K E S A T U A N   K A J I B U M I   M A L A Y S I A

GEOLOGICAL SOCIETY OF MALAYSIA

N E W S L E T T E R

Number 17 | March 1969

Contents

GEOLOGICAL SOCIETY OF MALAYSIA

Officers - 1969

President	:	C.S. Hutchison University of Malaya Kuala Lumpur
Vice-President	:	S.S. Rajah Geological Survey Kuala Lumpur
Secr./Treas.	:	K.J. Pocock University of Malaya Kuala Lumpur
Editor	:	P.H. Stauffer University of Malaya Kuala Lumpur
Councillors	:	C.H. Yeap Associated Mines Kuala Lumpur
		P.Y.N. Wong Geological Survey Kota Kinabalu, Sabah
		S.P. Sivam (co-opted) University of Malaya Kuala Lumpur

Address of the Society:

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

GEOLOGIC NOTES

Some NW Trending Faults in the Kuala Lumpur and Other Areas

Y.K. Shu
Geological Survey of West Malaysia

In Newsletter No. 15, November 1968, P.H. Stauffer drew attention to the long recognized evidence of major faults in the Kuala Lumpur area, and postulated linear contiguity with a variety of other features interpreted by him from the Geological Map of Malaya, 6th edition. He suggested the possibility that the various features enumerated indicate the presence of a major fault striking at approximately 105°, and extending clear across the Malay Peninsula. Since his interpretation was admittedly mainly a "map exercise", and therefore lacked the support of adequate field observations, he appealed for further information from field geologists.

The writer has done field work in areas east of Kuala Lumpur and in the Jelebu District, and as a result is familiar with the major structural elements present. In the following notes an attempt will be made to present the facts as observed in the field, and correlate them with the knowledge which has been acquired by other geologists of the Geological Survey regarding wrench faulting in adjoining areas of the Peninsula. The attached sketch map will aid in visualizing the overall structural picture.

Faults in the Kuala Lumpur area, especially that in which the well-known Klang Gates quartz reef occurs, have been of great interest to geologists for many years. The first written work on the subject was prepared by Alexander and Procter (1955) following an investigation concerning a proposed dam-site at Klang Gates. In this paper they gave a detailed account of the internal structure of the quartz reef, suggesting that it could be related to recurring movements. E.H. Yin (Unpublished Memoir 1962) compiled the work of a number of Government geologists in the Kuala Lumpur area into one report. Most of the major quartz reefs of the region are shown on the geological map prepared to accompany this volume. D.J. Gobbett (1964) showed both the Ampang Fault and the Klang Gates quartz reef on his map of the Lower Palaeozoic rocks of Kuala Lumpur. The writer covered most of the western slopes of the Main Range between Kuala Kubu Bharu and Ulu Langat during the course of an investigation connected with the Kuala Lumpur Water Supply Scheme in 1965-66. B.N. Koopmans (unpublished work) has also made a photogeological interpretation of the structures present in the Klang Gates and Ulu Langat areas. The continuation of the major structural elements were traced into the Jelebu area which is currently being mapped by the writer.

The accompanying sketch map is a compilation of data collected by Willbourn (1922), Roe (1953), Alexander (1968), Yin (Unpublished Manuscript, 1962), Jaafar (Unpublished Manuscript, 1967), and the writer. The map shows only the major structural elements. It can be seen that by far the most prominent and persistent faulting in the area makes up the main set of wrench faults trending at 310°-320° with associated splays or tension fractures at 280°-290°. Of these two types, the latter, of comparatively minor and discontinuous character, coincide in direction with the major quartz reefs of the Kuala Lumpur area, as mentioned by Stauffer at 105° (285°). In the area shown on the map all offsets observed, with the exception of one on a N-S fault west of Karak, are left-lateral. The N-S faults are thought to be the oldest, and these are cut by both the prominent NW-SE set and a few relatively minor complementary NE-SW faults. The longest and most prominent fault observed has its expression in an apparently continuous broad zone of mylonite, flaser granite, sheared granite, and large quartz veins, which trends NW-SE for a distance of at least 70 miles. It has been traced from Kuala Kubu Bharu through Bukit Tinggi, up the Benus Valley, down the Kenaboi Valley, thence to an area about 3 miles north of Bahau where it truncates a NNW-trending conglomerate ridge. Believing that a feature of such regional magnitude merits a name, the writer proposes that it be called the "Bukit Tinggi Fault Zone". To the southwest of this major fracture as far as Seremban, some 26 miles, there is present a series of subparallel but less prominent faults also apparently of the wrench type. Willbourn (1922) mapped large quartz veins in some of these fractures.

