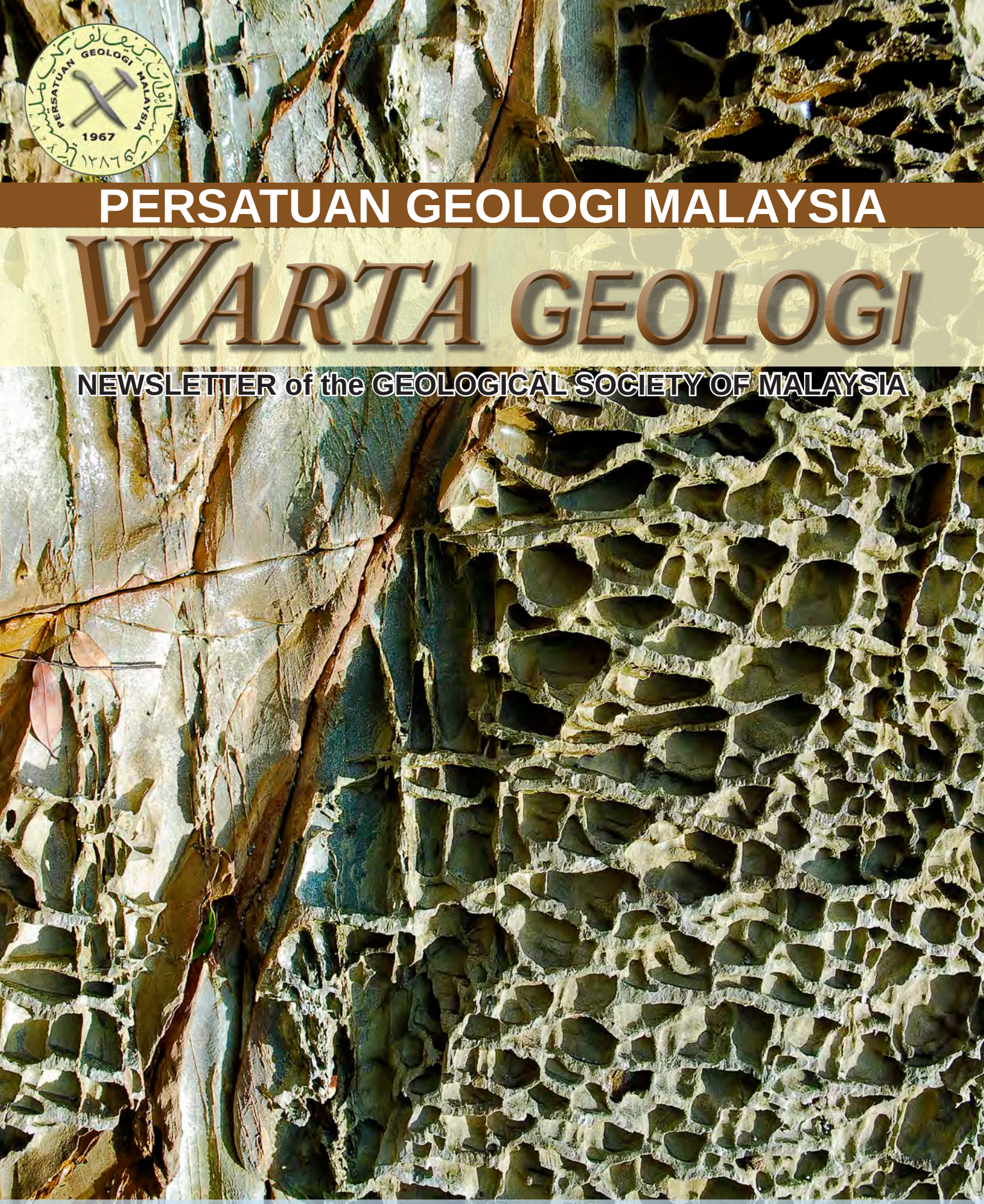

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Geological Society of Malaysia
c/o Department of Geology,
University of Malaya,
50603 Kuala Lumpur, Malaysia
Tel: 603-79577036 Fax: 603-79563900
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Cover photo: Honeycomb weathering of sandstone, Machinchang Formation, Pantai Pasir Tengkorak, Langkawi by T.F. Ng

Warta Geologi

Newsletter of the Geological Society of Malaysia

CATATAN GEOLOGI
GEOLOGICAL NOTES

The Jokut Quarry – Observations on an intensely folded carbonate sequence North-West of Mulu, Sarawak

Franz L Kessler

Curtin Consultancy Services
Miri, Sarawak, Malaysia
email: ranzlkessler32@gmail.com

Abstract — The Jokut Quarry is located NE of the Mulu Massif and forms probably the northernmost known occurrence of carbonates in this part of Sarawak. The exposed carbonates are intensely folded and fractured, and float within an even more intensely folded and tectonized mass of shales and slates. The carbonates, mainly formed by bioclastic mudstones to packstones contain mounded features. The outcrop was measured and described during a scouting trip to Limbang in July 2011. Current field data suggest that the Jokut carbonates may be part of a much larger olistostrome complex. The Jokut area is important, given a section of the Oligocene shelf edge and slope can be studied there.

Keywords: carbonate, limestone, Oligocene, Sarawak, tectonics

INTRODUCTION

This article is a first of a planned series of publication that describe carbonate outcrops in Sarawak. Outcrops in Sarawak are impermanent features, and the Jokut quarry is no exception. Operations in the quarry area started in 2006, and the currently mined deposit is almost exhausted (Aug 2011).

One approaches the outcrop from Nanga Medremit in Limbang (Figure 1). It is here where the tarmac road ends, and the quarry road starts. Negotiating this road is not for the faint-hearted: The road being narrow one comes often face-to-face with heavily loaded lorries on their way to Brunei construction sites. Driving at maximum speed (drivers are paid on a per-trip basis), they cause immense dust clouds as they chase ahead. One reaches the quarry after approximately 150 minutes under benign conditions. The quarry is part of a series of outcrops along the upper Selidong River and her tributaries, and the limestone is referred to as the Selidong Limestone.

The limestone forms thin layers within a heterogeneous mixture of slates probably belonging to the Setap Shale Formation. Both the limestone members and the surrounding slate are strongly folded and tectonized. The Jokut quarry is located in the most prominent carbonate bed.

