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CONTENTS

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GEOLOGIC NOTES

Wood-tin from Peninsular Malaysia

C.W.E.H. Smith and K.F.G. Hosking
(Associated Mines Sdn. Bhd., Kuala Lumpur & University of Malaya, Kuala Lumpur, respectively)

In 1964 one of us (C.W.E.H.S.) obtained a specimen of cassiterite from the concentrates of a pallong mine (that has since been abandoned), near the granite/metasediment contact in the Sungai Anak Raman area of Pahang (fig. 1). A thin section of the specimen was prepared and examination of it indicated that the cassiterite present was almost wholly in the form of wood-tin. This section was appropriately labelled but no account of the find was published. A few months ago one of us (K.F.G.H.) discovered the section, by chance, amongst a collection of slides at Pahang Consolidated Mine, and in view of its importance the finder of the parent specimen and he decided to write this note.

DESCRIPTION OF THE SECTION (Fig. 2)

In essence, the section consists of wood-tin with which are associated minor amounts of tourmaline, quartz and 'normal' cassiterite. The tourmaline is earlier than the wood-tin whilst the quartz may have been deposited more-or-less contemporaneously with it. The 'normal' cassiterite would appear to have been deposited immediately after the wood-tin.

Most of the masses of wood-tin consist of a core of orange-brown cassiterite which often lacks a clearly-defined texture although on occasion there is a suggestion that it consists essentially of packed spherulites. At least in one instance the core consists of polygonal masses that may owe their form to the mutual interference of developing spherulites, probably when they were in a gel state. Near the outer edges of the cores one or two ill-defined, narrow, darker zones are sometimes in evidence. The cores are rimmed by colloform cassiterite (the wood-tin proper). This is composed of approximately parallel bands that are variable in width,