The great width of the zone in which the NW-SE faults occur is an indication of the regional character of this fracturing. Within the zone regional stresses have been relieved by many minor adjustments along a multitude of parallel planes, and it is unlikely that any individual fracture of outstanding continuity, or on which a large displacement has occurred, can be found. The "Bukit Tinggi Fault Zone" as described above would appear to be an exception to this, but in fact it also is a similar complex zone of adjustment rather than an individual fracture. Other similar fracture zones in which sets of NW-SE faults are prominent have been mapped elsewhere in the Peninsula as follows:

Pahang-Johore

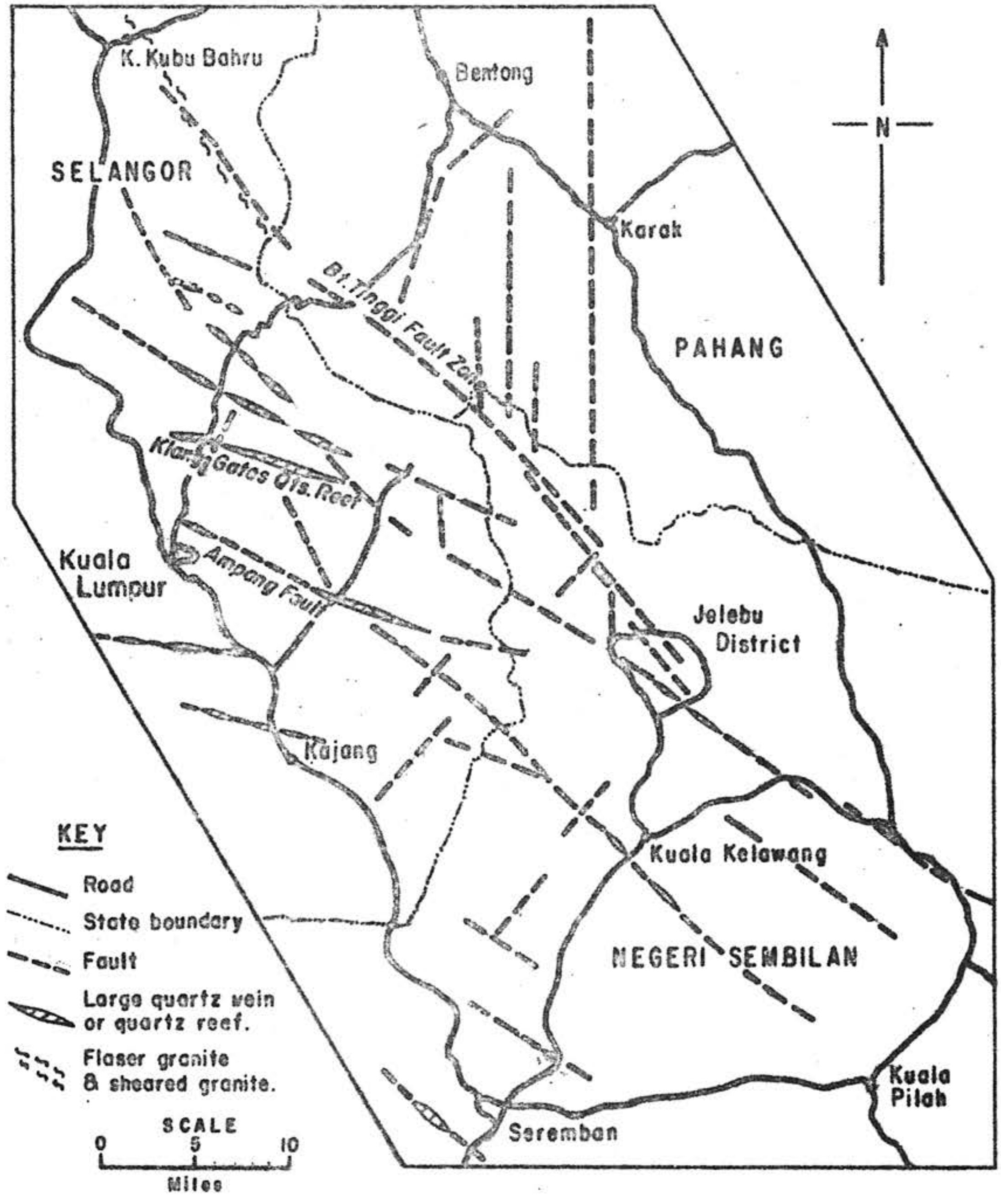
Messrs. F.S. Chong, R.H. Cook, G.M. Evans, and T. Suntharalingam are conducting a program of reconnaissance geological mapping in the Malaka-Mersing area which includes parts of Johore and southern Pahang. This work has revealed the presence of a series of major subparallel wrench faults with an approximate trend of 290° in zone over 30 miles wide.