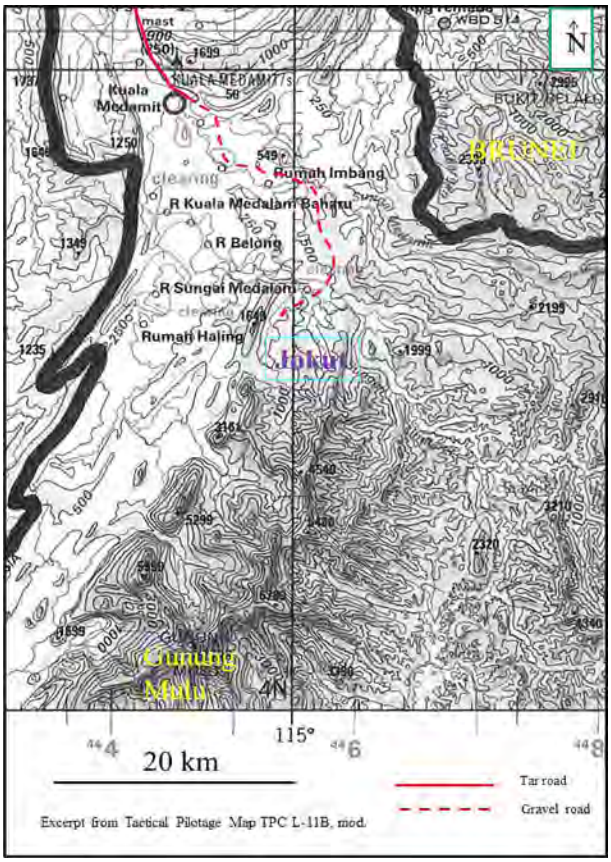

Figure 1: Topographic map with access road; the mountainous landscape South of Jokut is mainly formed by Rajang clastic rocks, and Melinau limestone.

OUTCROP DESCRIPTION

A sketch of the measured outcrop is shown below (Figures 2 and 3). The carbonates form a morphological

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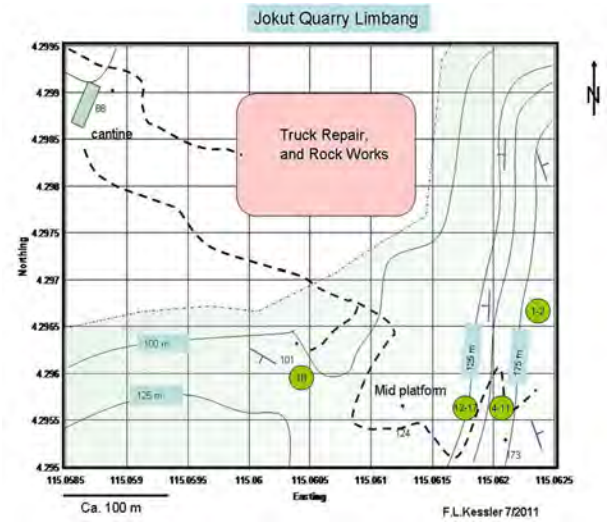

Figure 2: Sketch map of the quarry area based on GPS and optical laser distance finder data; several GPS points with elevation (meters) are shown. Light blue/green color fill stands for the current (Aug 2011) carbonate outcrop area as part of the industrial extraction. The limit of the quarry area is shown as a dotted line. Sample locations are shown in green-filled circles. Dashed lines: Access roads in the larger quarry area.

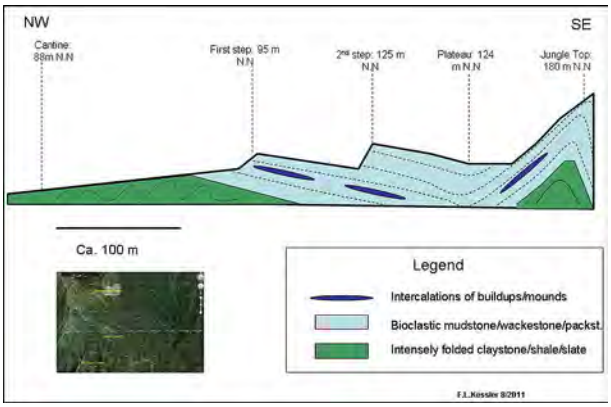

Figure 3: Profile section through the quarry. The carbonates are estimated to be in the order of 50- 80 m thickness, and are embedded in a heterogeneous and highly tectonized mixture of shales and slates.

rip in the terrain, with the mined area cutting through the western outcrop section. A panoramic view is shown in Figure 4. At closer inspection, the carbonates do not form a simple stratigraphical rib as such, but instead appear as an intensely folded complex (Figures 5 and 6), with the rib being the expression of an anticline with a ca. 90-60° E dipping fold axis. Hence what appears in the field as a simple stratigraphic unit may, in fact, be the head of a cylindrical fold and, at given locations, a recumbent anticline.

COMPOSITION OF ROCKS

The sequence is formed by bioclastic carbonates – mudstone, wackestone, packstone. A microfacies analysis is currently planned. Buildups and mounds of small

Figure 4: Panorama view of the Jokut Quarry.

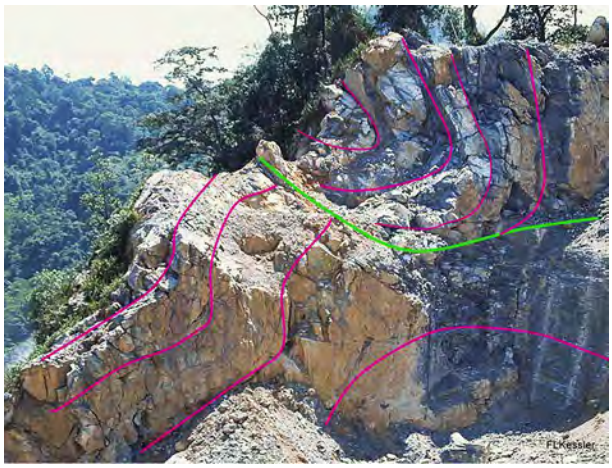

Figure 5: Cylindrically folded limestone section in the upper part of the quarry. This part of the quarry is loose with overhanging rock walls and forms an HSE risk.

lenticular shape (typically patches of 3 m by 50 cm) are seen to form intercalations within the bioclastic rock sequence. The mudstone/wackestone beds are typically very finely laminated, implying a very low and steady sedimentation rate. The rock is very hard, but finishes breaking like glass with concoidal surfaces. This could be indicative that the rock contains silica, to be investigated.

INTERPRETATION

Hutchison (2005, p. 92) describes the Selidong Limestone as a sequence of calcarenites and calcilutites, of Upper Oligocene age. Several tectonized limestone beds crop out below the quarry along the Selidong River (Figure 7). The limestone contains only mounds of unknown composition.

Given the carbonate rock sequence is intensely folded, and also embedded in even stronger folded chaotic heterogeneous mixtures of shale and slate, it is suggested that the Jokut carbonates may be part of a much larger olistostrom complex – this being a working hypothesis right now. Given the Mt. Mulu carbonate area is only some 10 kilometers away to the South-East, it appears to be logical to put the observed limestone sequence in context with the Mt. Mulu area carbonates.

Figure 6: Most beds in the upper section of the outcrop show a steep dip towards the East/Southeast. The shown steeply dipping limestone rib is ca. 7 m thick.

Figure 7: Isolated and faulted beds of inferred deep marine Selidong Limestone units, embedded in slate, are seen along the Selidong River.

In this context Hutchison (2005) points out that no reef bodies were ever found in Mulu, and that the as Melinau Formation described carbonates may be of shelfal nature but deposited at considerable distance to the palaeo-coast. The Jokut sequence, however, is clearly located even further basinwards.