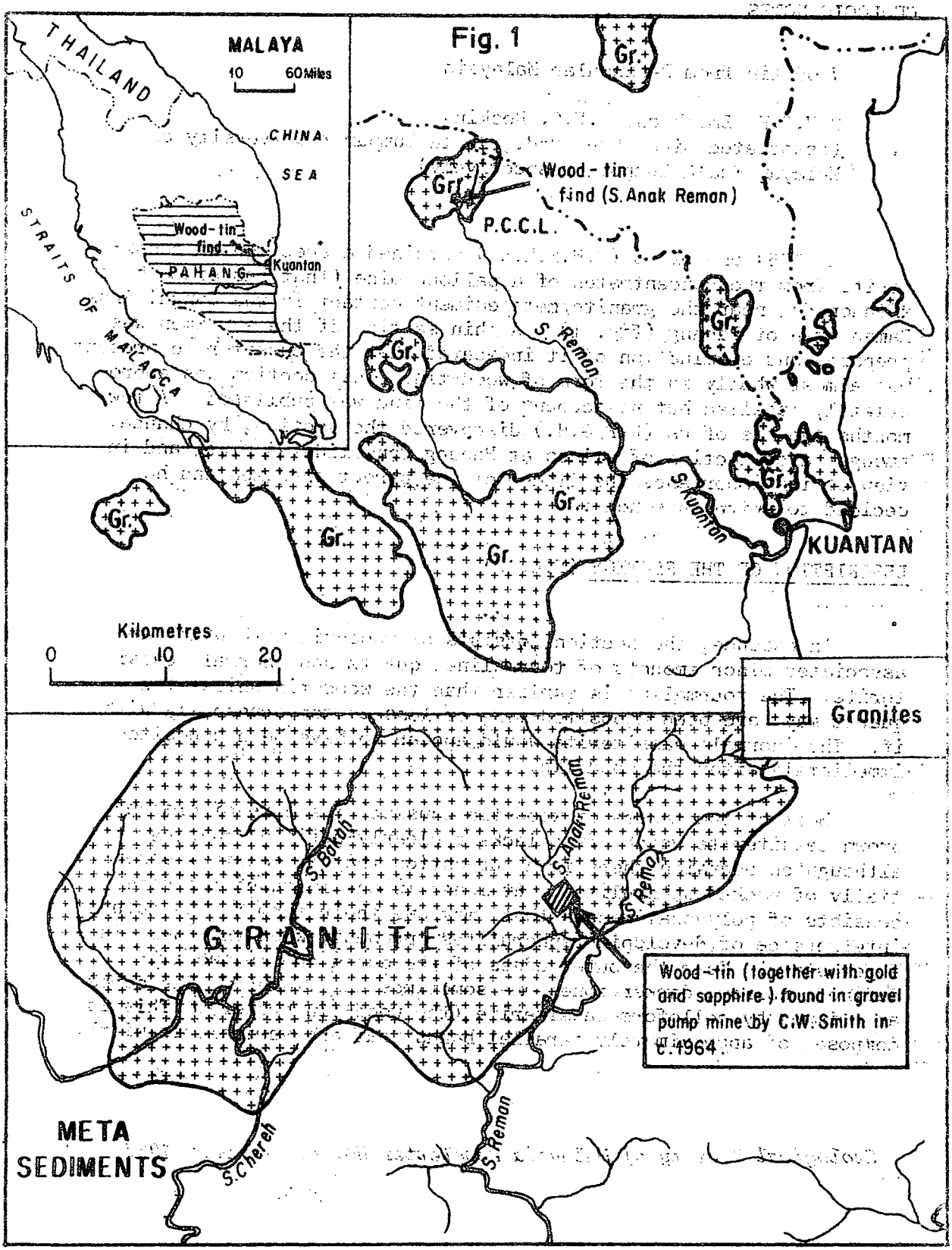
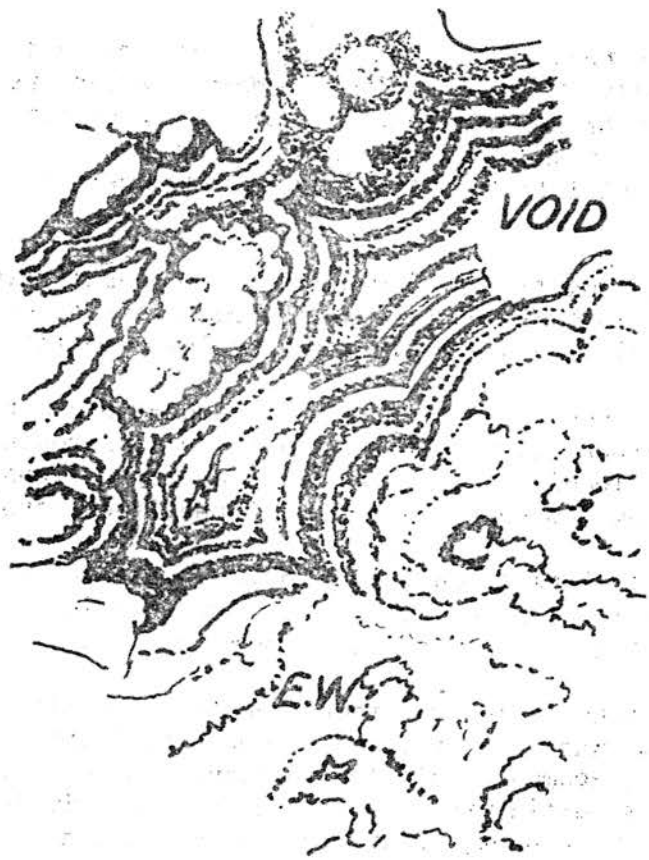


Fig. 1
MALAYA
10 60 Miles
THAILAND
CHINA SEA
STRAITS OF MALACCA
Wood-tin find
PAHANG
Kuantan
Wood-tin find (S. Anak Reman)
P.C.C.L.
S. Reman
S. Kuantan
KUANTAN
Gr.
Kilometres
0 10 20
Granites
S. Bokah
S. Anak Reman
S. Reman
GRANITE
Wood-tin (together with gold and sapphire) found in gravel pump mine by C.W. Smith in c.1964
META SEDIMENTS
S. Chereh
S. Reman

