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G E O L O G I C A L N O T E S

The Curious Tin-Ore of Wheal Primrose, St. Agnes, Cornwall.

K.F.G. Hosking, Calle Isla de Cuba, 23, 1^o, 3, Sitges (Barcelona), Spain.

"And still they gazed, and still the wonder grew,"

(Oliver Goldsmith)

Wheal Primrose is a small, long-abandoned tin mine, within Killas (non-calcareous, meta-sediments) in the parish of St. Agnes, West Cornwall. During the last century the mine achieved some mineralogical fame because it had been claimed that a silicate of tin had been found there. Probably the so-called silicate of tin occurred in the Pink Lode. Long after its discovery Collins (1882, p. 8), when referring to the substance in question, remarks that "the silicate of tin described by Mr. G. Garby is perhaps a pseudomorph after quartz. Some occurred about 1820 as an impalpable powder, or compact; yellowish-grey in colour and composed of 53.0 percent of oxide of tin, and 46 percent of silica. According to Mr. J. Michell, some of the silicate often was in hexagonal prisms, much like quartz, but with the summits always wanting". (Collins does not mention where Garby described the substance under review nor from where he obtained Michell's description of it, nor can I shed further light on these unknowns. I do know that the former was a well known mineral dealer whilst the latter was a prominent local mining engineer).

Elsewhere, Collins (1882, p. 15) describes what had been earlier regarded as massive silicate of tin as follows: "It is a compact greyish stone to the naked eye, not unlike a stanniferous sandstone. In a thin section it is seen to consist of a mass of light-coloured quartz full of minute needles of dark-brown cassiterite, often pointed at each end. A good many brown patches and grains of iron oxide are visible, and also some patches of what looks like tourmaline".

Massive Primrose ore in my collection is somewhat different from that described by Collins in that it is pale-buff in colour and strongly patterned by dark-brown veins and irregularly shaped replacements. A photograph of a slice of this ore appears as figure 21 (p. 1217) in Hosking, (1969). In thin section the paler areas of this ore consist of minute, buff, often doubly-terminated isolated crystals or aggregates of cassiterite. These crystals are often only 1-2 μm in length. This buff cassiterite is randomly disposed in a quartz matrix and the whole is veined and locally replaced by an aggregate consisting of comparatively large acicular cassiterite crystals, with $\{111\}$ terminations, which show some orange-brown zoning, later chlorite, a little chalcopyrite, and quartz. Perhaps, as I have noted elsewhere (Hosking, 1969) this

cassiterite of the veins and replacements may owe its development to its mobilisation of tin from some of the earlier deposited cassiterite in the lode.

It seems that when Collins was writing, he and other mineralogists, when referring to the special tin-ore of Wheal Primrose, often had in their mind's eye certain hexagonal crystals, samples of which were, perhaps, first collected, as noted above, by Michell, as Collins, (1882, p. 33) writes "the so-called 'silicate of tin' from Wheal Primrose has been thought to be pseudomorphous after quartz, but the microscope shows it to be of quite a different nature. The crystals are of a grey colour - generally they are groups of rough hexagonal prisms with rough or broken terminations. In thin sections the quartz is seen to be filled with minute botryoidal groups of tin particles, nearly or quite opaque and of a brownish colour. They are in fact enclosed in the quartz, just as we often see chlorite, oxide of iron and other minerals enclosed in the quartz".

Beringer (1915, p. 426), a remarkable chemist/mineralogist, who worked for many years at the Camborne School of Mines, made the following remarks about the cassiterite content of the Wheal Primrose quartz crystals: "By far the most interesting of the particles consist of immature crystals of cassiterite, caught and absorbed at their birth by growing quartz crystals. We have in our collection distinct crystals of quartz coloured fairly uniformly by minute granules of cassiterite as if it were a pigment. A cross section of such a crystal giving a hexagon of 6 mm showed one or two small crystals of 100 to 200 microns in size. The rest was cloud, resolvable under the highest power into small grapes and clusters of grapes."

Perhaps twenty years ago the late Sir Arthur Russell gave me a specimen of the cassiterite-bearing quartz crystals from Wheal Primrose which meets the description of the material collected by Michell, and noted above, and is similar to a sample of the Wheal Primrose ore that is figured by Collins (1882).

In order to obtain a clearer picture of the nature and disposition of the cassiterite in this material a longitudinal polished section of one crystal was prepared and examined under the Scanning Electron Microscope and a number of normal primary reflected, electron scanning photomicrographs were taken: figures 1 and 2 are two of the most revealing ones. Figure 1 shows that within the quartz crystal the aggregates of cassiterite are erratically disposed and that they vary considerably in size, some being no more than a few μm across (a fact that is better confirmed by reference to figure 2). Many of the smaller aggregates seem to consist of a skin of minute cassiterite crystals surrounding a hollow centre whilst each of the larger aggregates is composed of a group of simple aggregates that are in part separated by voids. I think the hollow centres and voids were present in the specimen before it was polished: that is to say they were not the result of imperfect workmanship. Finally, it is important to note that some of the aggregates protrude beyond the quartz host crystal.

Genesis

I think the unusual tin-ore under review developed in open spaces within a lode that contained earlier 'normal' tin-ore. I believe that the open spaces were first more-or-less completely filled with a gel consisting essentially of $\text{SiO}_2/\text{SnO}_2/\text{H}_2\text{O}$ that had built up from the walls towards the centres of the open spaces, and that from the walls to the centre there was a general decrease in the ratio of SnO_2 to SiO_2 . This last view is based on the fact that the massive ore in my possession is decidedly richer in cassiterite than the crystals of quartz that I think developed near the centre of the original open spaces.

In due course the SnO_2 component crystallised in the silica gel as isolated crystals and also as aggregates of crystals of cassiterite that, at least on occasion, as in the quartz crystal I have described above, surround hollow centres.

I do not know how the tin component was disposed in the original gel nor what triggered off development of the cassiterite crystals. As SnO_2 is distinctly less soluble in aqueous solutions than SiO_2 one would expect cassiterite to develop before quartz in the particular system under review. The fact that one finds shells of cassiterite crystals disposed around hollow centres suggests that each aggregate may have developed from a blob of SnO_2 gel which commenced crystallising at the junction of the SnO_2 and SiO_2 gel. In such a circumstance, as soon as cassiterite development commenced the components necessary for the continued growth of the crystals would move radially within the blob towards the cassiterite fringe. Ultimately a shell of cassiterite crystals surrounding a hollow centre would be produced.