Johore

Adjacent to the above area, some 10 miles to the south, S.S. Rajah has mapped similar wrench faults near Gunong Blumut.

West Pahang

In the vicinity of Gunong Benom two wrench faults striking at 310°, and with an aggregate length of 24 miles, were mapped by Jaafar (1967).



K. Kubu Bahru
Bentong
N
SELANGOR
Karak
Bt. Tinggi Fault Zone
PAHANG
Klang Gates Qts. Reef
Kuala Lumpur
Ampang Fault
Jelebu District
Kajang
Kuala Kelawang
NEGERI SEMBILAN
Kuala Pilah
Seremban
KEY
Road
State boundary
Fault
Large quartz vein or quartz reef.
Flaser granite & sheared granite.
SCALE
0 5 10
Miles

South Trengganu

In the Ulu Paka area, four wrench faults, now partially occupied by quartz reefs, were mapped by F. Chand of the Survey.

Perak

Near Tapah, during field-work carried out in connection with the Bàtang Padang Hydro-Electric Scheme, Messrs. Chung, Ledgerwood, and Singh reported the occurrence of a zone of faulting in which NW-SE fractures are prominent.

Kedah

Burton (1965) gives a detailed description of the NW-SE wrench faulting zone in the Baling area. He applies the name "Bok Bak Fault" and suggests the possibility that the zone may extend south-eastward across the entire Peninsula. This, however, has not been confirmed by field evidence.

The field evidence cited above indicates the prominence and regional character of NW-SE fault zones throughout the Peninsula. The traces of these features show up well in the crystalline rocks, but in intervening sedimentary areas are less distinct and easily overlooked, rendering proof of continuity difficult, if not impossible. This important factor must be kept in mind when inferring continuity between widely separated points of actual observation in order to establish the presence of long, unbroken, transpeninsular faults, since there is the likelihood of transgressing from one fault to another, or of being led astray at points of low angle bifurcation. Even though it is the writer's opinion that regional faults of transpeninsular magnitude do, in all probability, exist in Malaya, the fact remains that as yet insufficient conclusive field evidence has been found to confirm such a view.

Based on field evidence, the concensus of opinion of various geologists is that movements took place on the NW-SE faults in post-Cretaceous times. Stauffer suggests a possible Quaternary age for movements on his "Kuala Lumpur fault zone". The internal structures seen in quartz reefs, and the cataclastic structures observed in granitic dykes injected along faults in the Jelebu District, both suggest a long period of recurring movements which could have commenced in Tertiary or even earlier times and lasted up to the present.

The writer wishes to express thanks to the Director of the Geological Survey of West Malaysia for having given permission to publish this note. In addition due acknowledgement is made to his colleagues for supplying helpful information and encouragement, and to A.G. Darling for editing the manuscript.

References:

ALEXANDER, J.B., 1968 The geology and mineral resources of the neighbourhood of Bentong, Pahang, and adjoining portions of Selangor and Negri Sembilan. District Memoir 8, Geol. Surv. of West Malaysia.

ALEXANDER, J.B. and PROCTER, W.D. 1955: Investigations upon a proposed dam-site at Klang Gates, Federation of Malaya. Colon. Geol. Miner. Resour. 5, pp. 409-415

BURTON, C.K., 1965: Wrench faulting in Malaya. J. Geol. 73, pp. 781-798

GOBBETT, D.J., 1964: The Lower Palaeozoic Rocks of Kuala Lumpur, Malaysia. Fed. Mus. J., 9, pp. 67-79

JAAFAR BIN AHMAD, 1967: Unpublished Manuscript on the Benom-Karak area.

ROE, F.W., 1953: The geology and mineral resources of the neighbourhood of Kuala Selangor and Rasa, Selangor, Federation of Malaya, with account of the geology of the Batu Arang coalfield. District Memoir 7, Geological Survey, Federation of Malaya.

WILLBOURN, E.S., 1922: An account of the geology and mining industries of South Selangor and Negri Sembilan. Calcutta: Baptist Mission Press.

YIN, E.H., 1962: Unpublished Manuscript on the Kuala Lumpur area.