The processes leading to folding of the Selidong limestone in the greater Jokut area remain uncertain. There are three possibilities:

Folding originating in the context of gravity gliding;

Folding as a result of compression;

A combination of the above.

It is believed, that further work on the outcrop could yield promising bio-stratigraphic and bio-facies data. Under such a scenario, it might be possible to better reconstruct the Mulu carbonate system, and to establish the position of the Palaeogene shelf edge.

IMPORTANCE OF THE JOKUT QARRY IN REGIONAL CONTEXT

Given that coastal areas of Northwestern Sarawak (Miri) and coastal Brunei are essentially covered by Neogene deposits that camouflage older rocks, the Jokut/Limbang area is unique in the sense that the Oligocene basin margin can be studied here – both in terms of stratigraphic succession/facies and deformation.

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Rekod penemuan fosil Trias bivalvia *Daonella* dari Aring, Kelantan

Ahmad Rosli Othman[1,2] & Mohd. Shafeea Leman[2,3]

[1]Jabatan Mineral dan Geosains Malaysia, Wisma Persekutuan, 15200 Kota Bharu, Kelantan
emel: ahmadrosli@jmg.gov.my
[2]Institut Alam Sekitar dan Pembangunan (LESTARI),
[3]Pusat Pengajian Sains Sekitaran dan Sumber Alam, Fakulti Sains dan Teknologi,
Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor
emel: shafeea@ukm.my

Abstrak — Fosil bivalvia Daonella lommeli (Wissman) dan Daonella cf. pichleri Mojsisovics telah ditemui pada satu singkapan batuan enapan marin di Lokaliti QZ467 di kawasan Aring, Gua Musang. Fosil ditemui dalam batu lumpur kelabu kepunyaan Formasi Telong yang termasuk dalam Zon Batuan Trias Timur. Kedua-dua pesies ini mencirikan Zon Daonella lommeli dan Zon Daonella pichleri serta ditemui bersama ammonoid-ammonoid dari Zon Frankites regoledanus berusia Ladinian Atas, Trias Tengah. Bivalvia ini terhad dalam Lautan Paleo-Tethys di persekitaran samudera dalam. Ini adalah penemuan pertama spesies-spesies tersebut dari Negeri Kelantan. Penemuan fosil ini juga memberikan gambaran bahawa lembangan Semantan (laut dalam) mungkin mengunjur ke utara dari Singapura hingga ke selatan Kelantan. Pengkelasan zon-zon Daonella dalam strata batuan Trias juga dikajisemula.

Note on discovery of the Triassic bivalve Daonella from Aring, Kelantan

Abstract — The bivalves fossil of Daonella lommeli (Wismann) and Daonella cf. pichleri Mojsisovics was recovered from an outcrop of marine sediment at the Locality QZ467, in the vicinity of Aring, Gua Musang. These fossils was found in gray mudstone belonging to the Telong Formation which is included in the Eastern Triassic Rocks Zone. Both are characteristic species of the Daonella lommeli Zone and Daonella pichleri Zone and found together with the Upper Ladinian (Middle Triassic) ammonoids indicative of the Frankites regoledanus Zone. These bivalves is restricted to the Paleo-Tethys Ocean in a deep marine environment. This is the first discovery of both species in Kelantan. This discovery demontrated that the Semantan basin (deep marine) probably extends northward from Singapore to south Kelantan. The classification of Daonella zones within Triassic rocks here is revised as well.

Keywords: Bivalve, Daonella, Aring, Upper Ladinian, Telong Formation, Semantan basin

PENGENALAN

Daonella merupakan salah satu genus Bivalvia bercengkerang nipis yang mendominasi dasar lautan di sepanjang zaman Trias (McRobert, 2010). Selain *Daonella*, genus *Clairia*, *Posidonia* (=*Peribositra*), *Enteropleura*, *Aparimella* dan *Halobia* sering dirujuk sebagai spesies bivalvia Trias yang bertaburan meluas dan merupakan makrofosil yang baik untuk kajian biostratigrafi. Bivalvia bercengkerang nipis ini memainkan peranan penting dalam membina zon-zon biostratigrafi Trias Tengah terutamanya bagi unit-unit litologi yang tidak menunjukkan kehadiran fosil indeks lain seperti ammonoid dan konodon (McRobert, 2010; Lucas, 2010; Schatz, 2001). Di sepanjang zaman Trias Tengah, *Daonella* mendominasi dasar lautan di persekitaran samudera dalam (Kobayashi *et al*., 1966; Meng *et al*., 2007) dan hanya terdapat semasa usia Anisian Akhir sehinggalah ke usia Ladinian Akhir (McRobert, 2010).

Di Malaysia, spesies-spesies *Daonella* sering dijumpai dalam Zon Batuan Trias Barat dan dalam Zon Batuan Trias Timur (Kobayashi, 1964). Kajian ini mendokumentasikan penemuan dua spesies *Daonella* iaitu *Daonella lommeli* (Wissman) dan *Daonella* cf. *pichleri* Mojsisovics dalam strata batuan sedimen kepunyaan Formasi Telong dari kawasan Aring, Kelantan yang terletak dalam Biofasies *Daonella* dalam Zon Batuan Trias Timur di samping menentukan kedudukan biostratigrafinya dalam geokronologi Trias Tengah. Sebelum ini, spesies-spesies ini sering ditemui dalam jujukan batuan Formasi

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Semantan di Pahang dan Negeri Sembilan. Kajian ini juga melibatkan kajian semula zon-zon *Daonella* yang dibina oleh Kobayashi (1964), Kobayashi *et al*. (1966) dan Tamura *et al*. (1975) bersandarkan kepada maklumat paleontologi terkini.

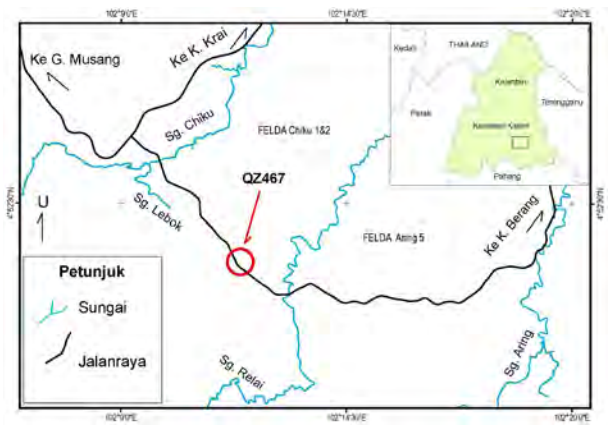
KAJIAN TERDAHULU

Spesies *Daonella lommeli* (Wissman) dan *Daonella* cf. *pichleri* Mojsisovics sering ditemui dalam singkapan batuan berfosil berusia Trias Tengah bersama-sama spesies-spesies *Daonella* lain dalam Formasi Semantan di beberapa kawasan Pahang dan Negeri Sembilan. Di Pahang, *Daonella lommeli* (Wissman) banyak dilaporkan penemuannya di kawasan Mentakab dan Lancang (Kobayashi, 1964; Metcalfe *et al*.,1982; Ahmad Rosli Othman, 2011) manakala di Negeri Sembilan, spesies ini dilaporkan di Kuala Pilah (Khoo, 1998) dan Durian Tipus (Loganathan, 1993). *Daonella pichleri* Mojsisovics hanya ditemui di kawasan Mentakab, Pahang (Kobayashi, 1964; Ahmad Rosli Othman, 2011).

