines Magazine, pp. 342-343 and p. 363.

MEETING OF JUNE 10TH : T.P. THAYER

At a meeting of the Society held in the Geology Department, University of Malaya, at 8.00 p.m. on Wednesday, June 10, 1970, Dr. T.P. Thayer of the U.S. Geological Survey gave a talk on the topic "Peridotite - gabbro problems". The speaker was introduced by Professor K.F.G. Hosking. The following is a synopsis of Dr Thayer's talk:

At Darvel Bay in eastern Sabah is a complex of basic and ultrabasic rocks which have been interpreted by C.S. Hutchison to represent old basic volcanic rocks intruded by and metamorphosed by peridotites. The problems shown by these rocks are fundamental ones in the whole question of the origins of peridotites. The Silumpat Gneiss, which Dr Hutchison interprets as altered volcanics, may instead represent a gabbro that came in at the same time as the peridotite, both in the form of semi-solid rock. The gneissic texture might then be a primary igneous feature.

Some people have thought that Alpine-type peridotites are the residuals left from partial melting of basalt out of the mantle. But gabbro melts as easily as basalt, and so where gabbro is associated with the peridotite, this partial melting hypothesis is not tenable.

This problem is one which occurs world-wide. I will show you photographs of peridotite and gabbro intruded into unsheared and hardly metamorphosed country rocks, particularly in eastern Oregon, where I have worked a long time on such rocks.

There are many different types of peridotites, but tonight will be concerned only with two major ones: the stratiform and the Alpine-type. Their basic features are shown in the table:

| Type of body | Stratiform | Alpine |
| --- | --- | --- |
| Chromite deposits | Stratiform | podiform |
| Textures and structures | Sedimentary | metamorphic |
| Mineralogy | Igneous | igneous |

In stratiform bodies, crystal settling within a magma produces layering which is often extremely delicate and persistent. Some thin layers of chromite, etc., have been traced for 100 km and more.

But Alpine peridotites are a jumble, with textures and structures which are the result of metamorphic processes, and chromite bodies which are podiform.

In rocks of the Bushvoldt Complex in Africa there are very thin and sharp "beds" of chromite and magnetites. Some people have interpreted these as small sills, but there are several serious objections to this, not the least of which is the fact that never do you see one of these layers cross another, although they do split and anastomose.

In such layered bodies one often finds 'accumulate texture': a layer begins at its base with nearly pure chromite in small crystals, and as one goes up, the number and size of olivine crystals increases, until the rock consists of large olivines in an interstitial net of chromite.

In the Alpine bodies one can find the same textures: in fact any texture found in the stratiform bodies can be matched in the Alpine-type. But the Alpine bodies also contain some textures which are unique to these podiform rocks. These include 'Schlieren' texture, with distorted flattened olivine grains in chromite 'matrix'; nodular textures, with chromite nodules up to $2\frac{1}{2}$ cm in diameter; and massive chromite with mosaic crystalline texture including crystals up to 15 cm and more across.

Hence we conclude that stratiform and Alpine-type peridotite bodies are given their final character under different conditions of formation: high in the crust in the upper mantle for the former and for the latter.

In the Zambales Complex (Luzon) we find a very sharp interlayering, on a scale of centimeters, of anorthosite and peridotite. This nice layering goes right across lithologic contacts on a layer map scale. Hence this fine layering is a gneissic, metamorphic feature. It is found that the location of chromite bodies in the Zambales Complex is related to the gross lithologic contacts, not to their gneissic layering.

In eastern Oregon we find good evidence of shearing, folding, and axial plane foliation in the peridotites, which have been intruded into unsheared volcanic rocks.

The texture of the gabbro is ragged, showing that it came in as a semi-solid. Hence it must have come in together with the peridotite.

In Oregon, the gabbro is intruded by albite granite and trondhjemite, producing an "epidiorite" by alteration of gabbro to produce a hornblende-plagioclase rock.

This whole set of igneous rocks shows chemical similarities, e.g. Mg $>$ Fe, showing that all of them - from the peridotite to the albite granite - are one magmatic suite. They represent, in fact, the plutonic portion of the ophiolite suite of rocks.