Stanniferous Garnets

K.F.G. Hosking and J.H. Leow
University of Malaya

During recent years stanniferous andradites have been recorded from a number of widely separated localities. Hosking (1965) noted that the andradites of Pinyak Mine (Thailand) fell into this category: el Sharkawi and Dearman (1966) established their presence at Red-a-ven (S.W. England) and also demonstrated that the grossularites there contained some tin but that it was small by comparison of that occurring in the andradites. Mulligan and Jambor (1968) recorded the presence of stanniferous andradites in Canada, and Swettman (personal communication) notes that the andradites of Langkawi Islands contain about 2% Sn. Dadak and Novak (1965) described stanniferous andradites from Czechoslovakia. Murthy (1967) showed that pyrope-almandine type garnet in sillimanite-mica schists from an area in Bihar (India) contain up to 2% Sn and he proposed the name dhanrasite for this tin-bearing species.

However, lest it should be thought that the fact that garnets may be stanniferous is a 'new' discovery it is pertinent to quote from 'Elements of the art of assaying metals', 'Written originally in Latin, by John Andrew Cramer, M.D. with notes and diagrams not in the original, particularly useful to the English reader. By Cromwell Mortimer, M.D. Secretary to the Royal Society (2nd edition, corrected, London. Printed for L. Davis and C. Reymers, against Grays Inn Gate, Holborn; Printers to the Royal Society MDCCLXIV)'. According to p.A2 'the principal parts of the Treatise were first disposed into Order, to serve as materials for a course of Lectures and Experiments;

which, in the year 1737, were given at Leyden, to a Society of Gentelmen, most eminently distinguished for their skill, in all Branches of Natural Sciences'.

The pertinent quotation (p. 151) is as follows:-

> "The Garnate is reckoned among precious Stones: its of an unsettled Figure, though most commonly dodecaedral+, regular enough, not rare, half transparent, and having its Name from the Flowers of Pomegranites of which it has the Colour. This now and then contains Tin; so that on this Account it deserves to be reckoned among the Ores of this Metal. Nevertheless, all kinds of Garnates ought not to be referred to this Class. For they fell, under the same Name, Stones that have indeed the same Colour, but are more transparent, vitrescent and rather of the Nature of Flints.
>
> + or composed of twelve sides"

Clearly the writer of the above did not know whether the tin occurred in the lattice of the garnet or whether it was present as inclusions of cassiterite, or other tin mineral, in the silicate.

It is, of course, most important for those concerned with 'hard-rock' tin mining to appreciate that economically important concentrations of cassiterite can occur in garnet-bearing rocks (as they do, for example, in the Pinyak Mine, Thailand and in a number of localities in the South-west of England). On the other hand, stanniferous garnets may be found in skarn rocks that are quite devoid of cassiterite or tin-bearing sulphides (as at Red-a-ven and Langkawi).

REFERENCES:

DADAK, V. and NOVAK, F. (1965) Tin-containing andradite from Plavno mine in the Krusne Hory Mountains, Czechoslovakia: Min. Mag., 35, 379-385

EL SHARKAWI, M.A.H. and DEARMAN, W.R. (1966). Tin-bearing skarns from the northwest border of the Dartmoor granite, Devonshire, England. Econ. Geol., 61, 362-369

HOSKING, K.F.G. (1965) The search for tin. Min. Mag., 113, 368-383

MULLIGAN, R. and JAMBOR, J.L. (1968). Tin-bearing silicates from skarn in the Cassiar District, Northern British Columbia. Canad. Min., 9, 358-370

MURTHY, S.R.N. (1967). "Dhanrasite" - the tin garnet. Curr. Sci., 36, 295

VISIT BY DIRECTOR OF IGS

Dr K.C. Dunham, FRS, Director of the Institute of Geological Sciences in London, and External Examiner in geology to the University of Malaya, visited West Malaysia during January 1969. He examined graduating geology students at the University, and had talks with geologists there and at the Ipoh headquarters of the Geological Survey.

On the evening of January 29th Dr Dunham gave a special lecture at the University of Malaya, sponsored jointly by the Geological Society of Malaysia and the Newsletter entitled "The natural concentration of minerals." Professor Chin Fung Kee, Deputy Vice-Chancellor of the University, introduced the speaker. A synopsis of his talk follows:

Minerals can be concentrated both by exogenous processes, in which the energy required for the concentration is of an extra-terrestrial origin, and by endogenous processes in which the energy comes from the Earth itself.