Di Negeri Kelantan, fosil-fosil *Daonella* telah dilaporkan penemuannya di kawasan Aring dan Chiku dalam Jajahan Gua Musang. *Daonella* sp. dilaporkan wujud di Sungai Lebok (Kobayashi *et al*.,1966; Jones *et al*., 1966; Burton, 1973) manakala *Daonella* cf. *indica* Bittner ditemui di Sungai Chiku, Gua Musang (Yin, 1963) bersama-sama ammonoid ?*Paratrachyceras* sp. (= *Frankites*) dan *Peribositra kedahensis* Kobayashi. Spesies endemik *Daonella pahangensis* Kobayashi pula ditemui oleh Ahmad Rosli Othman dan Mohd. Shafeea Leman (2009) di Lokaliti QZ467 iaitu di kawasan yang sama di mana spesies *Daonella lommeli* (Wissman) dan *Daonella pichleri* Mojsisovics dalam kajian ini diperihalkan. Oleh itu sebanyak empat spesies *Daonella* telah ditemui di kawasan Aring iaitu *Daonella* cf. *indica* Bittner, *Daonella pahangensis* Kobayashi, *Daonella lommeli* (Wissman) dan *Daonella pichleri* Mojsisovics.

Fosil bivalvia ini ditemui bersama fosil ammonoid *Frankites regoledanus* (Mojsisovics), *Frankites apertus* (Mojsisovics), *Frankites* sp. A, *Daxatina canadensis* (Whiteaves), *Sirenotrachyceras thusneldae* (Mojsisovics), *Zestoceras lorigae* Mietto & Manfrin, *Zestoceras barwicki* (Johnston), *Clionites* cf. *angulosus* Mojsisovics, *Celtites epolensis* Mojsisovics, *Megaphyllites jarbas* (Munster) dan *Joannites* cf. *trilabiaius* Mojsisovics. Beberapa spesies ammonoid ini mencirikan tahap Ladinian, Trias Tengah hingga Karnian, Trias Atas (Ahmad Rosli Othman & Mohd. Shafeea Leman, 2010).

Rajah 1: Gambar menunjukkan singkapan batuan Formasi Telong di Lokaliti QZ467.



Rajah 2: Peta lokaliti penemuan fosil *Daonella* di Lokaliti QZ467. Fosil *Daonella* juga ditemui di Sg. Lebok dan Sg. Chiku, Gua Musang, Kelantan.

KERANGKA GEOLOGI

Berdasarkan taburan bivalvia yang dominan, Zon Batuan Trias Timur terbahagi kepada dua biofasies iaitu Biofasies *Daonella* dan Biofasies *Myophoria* (Kobayashi, 1964; Burton, 1973). Dari kajian terkini didapati bahawa Biofasies *Daonella* bersekutuan dengan ammonoid Ladinian manakala Biofasies *Myophoria* pula bersekutuan dengan ammonoid Anisian. Kawasan kajian terletak dalam biofasies *Daonella* berdasarkan kehadiran ammonoid-ammonoid berusia Longorbardian, Ladinian Akhir, Trias Tengah.

Lokasi penemuan fosil adalah pada kedudukkan koordinat RSO: QZ 467902 WMR: 536601 yang dirujuk sebagai Lokaliti QZ467 (Rajah 1). Kawasan penemuan terletak di bahagian tenggara Negeri Kelantan (Rajah 2) dalam Jajahan Gua Musang. Berdasarkan pemetaan geologi yang dilakukan oleh Aw (1990) di kawasan Aring, batuan di kawasan ini dipetakan sebagai Formasi Telong yang berusia Perm Tengah hingga Trias Atas yang secara litologi dan taburan fosilnya adalah setara dengan Formasi Semantan (Kamal Roslan Mohamad, 1996).

USIA DAN TABURAN

Kesemua spesies *Daonella* yang ditemui di Semenanjung Malaysia adalah mewakili usia Ladinian, Trias Tengah (seperti Kobayashi, 1964; Jones *et al*., 1966; Jaafar Ahmad, 1976; Metcalfe *et al*., 1982; Loganathan, 1993; Khoo, 1998; Ahmad Rosli Othman & Mohd. Shafeea

Leman, 2009). Walau bagaimanapun terdapat beberapa spesies *Daonella* dilaporkan terus wujud sehingga tahap Karnian seperti *Daonella procteri* Kobayashi, *Daonella sumatrensis* Volz dan *Daonella burtoni* Kobayashi & Tokuyama di Kedah (Kobayashi, 1964; Tamura *et al.*, 1975), *Daonella lilintana*, *Daonella sumatrensis* di Timor, Indonesia dan *Daonella yoshimurai* di Jepun (Kobayashi *et al.*, 1966). Berdasarkan taburan spesies-spesies *Daonella* yang begitu banyak terdapat di Malaysia, Kobayashi *et al.* (1966) telah membina zon-zon *Daonella* dan berpendapat bahawa taburannya terhad dalam Lautan Paleo-Tethys. Dari penelitian beliau terhadap kehadiran *Daonella* dalam jujukan batuan di beberapa lokasi berfosil di Mentakab, Pahang, beliau mendapati bahawa spesies-spesies *Daonella* jarang wujud bersama dalam satu horizon tetapi wujud pada horizon-horizon tertentu.

McRobert (2010) telah membina skala pengezonan bivalvia Trias berdasarkan taburan spesies-spesies *Daonella* di rantau Tethys, Amerika Utara dan Boreal. Skala pengezonan bivalvia tersebut bukanlah skala yang dibangunankan berdasarkan kajian biosratigrafi lapisan demi lapisan tetapi hanya bersandarkan kepada kompilasi kajian literatur dan koleksi-koleski muzium. Menurutnya, pengezonan bivalvia Trias tersebut adalah tidak formal dan memerlukan kajian lanjutan. Kaitannya dengan zon-zon ammonoid adalah kabur memandangkan bivalvia ini amat jarang ditemui bersama ammonoid dalam satu horizon. Begitu juga di Malaysia, hampir kesemua penemuan spesies-spesies *Daonella* dilaporkan tanpa kehadiran fosil ammonoid. Oleh itu sukar untuk dikaitkan kehadirannya dengan zon-zon ammonoid. Berbeza di kawasan Aring di mana spesies-spesies *Daonella* dilaporkan hadir bersama ammonoid Ladinian-Karnian tetapi kedudukan horizonnya di lapangan tidak dapat ditentukan kerana spesimen-spesimen *Daonella* ditemui dalam serpihan batuan di sekitar singkapan batuan dan bukannya dari horizon batuan.