The problem with this is that the mafic end of this suite is dry, yet the felsic end contains much water - how can this come about?

If we examine maps of the world distribution of major chromite deposits, we see that those in Alpine-type complexes follow the island arcs and mobile belts around the Pacific (with rich deposits in Palawan and Luzon in the Philippines), and along the Ural Mountains and the Tethyan belt from Yugoslavia to Pakistan.

Chromite deposits in stratiform complexes, by contrast, occur within the stable cratons, in two vague belts running about E-W, one in 'Laurasia" and one in 'Gondwanaland'.

There is also a great difference in age: the stratiform chromites are more than 2,500 million years old, while the Alpine-type chromites occur in Phanerozoic eugeosynclinal belts, less than 600 million years old.

Hence we see that peridotites differ with age. In addition, only the stratiform complexes contain significant sulfide deposits. These differences may give us a clue to events in the upper mantle during earth history. Why is it that we find no Alpine-type peridotites in the Precambrian? The Alpine-type bodies appear to be generated in the upper mantle by partial differentiation.

Discussion:

K.J. Pocock : Why are there no stratiform peridotites in the Phanerozoic?

TPT : There are many, but they don't have chromite deposits of significance. Alpine peridotites seem to be from different original magma than the stratiform ones.

K.J. Pocock : Why should there be no sulfur to make sulfide deposits in the Alpine bodies?

TPT : I don't know. Perhaps it may be because Mg-rich magma doesn't easily dissolve sulfur. Also, you may get liquid sulfur during partial melting, and this, being heavy, settles to the deepest parts and may just be left behind when the rest is intruded upward.

K.F.G. Hosking: How do you think the thin repetitions of chromite, as in the Stillwater Complex, were formed?

TPT : The most reasonable idea seems to me to be convective overturn within the magma. Crystals will settle only from a limited layer at the bottom of the magma chamber: this is because the increasing pressure raises the crystallization temperature faster than the probable thermal gradient. Hence crystallization takes place in the hottest part of the magma first. Depending on the composition of the melt, either olivine or chromite may settle out alone. Then convection may replace this melt by new material, possibly of different composition.

Also, crystallization of one mineral may "overshoot" the equilibrium point; then crystallization of the other mineral will occur until it too overshoots; in this Way the composition may oscillate and produce alternating thin layers of the two minerals.

P.H. Stauffer : How, in this process, can one get anastomosing layers, such as you showed in photos of the Bushveldt Complex?

TPT : By erosion, just as at any sediment-fluid interface. One can find many beautiful 'sedimentary' structures, including scour, channelling, and so forth, in the Bushveldt rocks.

B.K. Tan : The Jurassic radiometric age of the Darvel Bay rocks is interpreted by C.S. Hutchison as a metamorphic age - do you think it is in fact the igneous age of the Ultrabasic-gneissic Complex.

TPT : I don't know the ages of the rocks in the Philippines, but in the Darvel Bay rocks one always sees hornblende replacing pyroxene, never the other way around. Hence if the rocks have been produced by granulite facies metamorphism, they have been through a later amphibolite metamorphism.

S.P. Sivam : Is there any evidence on the cooling rate of the large stratiform bodies?

TPT : It must be quite slow. A guess that has been made for the Stillwater Complex is a minimum of 100,000 years.

S.P. Sivam : Producing such good sorting must be slow.

TPT : Yes, I agree.

K.J. Pocock : Could the complex interrelationships of the gabbro and peridotite which you think are co-magmatic be caused by differences in viscosity?

TPT : I think that's something we need more information about. The rocks will certainly behave very differently.

M.K. Choo : Why are the chromite bodies in the Philippines near the peridotite-gabbro contact?

TPT : I think it's a result of the chemistry of the system. To precipitate chromite, we need a certain percentage of Cr, and also a certain concentration of Al. Hence we need to precipitate enough olivine and plagioclase to bring these high enough to precipitate chromite. This may happen just before you reach the gabbro stability field.