Exogenous processes include the production of laterite and bauxite deposits by weathering. Such deposits may be very large. A bauxite deposit, discovered accidentally when a wartime airstrip was being built in the Gove district of Australia, is ten feet thick over an area of hundreds of square miles.

Iron and aluminum, in laterites and bauxites respectively, are concentrated by the removal of the other elements in solution. What happens to these removed elements has never been thoroughly investigated. However, logs floating down the Irrawaddy River are sometimes silicified, possibly a pointer to the answer.

Minerals may also be washed out of their original host rocks and later concentrated, e.g. tin in alluvial deposits. The strength of waves breaking on a beach may be sufficient to throw heavy minerals up the beach, and if the returning water is not capable of dragging the minerals back, a concentrate may be built up. Such deposits may be built up rapidly, and equally rapidly removed. Rutile, ilmenite, zircon, monazite and garnet have all been worked from such deposits.

Such placer deposits are very rare in the geological record even though sand deposits are common. One possible example is the Witwatersrand gold deposit but a placer origin for this deposit is not unquestioned.

The evaporation of sea water to produce salt is commonly practiced by man, but this process is also found in nature. Evaporite deposits of halite, dolomite, gypsum and potash salts are known. The Permian salt deposits of northwest Europe have a fourfold repetition of the cycle dolomite - anhydrite - halite - potash salts, and reach a thickness of 1400 feet. Salt deposits may form domes which can then act as gas and oil traps.

Submarine iron ore deposits are very rare today but are quite common in parts of the geologic record. The banded iron ores of the Precambrian, e.g. in Bihar and W. Australia, have become very valuable deposits through a process of desilicification, giving magnetite and haematite deposits. In northwest Europe important deposits of oolitic chamosite and siderite were formed in Jurassic times.

The Black Sea is a stagnant sea containing large amounts of sulphur-producing bacteria. Conditions therefore seem favorable for the deposition of valuable sulphides. However, only iron sulphides are being formed.

Can copper, lead and zinc be concentrated in sediments? The lead, zinc and copper deposits of Mt. Isa in Queensland may be one example.

There are some well attested cases of endogamous mineral concentration.

Thin but extensive chromite bands occur in ultrabasic bodies. The chromite crystallises early and sinks forming a layer. A similar concentration of nickel sulphide is found in the Bushweld complex.

The magnetite deposit at Kiruna, Sweden is associated with basalt. A process involving an early separation of silica and a squeezing of a last iron rich phase into a large crack is envisaged to explain this body.

Mineral deposits are associated with the granites of south-west England. The sequence appears to be one of granitic intrusion, border crystallization followed by fracturing and the intrusion of dykes, followed in turn by high temperature watery solutions containing boron and tin which penetrate into cracks in the granites and country rock giving a zonal arrangement of minerals as cooling proceeded. Some of the minerals are intergrown with contact metamorphic minerals.

In the lead-zinc province of the Pennines of England mineralized cracks penetrate a rhythmic sequence of limestone, sandstone and shales. The deposits are best in the limestone and sandstone and poor in the shales. The deposits are also best where the cracks are open. The ores appear to have migrated horizontally and not vertically. The center of the deposits contains fluorite and around this are copper and then lead-zinc sulphide ores. The fluorite dies out towards the fringe where barium minerals are found.

It was thought that a granite body which supplied the fluids lay below the area. In 1950 a gravity survey indicated that beneath the two centers of the deposits lay two granite cusps. Later boreholes were put down to a depth of 2000 feet. At 1280 feet granite was reached. However, the cores showed conclusively that the sediments lay unconformably upon the granite and hence the granite could not have been the source of the fluids. The granite has been shown to be of Lower Devonian age by radiometric dating while the sediments are of Carboniferous age.

Is the association of minerals and granite more apparent than real even in southwest England?

Fluid inclusions in ores have been found to contain brines of 4-6 times the salinity of sea water. The same kinds of brines have been found associated with various types of granite. Are the brines from igneous or connate waters? As ordinary ground water penetrates deeper it becomes more and more saline especially as it warms up. Around an intrusion the water becomes hot and the hot water migrating through a rock could concentrate elements from the rock. Also some elements may be picked up from the intrusion.

Some ore deposits are known that appear to have been laid down under conditions similar to those prevailing in the Black Sea today. However, no deposits are forming in the Black Sea and hence it has been postulated that hydrothermal solutions have issued from springs into the seas to supply the metallic elements which are then precipitated by the sulphur rich sea water. The Kupferschiefer (a euxinic black shale) in the Permian of northwest Europe outcrops over 20,000 sq. km, although it is only a few centimeters thick. It is very rich in many metals with 1% lead in many areas. Apparently a euxinic basin was in existence when a period of mineralization occurred. The metal solutions were poured into the euxinic basin where sulphides were deposited.