Later the silica gel supporting the cassiterite crystals was progressively converted to quartz from the walls to the centre of the system, but not before some of it near the walls had dehydrated sufficiently for syneresis cracks to develop. It was these cracks together with further fractures that developed after the gel had crystallised that became the sites of deposition of a further generation of cassiterite together with chlorite, quartz and a little chalcopyrite.

Towards the end of the period of the conversion of silica gel to quartz, crystals of quartz were growing within the gel near the centre of the lode in such a way that their long axes were approximately normal to the lode walls. These, of course, entrapped any cassiterite that lay in their paths of development. When these crystals were well-developed, renewed, but probably not particularly intense movement along the lode provided new channelways for ascending mineralising agents. It is thought that almost immediately after the deposition of the $\text{SiO}_2/\text{SnO}_2$ gel the existing channelways were blocked. The movement, leading to the establishment of new channelways was probably responsible for the damage sustained by the terminations of the centrally disposed, cassiterite-holding quartz crystals. The new channelways allowed mineralising agents to enter which destroyed the remaining silica gel, simultaneously liberating the cassiterite suspended in it. This cassiterite fell through the channelways until it encountered suitably disposed ledges upon which it accumulated. This, I think, accounts for the impalpable powder that was mentioned near the beginning of this paper.

Figure 3 is an endeavour to demonstrate pictorially my views of the genesis of the ore under review.

Finally it is worth mentioning that the Primrose ore under review is reminiscent of arandisite and silesite in that both these species were once thought to be silicates of tin. Arandisite is now known to consist of cassiterite disseminated in quartz, whilst silesite is 'probably a mixture of wood-tin and colloidal silica' (Palache et al., 1944, p. 579-580). In spite of these similarities there are probably marked differences between the developmental histories of these three, once called, silicates of tin.

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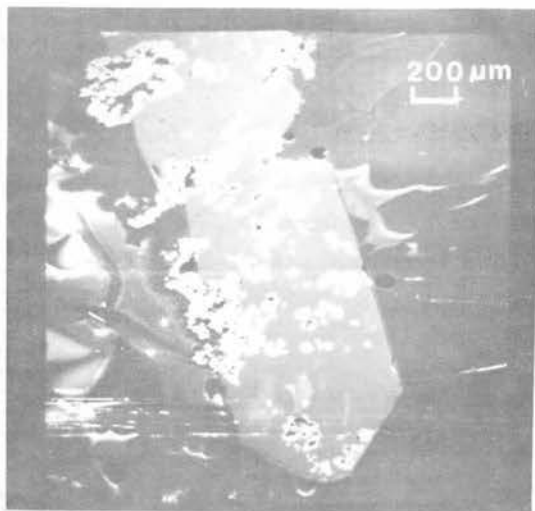


Figure 1: Aggregates of cassiterite crystals (near white) in two quartz crystals (pale grey). Wheal Primrose, Cornwall.

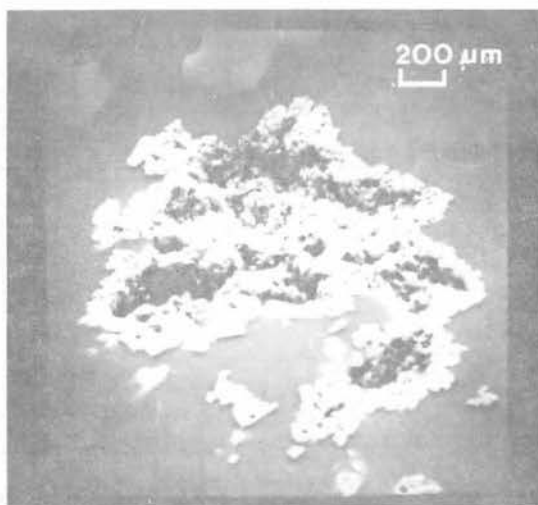


Figure 2: A complex aggregate of cassiterite crystals occurring in the quartz crystal in fig. 1, but photographed at a ten times greater magnification in order to better appreciate its nature.

NOTE: Figures 1 and 2 are normal primary reflected electron scanning photomicrographs.