Daonella lommeli (Wissmann) sering ditemui bersama *Peribositra wengensis* Wissman dalam strata batuan berusia Ladinian di Alps, Itali (Kobayashi & Tamura, 1959; Kobayashi, 1964) dan di Sepanyol (Budurov *et al.*, 1993; Marguez-Aliaga *et al.*, 1984; 2004). Dari cerapan lapangan, *Peribositra* didapati wujud bersama *Daonella pahangensis* Kobayashi dan *Daonella lommeli* (Wissman) dalam satu horizon tetapi tidak dapat ditentukan spesiesnya.

Selain di Malaysia, spesies *Daonella lommeli* (Wissmann) hanya ditemui dalam Formasi Namtham, di Vietnam (Vu Khuc *et al.*, 1991) di kawasan Asia Tenggara. Namun begitu, secara globalnya spesies tersebut ditemui secara meluas dan menjadi fosil bivalvia utama di negara-negara yang mempunyai singkapan batuan sedimen rantau Tethys seperti di China (Yang *et al.*, 1982), Iran (Krystyn & Tatzreiter, 1991), Turki (Ulker, 1968), Bulgaria (Budurov *et al.*, 1991) dan Sepanyol (Goy, 1995; Marguez-Aliaga *et al.*, 1984; 2004).

BIOSTRATIGRAFI DAN KORELASI

Dari segi biostratigrafi, berdasarkan perbandingan dengan pengezonan bivalvia Trias Tengah rantau Tethys yang dibangunkan oleh McRobert (2010), kedua-dua spesies ini adalah merupakan spesies penanda zon iaitu Zon *Daonella lommeli* dan Zon *Daonella pichleri* yang mewakili usia Ladinian Atas, Trias Tengah. Zon *Daonella lommeli* menjadi zon terakhir *Daonella* sebelum diduduki oleh zon-zon *Halobia*. Zon *Daonella lommeli* boleh dikorelasi dengan Zon *Daonella elegans* dari rantau Amerika Utara dan Zon *Daonella subarctica* dari rantau Boreal. Zon *Daonella pichleri* pula setara dengan Zon *Daonella nitinae* dari rantau Amerika utara. Perbandingan dengan zon ammonoid pula, didapati bahawa zon-zon tersebut boleh dikorelasikan dengan Zon *Frankites regoledanus*, Zon *Protrachyceras neumayri* dan Zon *Protrachyceras longorbardium* seperti dalam Rajah 3.

Skala pengezonan bivalvia Trias Tengah rantau Tethys ini mengalami sedikit perubahan untuk disesuaikan dengan taburan fosil *Daonella* di Malaysia iaitu penambahan zon *Daonella indica* di atas zon *Daonella lommeli*. Menurut Kobayashi (1964), spesies *Daonella indica* Bittner didapati berada pada bahagian atas horizon *Daonella lommeli* berdasarkan turutan fosil dari Himalaya. Selain itu Zon *Daonella pichleri* yang berada dalam horizon yang sama dengan *Daonella pahangensis* Kobayashi kini diletakkan di bahagian atas dari Zon *Daonella lommeli*. Di Bosnia, horizon *Daonella pichleri* berada di atas horizon *Daonella lommeli* (Kobayashi, 1964).

Berdasarkan taburan fosil *Daonella* yang banyak kedapatan di Malaysia, Jepun dan di kawasan Asia Tenggara, Kobayashi *et al.* (1966) telah mengkelaskan beberapa zon yang mengandungi spesies-spesies *Daonella* penanda zon tertentu relatif terhadap usia Trias Tengah seperti dalam Rajah 4. Terdapat sedikit perubahan terhadap pengkelasan zon *Daonella* ini di mana zon *Daonella* cf.

	Tahap		Zon-Zon Ammonoid	Zon-Zon Bivalvia
TRIAS ATAS	KARNIAN	Bawah	Austrotrachyceras austriacum	Halobia rugosa
			Trachyceras aonoides	
			Trachyceras aon	
			Daxatina canadensis	
TRIAS TENGAH	LADINIAN	Atas	Frankites regoledanus	Daonella lommeli
			Protrachyceras neumayri	
			Protrachyceras longobardium	Daonella pichleri
			Protrachyceras gredleri	
		Bawah	Protchyceras margaritosum	Daonella moussoni
			Eoprotrachyceras curionii	Daonella elongata
	ANISIAN	Atas	Nevadites sacedensis	
			Reitziites reitzi	
			Kellnerites felsoensensis	Daonella sturi
			Paraceratites trinodosus	
			Schreyerites binodosus	
		Tengah	Balatonites balatinicus	Enteropleura bittneri
			Nevadisculites taylori	
			Acrochordiceras ismidicus	

Rajah 3: Kedudukan zon-zon *Daonella* dalam pengezonan bivalvia dan ammonoid Trias Tengah bagi rantau Tethys (diubahsuai dari McRobert, 2010).

moussoni yang mencirikan zon ammonoid *Protrachyceras gredleri* (Schatz, 2001) berusia Ladinian kini ditempatkan di bahagian bawah zon *Daonella lommeli*. Sebelum ini zon *Daonella* cf. *moussoni* diletakkan di atas zon *Daonella indica* mewakili usia Karnian.

Kedudukan fosil *Daonella lommeli* (Wissmann) dan *Daonella* cf. *pichleri* Mojsisovics dalam lapisan batuan dari kawasan kajian tidak dapat ditentukan di lapangan tetapi ditemui bersama ammonoid-ammonoid yang mencirikan Zon *Frankites regoledanus* dan Zon *Daxatina canadensis*. Ditafsirkan bahawa sebahagian dari fauna tersebut terkandung dalam Zon *Frankites regoledanus* yang mewakili usia subtahap Longorbardian, tahap Ladinian, Trias Tengah berdasarkan kehadiran *Daonella lommeli* (Wissmann).

PEMERIHALAN FOSIL

Sebanyak dua spesimen berbentuk acuan luaran yang ditemui di Lokaliti QZ467 dalam Formasi Telong diperiksa. Spesimen-spesimen yang ditemui telah mengalami luluhawa yang teruk namun masih mengekalkan morfologi cengkerangnya. Spesimen disimpan di JMG Kelantan. Pemerihalan bagi kedua-dua spesimen tersebut adalah seperti berikut:

Superfamili POSIDONIOACEA Waller & Stanly
Famili HALOBIIDAE McRobert (2010)
Genus *Daonella* Mojsisovics
Daonella cf. *pichleri* Mojsisovics
Rajah 5A

.1964 *Daonella pichleri* Mojsisovics – Kobayashi: Plat 5, gambarajah 4, 5a-b.
.1991 *Daonella pichleri* Mojsisovics – Vu Khuc *et al.*: Plat 8, gambarajah 16.
.2011 *Daonella* cf. *pichleri* Mojsisovics – Ahmad Rosli Othman & Mohd. Shafeea Leman: Plat 1, gambarajah 6.