All valuable ore deposits are formed due to an unusual combination of processes.

\- JDB

RADIOMETRIC AGES FROM CAMBODIA AND NORTH VIETNAM

It will be of interest to geologists in the south-east Asia region that a new radiometric determination on granite at Bo Kham in north-east Cambodia has been reported by M. Lasserre, P. Lacombe, and E. Saurin in Cantes Rendues Acad. Sc. Paris, t.267, p. 2073-2076 (16 Dec. 1968) Series D.

The granite specimen from 107° 21' 17" east and 13° 49' 30" north gave an age of 227±1 m.y. by the Sr^{87}/Sr^{86} method. This age of Upper Permian compares with ages determined for the massifs of BAN SANG and PIA BIOK of north Vietnam, which have been reported by E.P. Izokh; Le Din' Khyu: Nguen Van Tien in Dokl. Akad. Nauk. S.S.S.R. vol. 155, No. 6, 1964 p. 1321. Unfortunately the present writer does not have access at this time to the latter publication.

The Upper Permian age compares well also with some of the West Malaysian granites which have given Upper Permian to Lower Triassic ages.

\- CSH

IMA IAGOD MEETINGS 1970

News has been received that the Seventh General Meeting of the International Mineralogical Association (IMA) and the Tokyo-Kyoto Meeting of the International Association on the Genesis of Ore Deposits (IAGOD) will be held concurrently in the Keidanren Kaikan in Tokyo on 28 and 29 August 1970 and in the Kyoto International Congress Hall in Kyoto from 31 August to 2 September, 1970 at the invitation of the Science Council of Japan.

The program for the two meetings includes the following:

1. Council and Commission Meetings
2. Symposium on 'Ore deposits as related to geologic structure and tectonics'.
3. Symposium on 'Mechanism of growth and phase transition of minerals'.
4. Symposium on 'Stratabound sulphide deposits'
5. Meeting on Ore Microscopy
6. Joint symposium on 'Geochemistry and crystallography of sulphide minerals in hydrothermal deposits'. (This includes topics on isotope geochemistry, ore-forming fluids, geothermometery, texture and structure of ores, crystal growth, crystal structures, etc.)
7. Pre- and Post-conference excursions.

Contributions are invited and abstracts of papers for the symposia or open sessions should be submitted to the Program Committee not later than 31 December, 1969.

General enquiries and correspondence should be addressed to:

Dr I. Sunagawa
Geological Survey of Japan
8 Kawada-cho
Shinjuku-ku
Tokyo 162, Japan

Enquiries on the programs for the symposia and open sessions should be addressed to:

Professor R. Sadanaga
Mineralogical Institute
Faculty of Science
University of Tokyo
Hongo, Tokyo 118
Japan

\- JHL

MEETING OF 14 FEBRUARY: T.F. GASKELL

A meeting of the Society was held at 5.00 p.m. on Friday 14 February 1969 in the Lecture Room of the Department of Geology, University of Malaya, Kuala Lumpur. The President, Dr C.S. Hutchison, introduced the speaker, Dr T.F. Gaskell of British Petroleum Ltd., who presented a talk on "The geology of continental shelves with special reference to the North Sea oil and gas". Dr Gaskell, who is a physicist by background, has been closely involved in the geophysical and geological exploration of the North Sea. A synopsis of his talk follows:

In the past 30 years the geology of ocean areas has been much studied. It has been found that deep ocean areas are geologically different from continents, but that the continental shelf areas are really part of the continents. Hence where there is oil on land, it may be expected to be present also under the adjoining shelf. It is estimated that 1/4 of the world's oil is under the shelf areas.

The North Sea is essentially all shallow shelf and it has long been recognised as simply a structurally depressed part of the European continent. On both sides, sediments of great thickness pitch under the water, and it is clear that they continue across. In the past it was not looked upon as a promising oil and gas area for several reasons. Firstly, many wells had been drilled in England and Holland, and these had in general found only small fields, while in offshore operations it is only large fields which are commercial. Also, the technology of drilling offshore has only recently been refined to the point where drilling in rough seas is possible. Finally, until a U.N. convention sorted things out in 1958, it was not clear which country had the rights to what part of the North Sea.