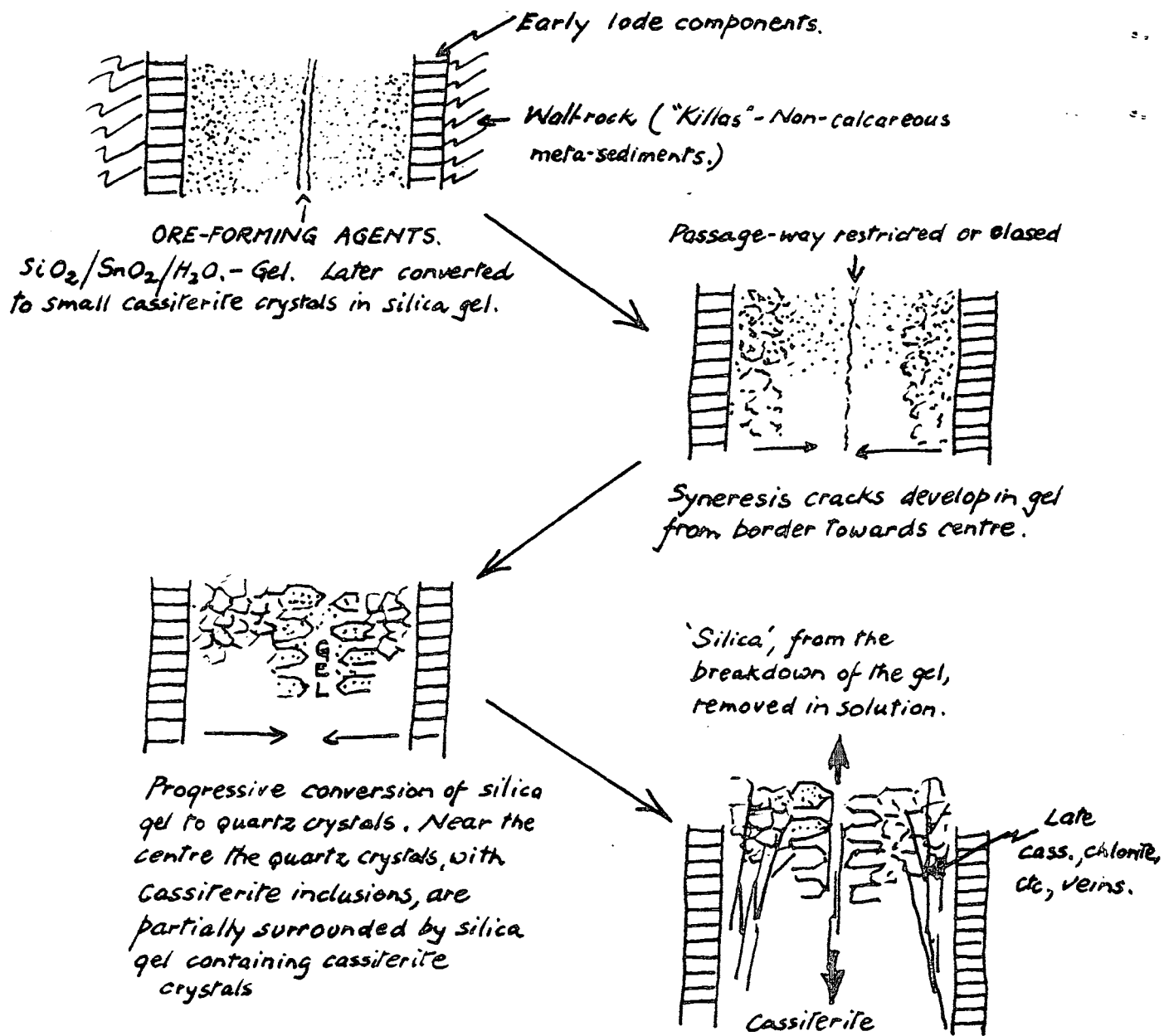


FIG. 3. A CONJECTURAL MODEL OF THE DEVELOPMENT OF THE QUARTZ/DISSEMINATED CASSITERITE ORE OF WHEAL PRIMROSE, ST. AGNES, CORNWALL.

This stage occurred after renewed fracturing allowed further mineralising agents to enter the system. These destroyed the silica gel and later promoted the development of cassiterite/chlorite, etc., veins in the 'massive' quartz/disseminated ore.

K.H.
 July, 1978.

A Roman's view of underground metal mining.

K.F.G. Hosking, Calle Isla de Cuba, 23, 1^o, 3, Sitges (Barcelona), Spain.

Recently, when reading Latham's (1951) wonderful English translation of the Roman poet Lucretius' great scientific poem 'On the nature of the Universe', that was probably written about 60 B.C., I came upon the following paragraph (op. cit., p. 242) that vividly describes, in a few words, the horrors besetting those who worked in underground metal mines about two millenia ago: "When men are following veins of gold and silver, groping with their picks in the bowels of the earth, what fumes are emitted from the pits of Scapte Hyle' What malignant breath is exhaled by gold mines! How it acts upon men's features and complexions! Have you not seen or heard how speedily men die and how their vital forces fail when they are drivern by dire necessity to endure such work?"

Between most of the time when Lucretius was writing and the present, the fundamental content of the above quotation represented the state of most underground metal mines, not solely those worked for gold and silver, and of the miners that worked in them. However, in recent times the 'malignant breath' exhaled by the mines differed from that of ancient times because it contained the poisonous gases generated by the use of high explosives and dust produced by the use of high explosives and rock-drills. The establishment of ways and means of dealing effectively with the gaseous products derived from the use of explosives underground has not offered great problems, but the dust problem, which differs markedly from mine to mine, due in part to the composition, shape and size of the particles generated, and in part to variations in mining practice, is close to being solved in some mines and far from being solved in others.

Until the early part of this century the presence of dust in mines was generally ignored even though in the second half of the 19th century there were those who thought that the various lung diseases of miners was caused by the dust they inhaled. Ever-better methods of dust suppression, stemming to no small degree from the researches that have been carried out in the gold-fields of South Africa, have greatly reduced the incidence of lung diseases amongst underground miners in many parts of the world. However, in spite of a great amount of investigation it is still not known with certainty why lung diseases amongst underground miners have been much more prevalent in some mining fields than in other. In the past the tin-fields of the Southwest of England and the gold-fields of the Witwatersrand were notorious because of the high incidence of lung diseases amongst their miners. On the Kolar gold-field of South India, on the other hand, the lung disease silicosis only assumed the dimensions of an occupational disease in about the early 1940's, in spite of the fact that for many years only dry drilling was used there (Holman, 1947). It seems to me that these differences may be due, at least in part, to differences in the levels of radio-activity in these fields. The South African gold mines yield important quantities of uranium concentrates, whilst pitchblende and secondary uranium species

have been recorded in many of the Cornish mines, a few of which have sold uranium concentrates. In addition, according to an article in the Cornish newspaper, the West Briton (Jan 15th., 1976, p. 1) the National Radiological Protection Board, whose headquarters are at Harwell, declared that the Cornish tin mines had an "unacceptable" level of radon. The article mentioned that "A survey in 1973 showed that at Pendarves the radon concentration in at least part of the mine was at a startlingly high level".

"The estimated exposure rate to radon was 67 working level months a year, compared with what is regarded as an 'acceptable' level of four WLM".

"Comparative figures for other Cornish mines were: Wheal Jane 0.84; Geevor 12.6; South Crofty 5.3".

Steps have been taken to reduce the radon concentration to acceptable levels and doubtless this has now been achieved.

The article also notes that Dr. Christophere Thomson, Health and Safety Executive employment medical officer said "I believe that from what few figures there are the risk from radon is very much less than that of dying in a mine accident." He also observed that chest X-rays of about 500 Cornish miners had been taken in the past 12 months and that they had not shown up a single case of lung cancer. In spite of these heartening observations I think that in a radioactive-high area, if a mine is not well run, that is to say, if the ventilation and dust suppression techniques employed are poor, the inhalation of radon and radioactive particles may well play an important role in the development of lung diseases amongst the miners.

'Ordinary' rocks, igneous, metamorphic and sedimentary, as opposed to certain ore-deposits, may contain radon-releasing species, so that a mine's atmosphere may contain a high concentration of radon without any obvious indication that this is likely to be the case and, in addition, radon-bearing ground waters entering a mine from a uranium-high external source may be the major reason for the atmosphere of that mine being radon-high.