Fig. 2



Colloform cassiterite (wood-tin proper) associated with a 'mush' of very fine-grained cassiterite (E.W.) with an embryonic colloform texture

(Tracing from photomicrograph)

Locality : Sungai Anak Reman

but all fairly narrow, and that vary in colour from pale orange, through burnt sienna to amber. The boundary between one band and the next is commonly diffuse and, in fact, the wood-tin is composed of acicular crystals that extend across a number of the bands and are orientated normal to the bands' boundaries where they intersect them.

Within the wood-tin are inclusions of comparatively large tourmaline crystals that are pleochroic from pale- to dark-blue: these have not suffered any replacement by the wood-tin.

In one instance a lacuna within the wood-tin has been infilled by pale-brown cassiterite that lacks colour-zoning, is non-pleochroic, and closely resembles that seen in sections of wood-tin from St. Agnes, Cornwall (Hosking. Unpublished studies).

A further inclusion consisting of an aggregate of small quartz crystals is also to be seen. These, as noted earlier, may have developed more-or-less contemporaneously with the wood-tin.

GENESIS

Lacking further evidence other than that the mine from which the specimen came was essentially a producer of 'normal' cassiterite, and because the specimen is similar to Cornish wood-tin, it seems likely that the wood-tin was deposited in a druse within a vein composed, at least in part, of quartz, tourmaline, and 'normal' cassiterite.

Whilst it is inappropriate to discuss the genesis of the wood-tin proper, in detail, in such a note, it is pertinent to mention that one of us (K.F.G.H.) considers that as far as the specimen under consideration is concerned, fundamentally the development of the mineral in question was as follows:- Initially spherulitic masses of 'stannic oxide' gel with entrapped iron ions in their cores were deposited, probably within a silica gel matrix. Contraction of the 'stannic oxide' gel due to water loss and centripetal age-hardening was accompanied by centrifugal migration of the iron ions and their rhythmic precipitation as ferric oxide, or hydroxide that later converted to oxide. Finally the spherulites were converted to aggregates of radially orientated acicular crystals of cassiterite. It is thought that essentially the same mechanism operates when the 'stannic oxide' gel is deposited on a druse wall as a portion of a sphere or as a layer.

Wood-tin is usually found in xenothermal deposits (e.g., Bolivia and Japan) or in epithermal ones (e.g., Mexico). When wood-tin occurs in what are essentially hypothermal deposits, as is the case in Cornwall, the evidence is that it is a very late mber of a suite of primary minerals. In Cornwall, whilst the tin lodes were essentially developed in Permo-Carboniferous times, there is reason for believing that the wood-tin in them was deposited very much later, perhaps in Jurassic o Tertiary times when, as a result of denudation, some of the lodes were exposed or close to the surface. That is to say the wood-tin there represents a xenothermal deposit within a hypothermal body. Perhaps the wood-tin-bearing deposit of Sungai Anak Reman has, also such a history of development.

OTHER RECORDS OF WOOD-TIN IN THE SOUTHEAST ASIAN TIN BELT

Whatever the developmental history of the Sungai Anak Reman wood-tin, there is little doubt that this variety of cassiterite is of distinctly rare occurrence within the Tin Belt of Southeast Asia. Payome Aranyakanan (1969, p. 85) notes that wood-tin, of about 1 mm diameter, was first discovered, in Thailand, with gold in placers at Huai Tagrao in Phanom Sarakham district, Chachoeng Sao Province, in 1968. However, the material was not examined in polished section (op. cit., p. 104) and so it would seem desireable that further work should be done on it in order to check its identity.