A very large gas field discovered at Groningen in Holland in 1959 spurred offshore exploration. This field was discovered virtually on the doorstep of a major oil company, which was drilling deep, into the basal Permian, hoping to find a small oil field similar to many shallow ones nearby. Instead, they discovered a thick mass of porous, gas-filled seolian sandstone capped by later Permian evaporite salts. It is now clear that this gas - mostly methane, with somenitrogen - is derived from the Coal Measures still deeper in the section (C^{12}/C^{13} ratios indicate the carbon was fixed by land plants, i.e. in coal deposits) and is therefore "dry" - not associated with liquid hydrocarbons. So there appears no real hope for petroleum under the North Sea, but great promise of large gas fields.

The United Kingdom divided its portion of the North Sea into small plots (100 sq. mi.) for leasing, so as to encourage many oil companies to participate and ensure that many wells were drilled. The fourth well drilled struck gas, and for a while about 25% of the wells were successful. Now, as more wells have been drilled, the ratio has dropped to the more normal 5% to 10% success.

How is the exploration conducted? First one must make sure that the Carboniferous source rocks are present at depth, and that the Permian reservoir and cap rocks are also exist. Both these conditions are fulfilled over a broad belt stretching from the English coast across to Holland and Germany.

An interesting sidelight is that continental drift appears to help explain the distribution of oil fields. Although oil fields now range in latitude from 70° N to 55° S, very young accumulations are limited to tropical latitudes, and when all fields are plotted against the latitude the areas had at the time the oil formed (based on paleomagnetic data) they nearly all fall back into the zone 20° either side of the equator. For instance, paleomagnetic evidence on the Dogger Bank shows that it was tropical in Carboniferous and Permian, drifted past the 20° line about middle Triassic, and is now at 55° Hence it would appear a waste of time to look for oil here in rocks (or coming out of rocks) younger than middle Triassic.

Geophysical tools used in exploration offshore include sparker, sideways sonar, magnetic, gravity, and seismic reflection surveys. Sparker shows the depth of soft mud, and the presence of hard layers. It can reveal shallow structures and is useful in the civil engineering of pipelines and sea-bottom installations. Sideways sonar gives a detailed picture of the bottom and can reveal structure where rocks are cropping out. Magnetic surveys are rapid and cheap (done from planes), but seldom have proved very useful in oil exploration. They could reveal the gross shape of the basement. Gravity surveys are more useful in showing the depth of sediments and the presence of light masses, such as the Permian salts, but they are hard to do accurately in ocean areas. Seismic reflection, the only major exploration method which is actually cheaper to do at sea than on land, is extremely valuable is delineating the deep structure and locating favorable drill sites. In modern seismic work, data are recorded on magnetic tape and processed by computer, which prints out an integrated picture of the subsurface structure. In the North Sea, seismic work even revealed the structure of the salt deposits (which being less dense do not reflect shock waves) - a triumph of sophisticated geophysics probably not possible a few years ago.

When it comes time to drill a well at sea, one must use either a fixed or floating platform. In shallow water (less than about 120 feet), fixed flatforms are normally used. These are towed to the site and simply jack themselves up on long "legs". Floating platforms must be used in deep water. Small ones which are just modified ships (like the Glomar vessels) are tending to give way to larger, specially designed semi-submersibles such as the "Sea Quest". These are huge triangular constructs which are supported by bouyang tanks kept about 70 feet below water; hence surface waves, even in storms, cause little motion of the platform. Large enough to be completely equipped and carry supplies sufficient for a long time, these great platforms are the best answer to the problem yet.

At the end of his talk, Dr Gaskell showed two short interesting color films, one concerning off shore drilling and laying of pipeline in the Persian Gulf and the other showing the cleaning operations organized after the tanker 'Torrey canyon' was wrecked along the Cornwall coast.

Discussion afterwards concerned problems of drilling in deep water, leasing policies, and the relative merits of different procedures used in cleaning up the Torrey Canyon's oil. Dr Gaskell pointed out that the leasing of small areas as had been done by the U.K. in the North Sea depended on the nearness of highly industrialized nations with large capital, and was probably not feasible or wise in areas such as the South China Sea.

Dr K.J. Pocock, Secretary of the Society, made the closing remarks and thanked the speaker for a most interesting presentation.

About 15 members attended.

\- PHS

NEWS OF THE SOCIETY

Suspension of issue of publications to unfinancial members:

At the meeting of the Council on 27 February 1969 it was decided that the issue of publications to unfinancial members would be suspended until such a time as the members concerned regained good standing in the Society. Accordingly the suspension will apply as from 1/4/69 to all members in arrears for 1968, as from 1/7/69 to all members in arrears for 1969: thereafter the suspension will apply to all members in arrears for the next year at the 1st of January of that year. Dues are payable, according to the Constitution of the Society, in advance.