In view of what is written above it seems to me that all underground mines should be subject to radon surveys, and based on the results of such surveys, action should be taken to eliminate any dangerously high concentrations of the gas and to prevent the development of any further high concentrations. Of course, for a variety of reasons, none of them commendable, some governments and some mining companies will not bother to implement such work which, when all is said and done, will be a shame, as the preservation of human life is more important than the winning of metals at any cost.

References

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- Latham, R.E., 1951. An English translation of 'Lucretius' "The nature of the Universe". Penguin Books, Harmondsworth, Middlesex, England. (256p).

A note on 'A procedure for computing the lattice constants of some crystal systems by Chan (1976)'.

Y.H. Lye, Dept. of Geology, University of Malaya, Kuala Lumpur.

Introduction

A procedure for computing the lattice constants of cubic, tetragonal, hexagonal and orthorhombic systems using an IBM 1130 computer was given by Chan (1976). However, the program needs to be modified when other computers are used. Recently, the University of Malaya, Kuala Lumpur replaced its IBM 1130 with an Univac 1100 computer and it is the intention of this note to point out the necessary changes to the procedure of Chan (1976) to suit the Univac 1100 computer system. Furthermore some minor additions are made to the original program to make it more readily suitable and applicable.

The method employed in the use of this program involves the solution of the general equation,

$$\frac{1}{d^2} = \frac{h^2}{a^2} + \frac{k^2}{b^2} + \frac{l^2}{c^2}$$

for the cubic, tetragonal and orthorhombic systems, and

$$\frac{1}{d^2} = \frac{4(h^2 + hk + k^2)}{3a^2} + \frac{l^2}{c^2}$$

for the hexagonal system,

by first reducing them into linear equations and then solving them by the method of least squares. The normal equations derived are transformed into matrix notation and are solved by using Gauss elimination method for a system of linear equations.

Modifications to the procedure

The following are the changes that must be made to suit the new computer:

- 1) For all the READ statements, change from READ (2, X), to READ (5, X)
- 2) Change all the WRITE statements from WRITE (5, X) to WRITE (6, X)
- 3) For the SUBROUTINE MIN, the statement 299 CALL EXIT, should be replaced by 299 RETURN, and the RETURN statement before this should be omitted.
- 4) Besides these changes, a new Id card (Identification card) is essential, followed by a @ FTN, TISC card. Also required after the program but before the data cards is an End-of-File card, @ EOF.

The program will be operational with the addition of a Finish Card @ FIN, placed at the end of the data cards.

The minor additions made are:

- 1) Instead of the READ (2, 4) (DATA (I,J), J = 1, 4) Card just before statement number 4, replace it with a READ (5, 4, ERR = 400) (DATA (I, J), J = 1, 4) card. To make this function complete and operational, 2 statements must be added after statements:

```
80      MA = MA + 1
      Go To 100.
```

The 2 statements are: 400 WRITE (6, 401) I
 401 FORMAT (1X , 'ERR ON CARD', I2).

By this change it is made possible for the computer to print out the number of the card that contains any errors made during the punching of any of the data cards. This will remove the frustration of searching for a minor error made on one card in a whole stack of data cards. It is also designed to stop the program so that unnecessary wastage of computer time and cost is avoided.

- 2) To calculate the axial ratio C/A for the hexagonal system, add the following statements after statement 42:

```
C      TO OBTAIN RATIO T = C/A
      T = C/A
      WRITE (6, 44)
44     FORMAT (20X, 'AXIAL RATIO FOR HEXAGONAL SYSTEM', //)
      WRITE (6, 45) T
45     FORMAT (20X, 'T = ', F 8.4)
```

- 3) To obtain the axial ratios A/B, C/B and C/A for the other systems, add these statements after statement 62.

```
C      TO OBTAIN RATIO R = A/B, S = C/B, T = C/A
      R = A/B
      S = C/B
      T = C/A
      WRITE (6, 64).
64     FORMAT (20X, 'AXIAL RATIO FOR OTHER SYSTEMS', //)
      WRITE (6, 65) R, S, T.
65     FORMAT (20X, 'R = ', F8.4, 5X, 'S = ', F8.4, 5X, 'T = ', F8.4)
```

Testing the applicability of the procedure

It has come to the attention of the author that former users of the program of Chan (1976) found that the program either does not work or that it gave results that are unexpected. Thus, in order to test the algorithm of the method of solution involved, a few sets of hkl and d values given in the JCPDS Powder Data File of several minerals belonging to various systems were obtained using the program and the results compared to those given in the JCPDS Powder Data File (Table 1). It can be seen from Table 1 that the algorithm of the method of solution is very good, comparable up to third decimal place, for tetragonal and

hexagonal systems with those given in the JCPDS Powder Data File, and is quite similar for crystals of the orthorhombic system. It also gives very good results for the cubic system (not tabulated).

Therefore it is evident that the program is generally applicable and can yield good results except for the orthorhombic system where the results may be good up to the second decimal place. It is hoped that this will clear up some doubts concerning the applicability of this program for the computation of lattice constants of some crystal systems.

Users of the program must bear in mind however that the method of solution involved, takes into consideration every set of hkl and d values given in the data cards. As such the position of the regression line and the matrix derived from it, will change with even a change in a single set of hkl and d values. This may explain the unexpected results some users obtained. The author believes that it is more advisable to use fewer sets of hkl and d values but of a high level of confidence, in the computation than many sets of hkl and d values, some of which are derived from diffuse lines or reflections of X-ray photographs or diffractograms.

One of the drawbacks of this program is that the standard deviation and error of the lattice constants derived cannot be easily obtained. It gives only single-valued answers. Other algorithms or methods must be employed if these are required such as variance analysis and multiple regression.

References

Chan, S.H., 1976. A procedure for computing the lattice constants of some crystal systems. Warta Geologi, 2, 15-26.