Singh and Bean (1967, p. 466) when discussing varlamoffite from Tekka, Perak, that was derived from stannite by oxidation due to supergene processes, note that the central collomorphic bands of a 'varlamoffite' crust "are clearer and more homogeneous than those in close proximity to the stannite, and in appearance strongly resemble light coloured 'wood tin', suggesting that the clearer bands represent dehydrated varlamoffite which has recrystallised to give "wood tin". Earlier, others have suggested that wood tin may be the product of supergene processes. Thus, Jones (1925, p. 309), when discussing the wood tin nodules found in Mexico, in veins, etc., in rhyolites, rhyolitic tuffs, and occasionally andesites, states that these nodules are "probably of secondary origin after stannite". However, the detailed study of the wood-tin deposits of Durango by Ypma and Simons (1969, pp. 179-191) makes such a theory untenable.

Much earlier, Collins (1872) having examined the encrustation on an ancient ingot of tin, from Tremethack Moor, Madron, Cornwall, noted that the crust was locally as much as a quarter of an inch thick and was of varying shades of brown. The analysis of the encrustation was as follows:-

Moisture evolved at 120°C	6.25%
Metallic tin	0.43
Chloride of tin	1.66
Peroxide of tin	90.62
Peroxide of iron	1.04
Silica	0.41
	100.41%

Collins concluded that "the crust therefore appears to be composed chiefly of peroxide of tin, somewhat resembling the native variety of cassiterite called wood-tin", but neither so hard nor so heavy".

In our view textural evidence and the close mineral associates of the wood-tin in many deposits throughout the world provide virtually unassailable proof that generally wood-tin has been deposited as a result of reactions involving ascending tin-bearing agents. From where the tin was derived, how it was transported, and whether or not the ground-water shell played a rôle in the genesis of the wood-tin, are unknown. It is, however, conceded that the observations of Singh and Bean and of Collins, that are recorded above, give reason for believing that wood-tin, or something closely akin to it, can, on occasion, be produced by supergene processes.

REFERENCES

ARANYAKANON, P., 1969. Tin deposits in Thailand. Pp. 81-104 of 'A second technical conference on tin'. I.T.C. (London) and the Dept. of Mineral Res. of Thailand.

COLLINS, J.H., 1872. Note on a portion of the incrusted surface of a block of "Jews' Tin". Journ. Roy. Instn. Cornwall, no. XIII, 2 pp., (reprint).

JONES, W.R., 1925. Tinfields of the World. Mining Publications, Ltd., London. (423 pp.)

SINGH, D. SANTOKH and BEAN, J.H., 1967. Some general aspects of tin minerals in Malaysia. Pp. 457-478 of "A technical conference on tin'. I.T.C. (London).

YPMA, P.J.M. and SIMONS, J.H., 1969. Genetical aspects of the tin mineralisation in Durango, Mexico. Pp. 175-192 of 'A second technical conference on tin'. I.T.C. (London) and the Dept. of Mineral Res. of Thailand.