Pemerihalan:- Cengkerang bersaiz sederhana, kerangka seperti bentuk *ovate* dan sedikit cembung. Cengkerang adalah *inequilateral* dan menunjukkan ketinggian kurang dari kepanjangan cengkerang. Cengkerang mempamerkan bahagian anterior dan sebahagian garis engsel tanpa bahagian posterior. Umbo terletak pada kedudukan hampir satu pertiga dari hujung anterior. Cengkerang dihiasi oleh rib berjejari, agak lebar berbanding ketak rib dengan nisbah 1:1.5. Terdapat rib bercabang dua pada kedudukan satu per tiga dari pinggir venter iaitu berhampiran umbo.

Pernyataan :- Spesimen yang diperiksa adalah tidak lengkap tetapi dapat dikenalpasti melalui bentuknya yang *ovate* bercengkerang *inequilateral* dengan kepanjangan yang melebihi ketinggian cengkerang serta mempamerkan rib bercabang dua berhampiran umbo. Spesimen ini sinonim dengan spesimen dari kawasan Sg. Tekal Besar (Kobayashi, 1964) dan Sg. Jentar, Mentakab (Ahmad Rosli Othman & Mohd. Shafeea Leman, 2011). Menurut Vu Khuc *et al*. (1991), spesies ini tergolong dalam himpunan zon *Protrachyceras – Daonella indica* berusia Ladinian di Wilayah Hoa Binh, utara Vietnam. Spesies ini turut dilaporkan dari Bagolino, Itali (Brack *et al.*, 2005) dalam Formasi Buchenstein yang mewakili usia Longorbardian, Ladinian (Trias Tengah) bersama *Daonella lommeli* (Wissman).

Daonella lommeli (Wissman)
Rajah 5B

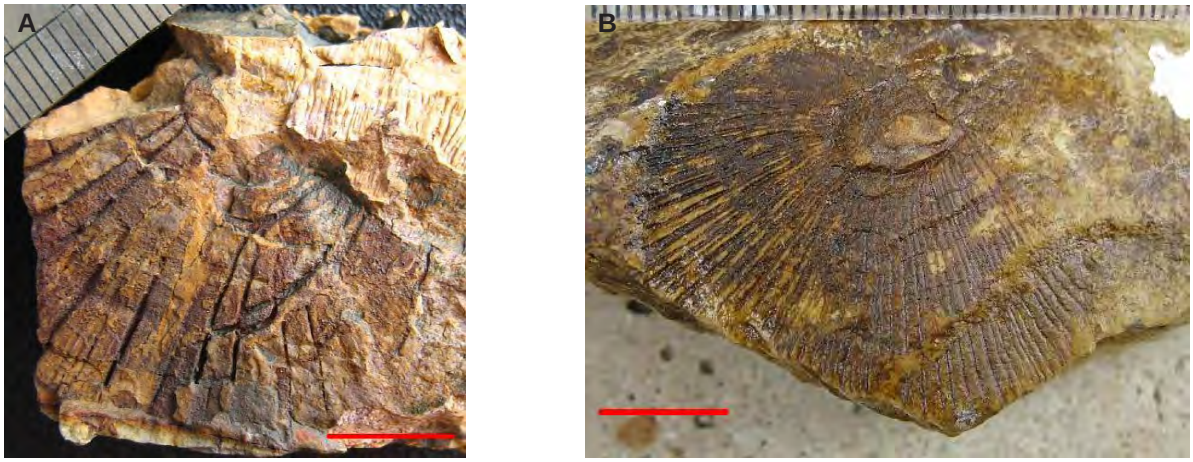
.1964 *Daonella lommeli* (Wissman) – Kobayashi: ms 61, Plat 5, gambar 6
.1982 *Daonella lommeli* (Wissman) – Metcalfe *et al.*: ms 113, Plat 1, gambar 5-6.
.1991 *Daonella* aff. *lommeli* (Wissman) – Vu Khuc *et al.* : ms 60, Plat 8, gambar 6.
.2004 *Daonella lommeli* (Wissman) – Marguez-Aliaga *et al.* : ms 287, Plat 2, gambar 3 dan 4.
.2011 *Daonella lommeli* (Wissman) – Ahmad Rosli Othman & Mohd. Shafeea Leman: Plat 1, Gambarajah 7.

Pemerihalan:- Spesimen adalah tidak lengkap tanpa umbo dan garis engsel. Oleh itu pengukuran dimensi bagi spesimen tersebut tidak dapat dilakukan. Walau bagaimanapun rib jenis *fasciculate* iaitu rib utama yang mempunyai gugusan rib kecil dapat diperhatikan pada spesimen ini. Rib jenis *fasciculate* hanya dipamerkan oleh *Daonella lommeli* (Wissman) dan ia mudah dibezakan dengan spesies-spesies *Daonella* yang lain.

Pernyataan :- Spesies ini sinonim dengan spesimen yang ditemui di Mentakab (Metcalfe *et al.* 1982; Kobayashi

Usia	Kobayashi et al. (1966) (Asia Tenggara)	McRobert (2010) (Rantau Tethys)	Kajian semula (Malaysia)	Kawasan kajian (Aring)
Karnian	*Halobia comata* *Daonella* cf. *moussoni*	*Halobia rugosa*	*Halobia talauana* *Halobia comata*	
Ladinian	*Daonella indica* *Daonella pichleri* *Daonella lommeli*	*Daonella lommeli* *Daonella pichleri* *Daonella moussoni*	*Daonella indica* *Daonella pichleri* *Daonella lommeli* *Daonella* cf. *moussoni*	*Daonella* cf. *indica* *Daonella* cf. *pichleri* *Daonella lommeli*
Anisian	*Daonella elongata*	*Daonella elongata*	*Daonella elongata*	

Rajah 4: Kedudukan zon-zon yang diwakili spesies-spesies *Daonella* dan *Halobia* penanda zon. Sumber dari Kobayashi *et al*. (1966) dan McRobert (2010).



Rajah 5: Dua spesies fosil bivalvia *Daonella* berusia Ladinian Akhir, Trias Tengah yang ditemui di Lokaliti QZ467, Aring, Kelantan dalam Formasi Telong. Skala bar mewakili 1 cm. A- Bekas cengkerang kanan *Daonella* cf. *pichleri* Mojsisovics; B- Bekas bagi cengkerang *Daonella lommeli* (Wismann).

1964; Ahmad Rosli Othman & Mohd. Shafeea Leman, 2011) serta di Kuala Pilah (Khoo, 1998) dan di Durian Tipus (Loganathan, 1993) terutamanya dengan kewujudan rib jenis *fasciculate* yang mencirikan spesies tersebut. Berdasarkan pengkelasan spesies-spesies *Daonella* oleh Kittl, *Daonella lommeli* (Wissman) tergolong dalam Kumpulan *sturi-lommeli* yang turut mengandungi spesies *Daonella pahangensis* Kobayashi, *Daonella subsuadrata* Yabe & Shimizu dan *Daonella densisulcata* Yabe & Shimizu (Kobayashi, 1964; Kobayashi & Tamura, 1959). Di Bulgaria, spesies ini ditemui bersama ammonoid berusia subtahap Longobardian, Ladinian Akhir dalam fasies Muschelkalk Atas (Budurov *et al.*, 1993).