_____, 1976. Erratum: A procedure for computing the lattice constants of some crystal systems. Warta Geologi, 2, p. 55.

Å	Cassiterite (tetragonal)		Columbite (orthorhombic)		Tourmaline-Dravite (Hexagonal)	
	JCPDS File No. 21-1250	computed using program	JCPDS File No. 16-337	computed using program	JCPDS File No. 14-76	Computed using program
a	4.738	4.737 ₂	5.730	5.733 ₂	15.931	15.930 ₈
b	-	4.739 ₅	14.240	14.193 ₂	-	-
average of a & b	-	4.738 ₉	-	-	-	-
c	3.188	3.187 ₅	5.080	5.087 ₁	7.197	7.199 ₅
a/b	1	1.000 ₇	0.402 ₄	0.404 ₉	-	-
c/b	0.673	0.673 ₅	0.357 ₇	0.358 ₃	-	-
c/a	-	0.673 ₇	-	0.887 ₃	0.452 ₈	0.452 ₉
Remarks	Computed using all the given lines in File		Computed using all given lines in File		Computed using first 50 lines given in the File	

Table 1: A comparison between the lattice constants stated for some minerals in the JCPDS File and the computed lattice constants using the modified program of Chan (1976). The hkl and d values used for computing are those stated in the respective cards of the JCPDS File. (For cassiterite $a \neq b$, but however, the average of $a + b$ is 4.738).

Tektite found on beach near Endau, Johore, Peninsular Malaysia.
Sia Hok Kiang, Dept. of Geology, University of Malaya, Kuala Lumpur.

A tektite was found on the beach of Teluk Kerengga, southeast of Endau in the north-eastern part of Johore, grid reference 006181 on sheet 109f Penyabong, Survey Dept. of Malaya No. 34-1961 (Fig. 1).

The tektite was found in the afternoon of 16th August 1978 by the author during the University of Malaya 2nd Year Geology field trip. It was found on the beach in a stretch of shells and pebbles of about 0.5m wide near the high tide mark. Seaward of the beach is a tidal flat extending to at least 0.5km offshore during low tide, and consisting of fine sand and mud particles.

The Teluk Kerengga region is a low lying area, with some ridges about 50m high located about 1 km to the west of the beach. Between the ridges and the beach is a wide stretch of beach ridges. A small river, Sungei Mawar flows northeastward out to the sea at Kampong Mawar, about 2 km south of the region. To the north, a headland of pyroclastic rock is found stretching seaward for about 1.5 km at Kampong Penyabong.

The tektite found is in the shape of an ellipsoid, measuring about 24x21x13 mm (Fig. 2), volume is 4.807 cm³ and weighs 11.807 g. The surface is dull and abraded but the numerous arcuate and linear grooves can still be seen, the deeper ones revealing the original glassy luster.

Most probably the tektite was washed up on the beach by waves during high tide. Abrasion of the surface is not so severe suggesting that it did not travel a long distance carried by water current nor has it been washed for long on the beach. The tektite could have been washed up from the sea bottom or it could have been washed from the mainland to the sea and then by longshore current to the shore. Since the prominent longshore current in the Endau region are northward (Tjia, 1970, Fig. 1), it is possible that the tektite was washed down the Sungei Mawar to the south of the site.

In any case it would appear to have been derived from fairly near its discovery point and thereby represents the first reported tektite locality in the state of Johore.

References

- Tjia, H.D., 1970. Monsoon-control of the eastern shoreline of Malaya. GSM Bulletin no. 3, 9-15.