Principal Tectonic Elements of Eastern New Guinea*

W. Manser, Department of Geology, University of Papua, New Guinea

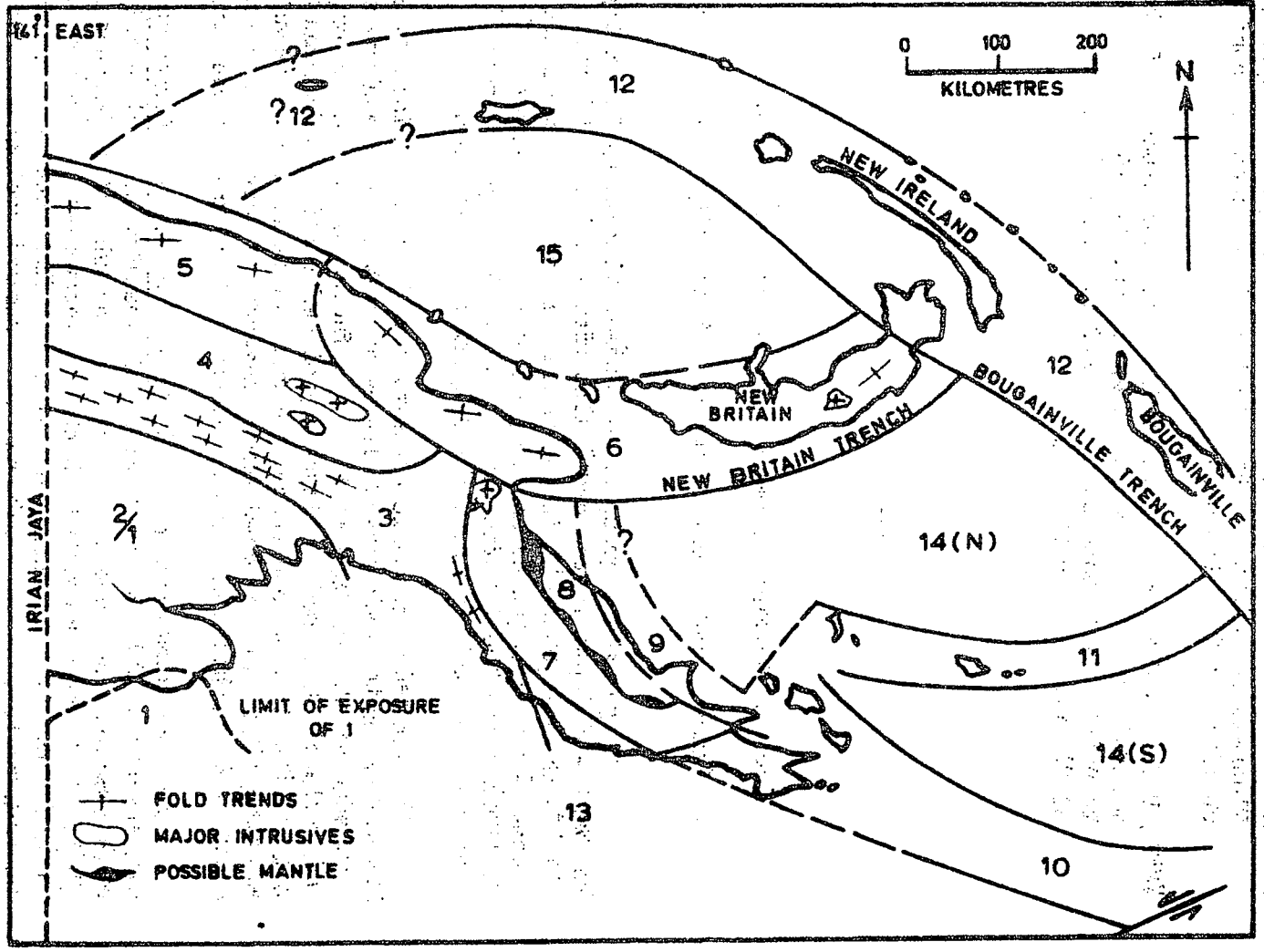
The large island group of New Guinea (including Irian Jaya in the west and Papua in the east) lies with a major NW-SE trend within the 'Tethyan Megashear', in the western equatorial rim of the Pacific Ocean. It is recognised as lying at or near the boundary of the Indo-Australian and the Pacific crust plates. The region under discussion covers an area of approximately 130,000 sq. kilometres.

Fifteen major tectonic elements have been recognised in Eastern New Guinea on the evidence of the relatively limited and incomplete knowledge of the geology of the area, facies of sedimentation, age and style of deformation, intensity of deformation, distribution of volcanicity in time and space, and current seismic and volcanic activity (Fig. 1). Several major elements are composite units, which with further study may be recognised as more smaller units.

The major elements are (1) Orioms Continental Platform, a tectonically stable basement of alkali granites intrusive into folded marine shelf sediments, overlain by the (2) Western Papuan Shelf, on which a northward thickening incomplete succession of Triassic terrigenous shelf sediments and limestones are mantled by Quaternary terrestrial sediments and andesitic volcanics. This Western Papuan Shelf is tectonically passive with broad flexures

* A summary of a talk delivered to the Society on 4th December 1973.