This action has been taken primarily because of the financial loss suffered by the Society as a result of correspondence and issue of publications to the comparatively large numbers of members who have left the country permanently and have not notified the Society of change of address or of their resignation.

This suspension procedure will not apply to those members who pay by bankers orders.

New Members:

The following were elected to membership in the Society at the meeting of the Council on 27 February:

Full membership: Dr K. Asama, National Science Museum, Ueno Park, Tokyo, Japan

Mr R.A.S. Cayzer, c/o Kenneth McMahore & Partners, Chase Manhatten Bank Building, Jalan Gereja, Kuala Lumpur.

Mr I. Fujiyama, Department of Paleontology, National Science Museum of Tokyo, Ueno Park, Tokyo, Japan

Professor J. Iwai, Institute of Geology and Paleontology, Faculty of Science, Tohoku University, Sendai, Japan

Mr T. Ozawa, Department of Geology, Faculty of Science, Kyushu University, Fukuoka, Japan

Dr S. Sakagami, Department of Geology, Faculty of Education, Ehime University, Matuyoma, Japan

Dr T. Yanagida, Department of Geology, Faculty of Science, Kyushu University, Fukuoka, Japan

Associate membership:

Mr X. de Peyronnet, Schlumberger Overseas S.A., MSA Building, 77 Robinson Road, Singapore.

Mrs K. Cutler (Stanford University Libraries), Serials Dept., Stanford University Libraries, Stanford, California 94305, U.S.A.

Miss M.B. Long, Department of Geology, University of Tasmania, Sandy Bay, Tasmania, Australia.

Mrs A.M. Pocock, 51 Jalan 16/9E, Petaling Jaya

South East Asia Bauxites Ltd., 404 Bangunan OCBC, Jalan Ibrahim, Peti Surat 189, Johore Bharu

Student membership:

Tan Bock Kang, Department of Geology, Imperial College, London S.W.1

Yee Kok Cheong, Department of Geology, University of Malaya, Kuala Lumpur

Resignations and expulsions:

Mr Foo Thin Chin has resigned from the Society on 12 January 1969.

The Council at its meeting on 27 February, acting under By-Law II, Section 2, declared the following persons to be expelled from the Society:

Miss B.A. Arrieta
Mr H. Dalton-Brown
Miss M.R. Hamon
Mr J.F. Roberts
Mr P.G. Temple

In addition, the election of Mr T. Supajanya is declared void.

Changes of address

C.A. BEH has advised that his address is 39 Jalan Perak, Canning Garden, Ipoh, Perak

BUSH, W.E. has joined Pacific Oriental Minerals Sdn. Bhd. and his address is now 10 Jalan Pakat, Ulu Klang Heights, Kuala Lumpur

CARTER, J.O. has transferred from South East Asia Gulf Co., 24 Liat Towers, Singapore, to Gulf Oil Corporation, P O Box 1166, Pittsburgh, Pennsylvania 15230, U.S.A.

GOBBETT, Dr D.J. advises that his address is The Old Farmhouse, Swaffham Prior, Cambridge CB5 OCA, England

JOLL, M.J. has advised that his address is c/o Idris Hydraulic Tin Ltd., P O Box 6, Kampar, Perak

McLEAN, C.A. III has advised that his address is now Rancho del Oso, Davenport, California 95017, U.S.A.

NEWELL, R.A. is now a graduate student in the Department of Geology, Colorado School of Mines and his address is 37 Hillside Drive, Denver, Colorado 80215, U.S.A.

PIAZZA, P. has advised that his address is now 1450 O'Connor Drive, Toronto 16 Canada

SALMON, E.C. advises that his address is now c/o Esso Exploration Malaysia Inc., P O Box 601, Kuala Lumpur

SWEET, M.J. has left the employ of Sungei Besi Mines Ltd. and his address is now 10 B Taman Serasi, Singapore 10

WAUGH, P.E. advises that his address is now Copsale Cottage, Broadwater Lane, Copsale, nr. Horsham, Sussex, England

WILFORD, Dr G.E. advises that his address is now c/o Bureau of Mineral Resources, P O Box 378, Canberra City, A.C.T. 2601, Australia

F.L. YAP advises that his address is now c/o Pejabat Kajibumi, Kuala Kangsar, Perak.

— KJP