LOCATION OF TELUK KERENGGGA

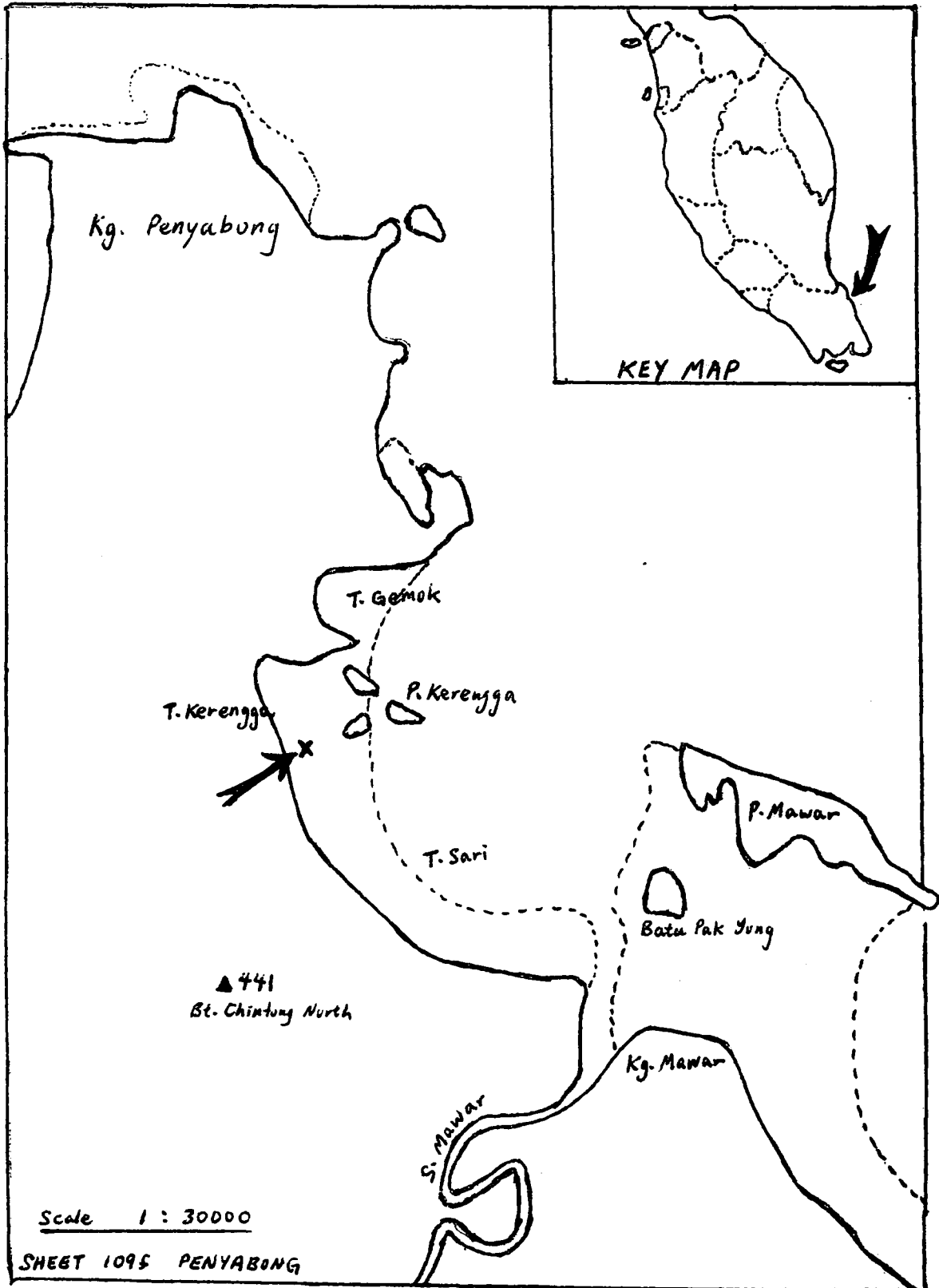


FIG. 1



Fig. 2

NEWS OF THE SOCIETY

Petroleum Seminar 1978

The Petroleum Seminar 1978 will be held in Hotel Jaya Puri on Monday, 11 December 1978.

The tentative programme is given below:

- 0830-0930 : Registration
- 0930-1000 : Opening address by President, Geological Society of Malaysia
- 1000-1045 : Sedimentology of carbonate build-ups in Central Luconia, offshore Sarawak - M. Epting, Sarawak Shell Bhd.
- 1045-1110 : Stratigraphy and geology of Straits of Malacca, offshore Malaysia - Nik Ramli, PETRONAS
- 1110-1140 : Coffee Break
- 1140-1215 : Some aspects of stratigraphy and tectonics of Malaysia-Philippine Region - A.R. Lloyd, Asia Exploration Consultants
- 1215-1240 : Review of exploration activities in Malaysia since Production Sharing Agreement - J.H. Armitage, Esso Production Malaysia
- 1240-1415 : Lunch
- 1415-1445 : Structural styles in Western Sabah offshore - A.J. Bol, Sabah Shell Ltd.
- 1445-1515 : Seismic stratigraphy offshore Sabah - J.N. Bubb & F.E. Walton, Esso Production Malaysia
- 1515-1545 : Coffee Break
- 1545-1610 : Geology of Labuk Bay sub-basin, offshore Eastern Sabah - J. Ponniah, PETRONAS
- 1610- : Closing remarks. President, Geological Society of Malaysia.

The third circulars together with registration forms will be sent to all members in due course.

JL/TTK

Donations

The Society gratefully acknowledges the following donations:

1. PETRONAS - \$1000
 2. Dr. H. Sawata - \$ 204
-

Bulletin 10

This Bulletin, scheduled to be published before the end of the year, will be a collection of seven papers on the geology of the Asean region. As a preview for our readers the titles of the seven papers and their authors are appended below:

1. Stratigraphic framework for exploration in Sarawak by Ho Kiam Fui.
2. Active faults in Indonesia by H.D. Tjia.
3. Geochemistry and petrogenesis of late Cenozoic alkaline basalts of Thailand by S.M. Barr & A.S. MacDonald.
4. Reconnaissance palaeomagnetic measurements on Triassic and Jurassic sedimentary rocks from Thailand by S.M. Barr, A.S. MacDonald & N.S. Haile.
5. Multiple deformations at Bukit Cenering, Trengganu by H.D. Tjia.
6. Galena-bearing grains from the Lenggang stanniferous placers, Belitung, Indonesia by K.F.G. Hosking & T.B.A. Rabelink.
7. Short Note: A comment on stratigraphic relationships in the Indarung area, Padang District, West Sumatra by N.S. Haile.

Editor's Note

If everything goes well we can expect Bulletin 10 to be out about the time when Christians will be celebrating Christmas. Preparations are also in hand on 'The Special Tin Symposium Bulletin' (Bulletin 11) and this may be expected by the end of the first quarter of 1979.

Papers are now being solicited for Bulletin 12 and those who wish to contribute are requested to refer to past Bulletins for the format to adopt.

Members' support for our Warta Geologi in the form of geological notes is indeed encouraging and gratifying compared to the dearth of papers a year ago. We even have the contributions by two students in this issue and it is hoped that lecturers will continue to encourage their students to publish their findings.

I would like to point out that for a small fee advertisements of a geological nature or pertaining to it may be inserted in Warta Geologi.

We wish those going to the 3rd Regional Conference in Bangkok a pleasant and profitable trip and knowing our excellent hosts they will come back enthused with stories of Thailand.

New Library additions

The following works have been added to the Society's Library and are available to members at the Klompé Reading Room at the Department of Geology, University of Malaya.

1. AGID News, nos. 14 & 15, 1978
2. New books, May-June 1978 (National Library, Singapore)
3. Journal of Research of the USGS, vol. 6, no. 4 & 5, 1978
4. IMM Transactions/Section A, vol. 87, April 1978
5. IMM Bulletin no. 862-864, 1978
6. Geophysical Research Bulletin, v. 16, no. 2, 1978
7. IMM Transactions/Section B, vol. 87, May 1978
8. National Library Singapore: adult reference collections accession list, Aug & Sept 1978
9. The University of Kansas, Paleontological contributions Papers 93 & 94, 1978
10. Geophysical Research Bulletin, v. 15, no. 4, 1977 & vol. 16, no. 1, 1978
11. Mine data sheets to accompany metallogenic map Bega 1:250,000 sheet, 1978
12. International subcommission on stratigraphic classification of IUGS Commission on stratigraphy, circular no. 56, 1978
13. Geosurvey Newsletter, vol. 10, nos. 16-19, 1978
14. Commonwealth Geological liaison office, NL. 9 & 10, 1978
15. Annales Academiae Scientiarum Fennicae, Series A III. Geologica-Geographica, nos 123-126, 1978
16. Early Tertiary Gastropod fossils from coastal region of Bohai, 1978
17. Memoirs of Nanjing Inst. of Geology and Palaeontology, Academia Sinica, no. 9, 1978
18. The Cenozoic Foraminifera from the coastal region of Bohai, 1978
19. On the paleogene dinoflagellates and acritarchs from the coastal region of Bohai, 1978
20. Bulletin of the Geological Survey of Indonesia, v. 4, no. 1, 1978
21. Technical publications of Indonesia - Economic Geology series no. 8, 1977
22. American Museum Novitates, no. 2652, 1978.