KESIMPULAN

Sebanyak empat spesies *Daonella* telah ditemui sehingga kini di kawasan Aring di mana tiga spesies daripadanya adalah merupakan spesies penanda zon. Spesies *Daonella lommeli* (Wissman) dan *Daonella* cf. *pichleri* Mojsisovics merupakan antara spesies *Daonella* yang baru ditemui dalam batuan Trias Formasi Telong di Negeri Kelantan. Penemuan spesies-spesies *Daonella* di kawasan Aring ini penting kerana ia didapati bersekutuan dengan ammonoid-ammonoid berusia Ladinian Atas (Trias Tengah) tidak seperti penemuan di beberapa lokasi di Pahang dan Negeri Sembilan yang tidak menunjukkan kehadiran ammonoid. *Daonella* yang ditemui di Lokaliti QZ467 didapati wujud bersama ammonoid-ammonoid Ladinian Atas yang mencirikan Zon *Frankites regoledanus*.

Kesemua spesies *Daonella* ini lazim ditemui di Lautan Paleo-Tethys di persekitaran samudera dalam. Penemuan ini menunjukkan bahawa sebahagian sedimen dari Formasi Telong adalah terenap di persekitaran samudera dalam. Berdasarkan taburan spesies-spesies *Daonella* dalam Formasi Telong yang sama dengan beberapa spesies-spesies *Daonella* dalam Formasi Semantan, ditafsirkan bahawa berkemungkinan wujud kelangsungan lembangan Semantan dari Singapura hingga ke selatan Kelantan. Seterusnya menjadi sempadan kepada lembangan tersebut ke utara sebelum disempadani oleh Formasi Gua Musang. Kenyataan ini juga disokong oleh kehadiran biofasies *Myophoria* bersama ammonoid-ammonoid Anisian dalam Formasi Telong sama seperti yang terdapat dalam Formasi Semantan.

Kewujudan banyak spesies-spesies *Daonella* dalam jujukan batuan Trias khususnya dalam Formasi Semantan dan Formasi Telong telah menyediakan peluang yang baik dalam memperkemaskan skala pengezonan bivalvia Trias Tengah khasnya yang didominasi oleh spesies-spesies *Daonella*. Maklumat penemuan *Daonella* penanda zon ini telah menambahkan lagi maklumat paleontologi dan biostratigrafi bagi Formasi Telong dalam Zon Batuan Trias Timur yang dicirikan oleh kewujudan Biofasies *Daonella*.

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Chairman's Lecture No. 17

A Tale of 2+1 Airports – the KLIA2 Sepang, the Senai and the Kuala Terengganu Airports

Tan Boon Kong

13 January 2012
Department of Geology, University of Malaya

Mr. Tan Boon Kong, Chairman of the Working Group on Engineering Geology, Hydrogeology & Environmental Geology delivered the 17th Chairman's Lecture on 13 January 2012 at University of Malaya. The lecture was chaired by Prof. Dr. Teh Guan Hoe. The lecture was an extension of the talk presented by Mr. Tan at the GSM NGC 2011, Johor Baru entitled "A Tale of 2 Airports – the new LCCT, Sepang, and the Senai Airport". In his talk Mr. Tan discussed the problems associated with the construction of KLIA2, Sepang (new LCCT terminal) due to the peat and soft soils at the site. The extension of the runway at Senai, Johore was relatively problem-free due to favourable ground consisting of residual soil of igneous rocks. There was minor issues related to the scarcity of construction sand in the construction of Kuala Terengganu airport. The lecture was followed by lively discussions.

Training Course

Risk & Volume Assessment in Exploration

17-18 January 2012
Department of Geology, University of Malaya, Kuala Lumpur

The two-day short course was conducted by Dr. Jan de Jager, Professor of Regional and Petroleum Geology, Utrecht University, the Netherlands, and visiting Professor, Department of Geology, University of Malaya. The course was co-organised by the Department of Geology, University of Malaya and Geological Society of Malaysia. The training course was designed for geoscientists working in exploration, portfolio analysts and their direct supervisors, as well as for those from disciplines working closely with exploration staff, such as reservoir engineers, petrophysicists and geophysicists. The course was attended by 46 participants from the industry (PETRONAS, Schlumberger, Fugro-Jason), academics and postgraduate students from University of Malaya.

TECHNICAL TALK

Geological and geochemical characteristics of the Tersang gold deposit in the Central Gold Belt, Peninsular Malaysia

Charles Makoundi
CODES ARC Centre of Excellence in Ore Deposits, University of Tasmania, Australia

24 February 2012
Department of Geology, University of Malaya

Abstract: Tersang gold deposit is located at the east of the Bentong-Raub Suture Zone in Pahang, Peninsular Malaysia. This deposit is hosted in sandstone (U-Pb detrital zircon dating: 319.3±5.9 to 337±2.6 Ma), breccia and felsic rhyolite (218.8±1.7 Ma). Ore minerals include pyrite, arsenopyrite, sphalerite, galena, geochronite, covellite and gold. The argillic alteration is dominant in the Tersang deposit and characterised by an assemblage of sericite, illite, and montmorillonite. Detailed paragenetic studies at Tersang revealed four pyrite types including euhedral to subhedral "spongy" pyrite with internal fracturing (pyrite 1), euhedral clean pyrite (pyrite 2) overgrown on pyrite 1, amorphous pyrite with high As and high Au (pyrite 3), crack-fill or vein pyrite with high As and low Au (pyrite 4). Pyrite 1 and Pyrite 3 are particularly enriched in Au, As, Co, Ni, Se, and Tl. Pyrite 1 and pyrite 2 show zoning of Co, Ni, As, and Se and they have low Ag/Au, and Ni/Co ratios indicating that these pyrites are likely of metamorphic origin. Sulphur isotope composition of pyrite, arsenopyrite and galena has a range of $\delta^{34}S$ values from -6.04 to 2.49‰. Additionally, these sulphide minerals are associated with primary hematite indicating that the sulphur may have been derived from the oxidation of the magmatic hydrothermal fluid at Tersang. Lead isotope ratios are 18.59 for Pb_20_6/Pb_20_4 and 15.75 for Pb_20_7/Pb_20_4 suggesting that lead was probably derived from the lower crust source rocks. Fluid inclusion studies yielded a homogenisation temperature range from 210 to 348°C with salinities between 1.74 and 11.93 wt % NaCl equiv. Laser Raman Spectrometry analysis indicates the presence of CO_2 (98.1-100 mol %) in fluids with a minor amount of CH_4 (0-1.9 mol %).