Fig. 1. Sketch map showing the principal tectonic elements of Eastern New Guinea



developed during the mid-Tertiary to Quaternary in response to basement faulting. (3) Accra Tectonic Zone of tightly folded and strike faulted marine sediments represents deformed geosynclinal accumulations of ?Jurassic to Miocene age, which were deformed mainly in the Oligocene with some post-Miocene faulting. Three distinct provinces within this zone are recognised. The (4) Central Highlands Orogenic Belt is a heterogeneous unit composed dominantly of a crystalline basement of pre-Permian Chlorite II-III metamorphic zone and granite quartz diorite intrusions, overlain unconformably by a thick discontinuous succession of Permian to mid-Miocene marine clastic sediments, basaltic volcanics and limestones, with localised Pliocene to Recent subaerial shoshonitic volcanic, and Pleistocene to Recent fluviatile valley fill and lake deposits. Five distinct provinces are recognised, and interpreted as fault-bounded blocks with different degrees of uplift and dissection with resultant differences in recorded geological history. The (5) North Sepik Arc contains Eocene to Pliocene marine clastic sediments and limestones on a basement which in the east is 'granites' intrusive into chlorite III greywacke suite metamorphics and in the west is faulted ultramafics; the style of geology in this element suggests correlation with exposures in Irian Jaya to the west. Folding is tight, and faulting appears related to basement faulting in response to a major sinistral shear couple. The (6) New Guinea Arc is a group of currently emergent fault-bounded blocks with differing degrees of uplift and dissection. A basement of 'granites' intrusive into Chlorite II-III metamorphic zone is overlain by gently folded Miocene to Pliocene marine shelf clastic sediments and limestones, in part mantled by Quaternary to Recent andesitic pyroclastics and Pleistocene limestones (some terraces of which are at 1000 m. above sea level on the north coast of the Huon Peninsula. The northern boundary of this arc is marked by the tholeiitic active volcanoes off the north coast of New Guinea and New Britain, its southern boundary by the Ramce-Markhann (?fault) depression and the New Britain trench. The (7) Owen Stanley Metamorphic Belt, which forms the spine of the 'tail' of Papua New Guinea, is composed of ?Jurassic to Upper Cretaceous Chlorite II-III greywacke suite sediments, lavas and limestones with rare intermediate highlevel intrusives which may be auriferous (e.g. at Wau). The unit has been emergent since mid-Miocene and is bounded on the north by the non-vertical Owen Stanley Fault and on the south by steep faults which have acted as conduits for Oligocene gabbroic intrusives and Pleistocene andesitic volcanics. The (8) Papuan Ophiolite Province north of the Owen Stanley unit contains a succession of layered ultramafics, gabbroic masses and Jurassic deep-

water limestones and marine lavas, and is interpreted as an upper mantle/oceanic crust deduction zone. Minor Miocene intermediate high-level intrusives puncture this succession. South of the Owen Stanley unit are tightly-folded Eocene limestone/chert successions intruded by Oligocene syntectonic gabbro, which may represent part of this province. The (9) Cape Vogel Basin contains Miocene to Recent marine clastic sediments on a basement of submarine basalt. The (10) Louisiade Metamorphic Belt contains Chlorite II-III greywacke suite sediments and volcanics on a locally-exposed basement of grains and amphibolite, partially vennered by Miocene and younger marine sediments and limestones. It contains several fault-bounded blocks rising and subsiding at different rates, and as a unit has been emergent since early Tertiary; over most of its area it is currently subsiding. The (11) Woodlark Ridge contains Miocene andesites and lavas on a basement of folded and intruded andesitic volcanics, with partial veneer of sub-Recent reef limestones - it is expressed mostly as a submarine high. The (12) Solomon Chain is a volcanically and seismically active unit, bounded on the west by active faults (including the Bougainville Trench - ?a subduction zone) and on the east by a sub-Recent tholeiitic volcanic chain. Several discrete blocks are recognised within the element. Basement is folded and intruded pre-Miocene greywackes and volcanics and is unconformably overlain by gently folded and faulted Miocene to Pliocene volcanigene shelf sediments and limestones, and partly mantled by Quaternary limestones and andesitic volcanics. The (13) Coral Sea Province, (14) Solomon Sea Province and (15) Bismanek Sea Province are areas of oceanic crust; in (14) a possible active spreading centre is thought to exist south of the Woodlark Ridge and the Bougainville and New Britain Trenches coincide with steeply oceanward-dipping Benioff Zones; in (15) recent seismic studies have identified two sub-plates, with first movement solutions on shallow earthquakes indicating sinistral shear on their E-W boundary.