Membership

The following persons have joined the Geological Society of Malaysia:

Student members

- Mohd. Tahir b. Mohd. Kassim, Jabatan Geologi, Universiti Kebangsaan Malaysia, Kuala Lumpur.
- Juhari b. Mat Akhir, Jabatan Geologi, Universiti Kebangsaan Malaysia, K.L.
- Chua Beng Yap, Geology, University of Malaya, Kuala Lumpur.
- Ibrahim b. Amnan, 35 Jln. Tempinis Kanan, Lucky Garden, Bangsar.
- Mahendran S. Ganesan 112, Jln. 20/2, Petaling Jaya.

Husani Zaini, Geology Department, University of Malaya, Kuala Lumpur.
Jamaluddin Othman, Batu 1/4, Jln. Raba, P.O. Banting, K. Langat.

Full Member

Martin J. Press, Dept. Civil Engineering, WA Institute Technology,
Bentley 6102, Western Australia.

Associate Member

Lee Meng Chong, 14, Jln. SS3/36, Petaling Jaya.
Tan Chin Tong, 30 Jln. Kamuning, Off Jln. Imbi, Kuala Lumpur.

Institutional Member

Institute of Geological Sciences, Library (Serials Section), Exhibition
Road, London SW7 2DE, England.

Change of address

The following members have informed the Society of new addresses
as indicated:

Kok Keong Cheang
Dept. of Geology
University of Georgia
Athens, Georgia 30602, USA

G.A. Schnellman
49 Ashworth Mansions
Elgin Avenue
London W9 1LW, England

G.D. Mansergh
N.Z. Geological Survey
Otara, Auckland,
New Zealand

W.F. Hooper
Coastal States Gas Corp.
Coastal Tower
Nine Greenway Plaza
Houston, Texas 77046, USA

Mahillah Bibi Rafek
Dept. of Geological Sciences
University of Saskatchewan
Saskatoon, Saskatchewan,
Canada S7N 0W0

P. Haseldonckx
c/o DEMINEX
P.O. Box 332
4300 Essen 1
W. Germany

A.H.G. Mitchell
c/o UNDP
P.O. Box 107
Kathmandu, Nepal

S. Ishihara
Geological Survey of Japan
Kawada-cho 8
Shinjuku, Tokyo, Japan

Mah Weng Hong
28 Jalan SS3/52
Sungei Way-Subang

Abdul Ghani Rafek
c/o 'Lehrstuhl Geologie III-Geotechnik'
Institut für Geologie
Ruhr-Universität Bochum
Universitätsstr 150
4630 Bochum-Querenburg, W. Germany

Khee Kok Kean
 Esso Production Malaysia
 P.O. Box 857
 Kuala Lumpur.

Address wanted

We would like the current address of the following members:

Ibrahim Komoo
 formerly of 129 Meadowburn, Bishopbriggs, Glasgow G64 3LU, U.K.

Raghubir Rampal
 formely of 1126 Jln. Pegawai, Klang.

Librarian, Teylers Stichting
 formerly of Damatraat 21, P.O. Box 333, Holland.

O T H E R N E W S

Sixth Asian Regional Conference on Soil Mechanics & Foundation Engineering

The Southeast Asian Society of Soil Engineering will hold the Sixth Asian Regional Conference on Soil Mechanics and Foundation Engineering in Singapore between 24-27 July 1979. This conference will feature discussion sessions on deformation and strength of soils, slopes and excavations, etc. and State-of-the-Art Reports on current problems.

The conference will be followed by a one day symposium on Soil Sampling in Clayey and Sandy Soils.

For further enquiries please write to:

Conference

Dr. Tan Swan Beng, Chairman
 Organizing Committee, 6ARC
 c/o Institution of Engineers, Singapore
 Suite 1306, 13th Floor,
 International Plaza
 Anson Road, Singapore 2.

Symposium

Mr. Hiroshi Mori
 Chairman, Committee on Soil
 Sampling of ISSMFE
 c/o Mori Geotechnique Inc.
 Room 1005 Sunheim Tamachi
 3-2-9 Kaigan, Minato-ku
 Tokyo, Japan

Episodes

The International Union of Geological Sciences (IUGS) has remodelled their quarterly news journal into an attractive soft cover volume stapled together along the spine and now call it "Episodes" (formerly Geological Newsletter). Episodes, published at the end of March, June, September and December, seeks to communicate an overview of the scientific interests, and activities of the International Union of Geological Sciences, its constituent and affiliated bodies and its international joint programs. Subscription at \$12.00 (Canadian) per year may be made from

Dr. V. Lafferty
 Managing Editor, EPISODES
 International Union of Geological Sciences
 Room 177, 601 Booth Street
 Ottawa, Canada K1A 0E8.

Obituary

The Chairman and Chief Executive of PETRONAS YB Tan Sri Abdul Kadir b Shamsuddin, 58, passed away on Wednesday, November 1978 as a result of a stroke. He leaves a widow, Puan Sri Zainab bt Datuk Abu Bakar, 3 sons and 2 daughters.

Tan Sri Kadir was born in Kajang, Selangor and was educated at Kajang High School, Raffles College (Singapore), Bristol University (England), Imperial Defence College (England) and Post Graduate School, Yale University (USA). His qualifications include Raffles College Diploma (Arts), LLB (Hons) Bristol and Bar-at-Law (England).

Tan Sri Kadir held many key positions in Government such as Asst. Superintendent of Posts (1939), the Asst. State Secretary Pahang (1952), Asst. Secretary, Ministry of Defence (1955), Joint Secretary, Malayan Independence Mission to the Constitutional Talks with the United Kingdom (1956), Executive Secretary of the Cabinet (1957), Secretary-General, Ministry of Defence (1962), Director-General, Public Service Dept. (1967), Chief Secretary to the Government, Secretary to the Cabinet and Head of the Civil Service (1970). He retired to become the Chairman and Chief Executive of PETRONAS in 1976. He also served as Chairman, Council of Universiti Pertanian Malaysia, Chairman, Advisory Committee of the National Library and Chairman & Commander-in-Chief, St. John Ambulance, Malaysia.

For his meritorious work he was honoured with the PMN, SPDK, PNBS and K. St. J.

Tan Sri Kadir will be remembered for his distinguished service to the country

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Calendar

Under this column the Society will note coming events on meetings, courses and symposia of interest to members. Date in parentheses gives the issue of Newsletter containing more information pertaining to the event.