K.F.G. Hosking: Would you care to comment on the origin of the granites associated with these bodies, e.g., at the Lizard?

TPT : In stratiform complexes you do get granophyres at the top. You could develop soda-rich granites in the upper mantle by differentiation. Trondhjemites have recently been reported from the mid-Atlantic ridge, and the isotopic compositions indicate they were co-magmatic with the peridotites from the same area.

---

Dr D. Taylor proposed a vote of thanks to the speaker for his extremely interesting and enlightening talk, and the meeting adjourned. About 35 members attended.

– PHS –

## PACIFIC SCIENCE CONGRESS: SYMPOSIUM ON MINERAL RESOURCES OF WESTERN PACIFIC

Mr. S.K. Chung, Director of the Geological Survey of Malaysia has kindly brought the following to our attention:

The Director of the Bureau of Mineral Resources, Australia, Dr. N.H. Fisher would like to contact possible contributors to the Earth Science section of the 12th Pacific Science Congress to be held in Canberra from August 18th – 27th, 1971. Dr. N.H. Fisher is responsible for organizing Symposium D IV: Mineral Resources of the Western Pacific (a) Metallogenic Provinces; and requests contributors on that subject to contact him as soon as possible.

The agenda of Symposium D IV is given below for your information.

# 12th PACIFIC SCIENCE CONGRESS

## CANBERRA

## AUGUST 18-27, 1971

### Outline of Symposium D IV : Mineral Resources of the Western Pacific

a. Metallogenic provinces

Metallogenic provinces of the lands bordering the western Pacific, with special emphasis on the inter-relationship between continental evolution and the formation of mineral deposits.

Papers will be requested under the headings:-

1. The metallogenic province concept
2. Geology and ore deposits of specific metallogenic provinces
   - (a) base metal provinces
     - i. Dominantly stratiform ore bodies
     - ii. Those associated with andesitic volcanics
     - iii. Other provinces
   - (b) Tin-wolfram-molybdenite-bismuth provinces
   - (c) Ultramafic mineral provinces
3. The influence of secondary processes on the occurrence of ore deposits in the Western Pacific area.

b. Sedimentary basins

Advances in knowledge of the structure, sedimentation, provenance, and tectonic history of the sedimentary basins of the Western Pacific and the bearing of these advances on the prospects for petroleum and other minerals in these basins. Special emphasis will be placed on offshore basins or those partly offshore, concentrating on the area bordering the Pacific Ocean and marginal seas, from southern Japan to New Zealand. It is not proposed to deal with basins wholly on land which are already fairly well known and it is hoped that contributions will present largely new information that is not already widely available in published form.

Convener : N.H. Fisher
Bureau of Mineral Resources
Box 378 P.O.
CANBERRA CITY. A.C.T. 2601
Australia.

NEW MEMBERS

The following persons have recently joined the Society, and their class of membership has been approved by the Council at its meeting of June 26th (A = Associate member; S = Student member; others are Full members) :

Mr. Charles C. Brennig, Jr., Continental Oil Co. of Malaysia, 801 AIA Building, Kuala Lumpur (A).

Mr. Chin Lik Suan, c/o Gopeng Consolidated Co., Ltd., Gopeng, Perak.

Dr. Jacques Claveau, 14 Chancery Hill Rd., Singapore 11.

Mr. Eng Poh Hong, No. 13, Rd. 12/12, Petaling Jaya, Selangor (A).

Mr. John Metcalfe Starke III, c/o Phillips Petroleum Co. Far East, Box 149, Killiney Road, Singapore 9.

Mrs. Madeline Stauffer, Government Secondary School, Serian, First Division, Sarawak (A).

Mr. Denis Tan Ngoh Kiat, c/o Department of Geology, University of Malaya, Kuala Lumpur (S).

Mr. Richard Warren, c/o Gaffney, Cline & Associates, 89/95 Anson Road, Singapore 2.

– PHS –

A NEW FACE

Members will notice that with this issue the Newsletter wears a new cover, one which gives the publication a more striking and colourful appearance and which allows us to display the Society's emblem. We feel it is an advance over the previous format, but will welcome any comments from members.