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MEETINGS OF THE SOCIETY

Meetings of 4th December 1973 and 14th January 1974

Dr W. Manser, Head of Department of Geology, University of Papua and New Guinea gave a talk entitled "The Principal Tectonic Elements of Papua and New Guinea to members of the Society on Tuesday 4th December 1973 in the Department of Geology, University of Malaya, Kuala Lumpur. A summary of this talk appear earlier in this Newsletter.

Professor John Rodgers of Yale University delievered two lectures to members of the Society and staff and students of the Department of Geology, University of Malaya on Monday, 14th January 1974 in the Department of Geology, University of Malaya. Professor Rodgers spoke on "What was the Appalachian Geosyncline like in early Paleozoic" and "Large gravity slides in the Mediterranean and elsewhere".

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NEWS OF THE SOCIETY

Annual General Meeting*

The programme for Friday 22nd February is as follows:

6 - 7 p.m. - Annual General Meeting

7 - 8 p.m. - Presidential Address by Mr R.W. Murphy

8 p.m. onwards - Satay/Beer Party given by the outgoing President, Mr R.W. Murphy

The programme for Saturday 23rd February will be finalized shortly but in order to plan for the Satay/Beer Party, it is essential that members wishing to attend the A.G.M. should fill in and return the form accompanying this Newsletter.

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*After this Newsletter was typed, the programme for the AGM was finalised and circulated to all members. Those who have replied to the earlier circular need not fill in the accompanying form.

Donations to the Society's Publication Fund

The Society wishes to record its appreciation to Esso Exploration Malaysia for its donation of M$4,600 to the Society's Publication Fund.

Society's Publications

All members should have received their free copy of Bulletin 6 and the Field Guide No. 1. Members who have not received either of these two publications are requested to inform the Society's Assistant Secretary as soon as possible. In addition, non-members who participated in the Society's Regional Conference on the Geology of Southeast Asia in March 1972 should have also received their free copy of Bulletin 6. Some of the copies of Bulletin 6 posted by the Society to members and participants at this conference have been returned undelievered,most probable due to an unnotified change of address.

Membership

The following members were elected to the Society on 7th December 1973:

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Change of Address

The following member has informed the Society of his new address:

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Australian Anglo American Ltd.
26th Floor, 500 Collins Street
Melbourne, Vic. 3000
AUSTRALIA

Symposium on Ore Microscopy

"News have been received that there will be a Symposium on Ore Microscopy during the 9th General Meeting of the International Mineralogical Association to be held in Berlin, in September, 1974.

Scientists wishing to contribute papers to this symposium should send an abstract to the Secretary of the Organising Committee, I.M.A. Meeting 1974 (c/o Miss Marjorie Hooker, U.S. Geological Survey, Washington DC 20244) with a copy to the Chairman for the Commission on Ore Microscopy (Dr S.H.U. Bowie, Institute of Geological Sciences, 64-78 Grey's Inn Road, London, WC1, 8NG, U.K.) and another to Prof. M. Font-Altaba (Secretary, C.O.M., Departmento de Cristalografia y Mineralogia, Universidad de Barcelona, Barcelona 7, Spain).