Geological Society of Malaysia1978

December : Seminar on 'The Petroleum Geology of the Sunda Shelf', Kuala Lumpur. Secretary, GSM, c/o Dept. of Geology, University of Malaya, Kuala Lumpur 22-11, (Nov-Dec 1977).

Other Events

- Nov 14 - 17 : Third Regional Conference on Geology and Mineral Resources of Southeast Asia, Bangkok, Thailand. Conference Secretary, IIGEOSEA, Division of Geotechnical & Transportation Engineering, Asian Institute of Technology, P. O. Box 2754, Bangkok, Thailand. (Jul-Aug 1977 & May-Jun 1978).
- Nov 26 - : First International Conference on the Future of Small
Dec 5 Deposits and Small Scale Mining, Mexico City. By Invitation only. (May-Jun 1978)
- Dec 14 : Tungsten Meeting of the Institution of Mining and Metallurgy, London, Secretary, Institution of Mining and Metallurgy, 44 Portland Place, London W1N 4BR, England. (Mar-Apr 1978).

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- 1979 : 14th Congress of the Pacific Science Association USSR. B.G. Gafurov, Chairman of the Soviet National Pacific Committee, Academy of Sciences of the USSR, Moscow. (Jul-Aug 1977).
- Apr 30 - : 1979 Offshore Technology Conference, Astrohall, Houston,
May 3 Texas. OTC Headquarters, 6200 North Central Expressway, Dallas, Texas 75206, USA. (Jul-Aug 1978).
- May 10 - 26 : Ninth International Congress of Carboniferous Stratigraphy and Geology, Washington, USA. President or Secretary-General IX-ICC, 1979, Museum of Natural History, Washington, D.C. 20560, USA. (Sep-Oct 1977).
- Jul 24 - 27 : Sixth Asian Regional Conference on Soil Mechanics and Foundation Engineering, Singapore. Dr. Tan Swan Beng, c/o Institution of Engineers, Singapore, Suite 1306, 13th Floor, International Plaza, Anson Road, Singapore 2. (Sep-Oct 1978).
- Oct 8 - 12 : Tenth World Mining Congress, Istanbul, Turkey, Dünya Madencilik Kongresi Turk Milli Komitesi, Ziya Gokalp Cad No. 17, Kat 8, Ankara, Turkey. (Jan-Feb 1978).

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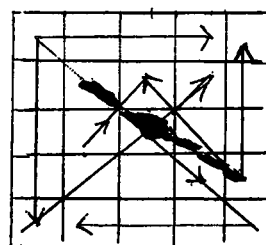
- Feb 11 - 16 : Fifth Gondwana Symposium, Wellington, New Zealand.
Secretary, Fifth Gondwana Symposium, Victoria University of Wellington, Private Bag, Wellington, New Zealand. (May-Jun 1978).
- Apr 10 - 15 : 8th International Geochemical Exploration Symposium, Hannover, Fed. Rep. Germany. Dr. H. Gundlach, Organizing Committee, 8th Int. Geochemical Exploration Symposium, Federal Institute for Geosciences and Natural Resources, P.O. Box 510, 153, D-3000 Hannover 51, W. Germany. (Jul-Aug 1978).
- Jul 7 - 17 : 26th International Geological Congress in Paris, France. Secretariat General du 26eme Congres geologique internationale, Maison de la Geologie, 77-78 rue Claude Bernard 75005, Paris, France. (Nov-Dec 1977).
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Mineralogy Word Puzzle

The puzzle contains names of minerals and mineralogical terms. The required words can be found either horizontally, vertically or diagonally in the puzzle. Some of the words are arranged with the letters in reverse e.g. "lapo" should read "opal". The "ite" of a mineral ending in "ite" is not included in the puzzle, e.g. "kyanite" should appear as "kyan" in the puzzle.

Clues are also given for the hidden minerals and terms. Answers will be given in the next issue of the *Warta Geologi*.

C	B	I	K	Z	C	C	Q	R	I
I	H	P	L	O	R	U	A	T	S
T	X	I	V	Y	O	O	M	J	S
R	N	J	A	E	S	K	L	M	O
I	I	D	T	S	S	T	B	X	A
N	F	C	E	B	T	J	I	P	P
E	F	I	R	A	Y	O	D	S	S
R	O	D	A	R	B	A	L	H	A
Q	C	N	R	E	T	G	I	L	T
U	X	E	O	P	U	R	F	H	I

Clues

1. The old age pensioner present in every biaxial mineral by decree (abbrev) (3).
2. Figure with two clear hyperbolic curves may not react positively (abbrev) (3).
3. The Spanish hero honoured with a C-cross (8 + ite).
4. Fruity member of the Silica Family distinguished for vitamin C (7).
5. Family blessed with holy twins (7 + ite).
6. German godfather of the Carbonate Mafia (5 + ite).
7. Canine member of the Plagioclase Family (8 + ite).
8. The undertaker (6 + ite).
9. The lawyer (3 + ite).
10. The sick mineral (3 + ite).
11. The mistaken mineral (3 + ite).
12. The annoyed mineral (5 + ite).

PERSATUAN GEOLOGI MALAYSIA
(GEOLOGICAL SOCIETY OF MALAYSIA)

Tujuan Persatuan Geologi Malaysia adalah untuk memajukan sains bumi, terutamanya di Malaysia dan tempat-tempat berhapiran. Sesiapa yang ingin menjadi ahli Persatuan sila dapatkan borang-borang daripada Setiausaha Kehormat.

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

Annual Dues

The annual dues of Full Members and Associated Members shall be M\$15.00 if paid in advance before the first day of each calendar year, M\$16.00 if paid between 1 January and 1 March or M\$17.00 thereafter. The annual dues for members elected after June 30 shall be M\$7.50 that year. An entrance fee of M\$5/- shall be payable on election.

Some Bahasa Malaysia (Malay) geographical terms

Bukit (Bt)	-	hill	Kuala (K)	-	mouth of river
Genting (Gtg)	-	pass	Pulau (P)	-	island
Gunung (G)	-	mountain	Sungai (S)	-	river
Jalan (Jln)	-	road, street	Tanjung (Tg)	-	cape
Kampung (Kg)	-	village	Teluk (T)	-	bay