The papers presented should be related to ore microscopy and not to the description or genesis of ore deposits."

It is hoped that there will be representatives from Malaysia attending the General Meeting of IMA. Copies of the IMA Meeting program and IMA news can be obtained from the Society's IMA representative, Mr J.H. Leow, Geomat (Pte) Ltd., Suite 532, 5th Floor, 19, Tanglin Road, Tanglin Shopping Centre, Singapore 10.

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NEWS FROM THE UNIVERSITY OF MALAYA

Title of Thesis submitted to the Department of Geology, University of Malaya, 1972-1973

1. Cheang Kok Keong: The geology of the Tapah and Bidor area with special emphasis on its primary mineralisation. 112 p. B.Sc. (Hons) 1972

2. Koe Seow Sam, Richard: Geology and petrology of north-west Gunong Pulai. 51 p. B.Sc. (Hons), 1972

3. Kumar T.A. Kuttan: The geology of the Johore Baru area, Johore, West Malaysia, 39p. B.Sc. (Hons), 1972

4. Lai Kok Hoong: The geology of the Taiping area, Perak, West Malaysia. 98p. B.Sc. (Hons)1972

5. Lean Kian Hai: Geology of the Ulu Yam area, Selangor, West Malaysia. 65p. B.Sc. (Hons) 1972

6. Lee Soon Chiong: Geology of the Mersing area, Johore, West Malaysia, 55p. B.Sc. (Hons) 1972

7. Lim Tee Peng: Geology of the Cheroh area, Raub, Pahang, West Malaysia. 87 p. B.Sc. (Hons) 1972

8. Lim Keng Hoo: The geology, mineralisation and geochemical survey of the Machang Satahun area, Trengganu, Malaysia. 88p. B.Sc. (Hons.) 1972

9. Lim Yew Kuen: Geology of the north-west sector of Gunung Ledang (Mt. Ophir) Johore. 79 p. B.Sc. (Hons) 1972

10. Mah Weng Hong: The geology of the area southeast of Endau, Johore, Malaysia. 65 p. B.Sc. (Hons) 1972

11. Ong Chow Meng: The geology, iron deposits and some aspects of geophysical studies of the Bukit Bangkong area, Pahang, W. Malaysia, 141 p. B.Sc. (Hons) 1972

12. Rao, Anthony K.: Geology and geochemical aspects of the southern Gunong Jerai area, Kedah, West Malaysia. 110 p. B.Sc. (Hons) 1972

13. Tai Say Ann: Geology of eastern Singapore Island with special emphasis on the old alluvium. 77p. B.Sc. (Hons) 1972

14. Tan Boon Kong: Geology, mineralisation and geochemical studies of the Kramat Pulai area, Perak. 84 p. B.Sc. (Hons) 1972

15. Tan Jee Theng: General geology, stratigraphy and palaeontology of the Panching area, Pahang, West Malaysia. 120 p. B.Sc. (Hons) 1972

16. Voon Choon Chan: Petrographic, mineralogic and geochemical studies of igneous rocks south of Gunong Pulai, Johore. 25 p. B.Sc. (Hons) 1972

THE ROCK "TOHUNGA"

"Among their party was one who prowled about like a simpleton, picking up shells, and collecting flowers and shrubs. This, we said, is a tohunga; he is searching for herbs to make 'wairakau', and one of our people offered to show him the plants and barks we use to that end. Presently he came rushing back crying: 'Beware! he is a tohunga of no ordinary degree! Not flowers, and plants, and shells alone, but also stones! for he chippeth here, and he chippeth here, and he chippeth there, and examineth them with a movable eye, until his satchel is laden. What manner of medicine will this become?"

(tohunga = Maori medicine man; wairakau = herb water i.e. medicine)

- from a Maori account of Captain Cook's landing in New Zealand, quoted in:

Baucke, Wm., 1928. Where the white man treads, 2nd edition. Auckland: Wilson & Horton Ltd., p. 67-8

P.H. Stauffer

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