TECHNICAL TALK

Some organic geochemical thoughts on concretions from New Zealand

Michael J. Pearson
Consultant Petroleum Geochemist and Basin Modeller, University of Aberdeen &
Associate Editor Journal of Petroleum Geology

28 February 2012
Department of Geology, University of Malaya

Abstract: A wide variety of concretionary bodies occur in the Miocene strata of New Zealand ranging from a few cm to 10 m in size. Some of these are classic spherical concretions formed during early sediment burial by diffusion and many of them display attractive septarian structures showing different coloured generations of calcite fill. Organic lipid extracts from the fills are distinctly different to those from the concretion bodies implying later origins for their fluids. Other concretions are more tubular and their lipids contain some organic markers that suggest they formed along conduits for ancient methane seepage.

TECHNICAL TALK

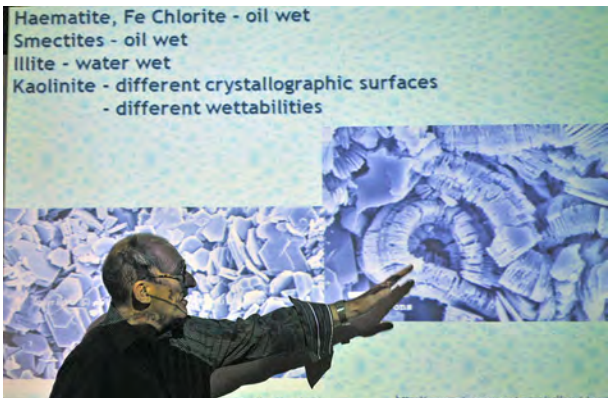
The importance of mineralogy in siliciclastic reservoirs

Joseph Hamilton
Senior Reservoir Mineralogist, ALS Ammtec, Australia

13 March 2012
Department of Geology, University of Malaya

Dr. Joseph Hamilton presented a talk entitled "The importance of mineralogy in siliciclastic reservoirs" on 13 March 2012 at University of Malaya. Dr. Hamilton is a geologist with a BSc from London University and a DPhil from Oxford University. He is a senior reservoir mineralogist with ALS Ammtec, where he leads the application of Automated Mineral Analysis techniques for the petroleum industry. He continues to supervise research students as well as occasional lecturing at universities. He is the 2011 Distinguished Lecturer for the Formation Evaluation Society of Australia.

The talk chaired by Dr. Nur Iskandar Taib was attended by about 20 geoscientists from the industry, and academics and students from University of Malaya. In his talk, Dr. Hamilton discussed the essential knowledge of mineralogy and its application for geologists and engineers working on siliciclastic reservoir. He presented several case studies of mineral analysis using a wide range of analytical instruments.



TECHNICAL TALK

The palaeo-orientations of Northwestern Borneo and adjacent South China Sea basins

H.D. Tjia
Emeritus Professor, Universiti Kebangsaan Malaysia

28 March 2012
Makmal Peta, Program Geologi, Universiti Kebangsaan Malaysia

Abstract: In the past two decades palaeomagnetic evidence from a limited number of areas onshore northwestern Borneo has been interpreted as showing progressive counterclockwise (CCW) rotation of the whole of Borneo island. For instance, palaeomagnetic computations of southwestern Sarawak data appear to represent over 51 degrees CCW rotation from the early Neogene onward. On the other hand, palaeomagnetic data from Sabah shows CCW as well as CW rotation. These data have been used for plate reconstructions of southeastern Asia. Several other authors have already pointed out inconsistencies of CCW rotations in the tectonic framework of the region. Ignored by all previous studies concerning the rotation of Borneo are published critical geological data. Among these are especially: (1) that Borneo has progressively accreted around a pre-Tertiary basement terrane (that is West Kalimantan which is part of Sundaland). Well-defined accretionary zones are the progressively younger Kuching, Sibu and Miri zones. (2) The mosaic assemblage of tectono-stratigraphic terranes that make up the Sarawak and Northwest Sabah basins. This fragmented nature has been duly recognised as basis for hydrocarbon ventures. (3) A fragmented pattern of well-bore breakouts that mostly are consistent with the tectono-stratigraphic terranes. In several hydrocarbon "blocks" successive time-structure horizons show stress histories that are at variance with progressive CCW rotation. Instances of CCW reverting to CW rotation are also known. Onshore evidence of stress kinematics suggests possible changes in compression orientations during most of the Tertiary but are definitely unequivocal in terms of systematic progression of the rotation of Borneo. It is concluded that the fragmented character of terranes of northwestern Borneo and adjoining basins preclude progressive CCW rotation, which is further constrained by patterns of well-bore breakouts, fold structures, and major wrench-faulting.

Mohd Rozi Umor
Program Geologi, Universiti Kebangsaan Malaysia

NEW MEMBERSHIP

Full Membership
1. Thomson anak Galin
2. Luqman bin Kaluni
3. Redzuan bin Ahmad Banjar
4. Rouhollah Dashti
5. Syed Mustafizur Rahman
6. Sven Monrad Jensen

Associate Membership
1. Kwok Siew Liong

Student Membership
1. Siti Nur Syahirah binti Mohd Adnan

Dear Members

Please update your contact details by sending your email address, telephone no. and fax no. to : geologicalsociety@gmail.com

Bulletin of the Geological Society of Malaysia

CHARLES S. HUTCHISON SPECIAL MEMORIAL ISSUE

Invitation for Papers

On 18 October 2011, Professor Dr. Charles S. Hutchison passed away at the age of 78. He was a founding member and past President of the Geological Society of Malaysia. The Society awarded him Honorary Membership in 1986 for distinguished services to the geoscience community and for the promotion of interest in geosciences in Malaysia. He was one of the foremost geologists working on the geology and tectonics of Southeast Asia. He was a strong supporter of the Bulletin, having contributed 19 papers and he continued to be a member of the editorial board up to the time of his death.

In recognition of Prof. Hutchison's outstanding contribution to geological research of Southeast Asia, we would like to invite interested researchers to submit papers for a special memorial issue of the Bulletin of the Geological Society of Malaysia. The submission procedures will be the same as for usual issues of the Bulletin. On submission, you should mark your paper as being for this special memorial issue. We will particularly welcome submissions related to Prof. Hutchison's work and interests in some way; for example, regional geology, tectonics, petrology and hydrocarbon and mineral deposits.

The deadline for first submission of papers is 30 June 2012, with an expected publication date of December 2012. If you have any pre-submission queries about the issue, please contact Dr. Christopher G. Howells (drroxs@yahoo. co.uk), Dr. Ralph Kugler (rlkugler@um.edu.my) or Dr. Ng Tham Fatt (thamfatt@gmail.com).

Geoscientist Award

Please be informed that nominations for the above award are now invited from all members of the Society. Relevant excerpts concerning the nomination of geoscientists and conditions of the award are listed below:

Eligibility

1. The geoscientist award is open to any individual or group of individuals working on the same project who are members of the Society.

2. The nomination shall be made for geoscientists who have done excellent research and contributed significantly to the development of Malaysian geology.

3. The research work must be original and should have been published before the nomination date.

4. The submission of research works which are known to have been already awarded at national or international levels would be automatically disqualified.

Procedure

1. Nomination for the award must be proposed and seconded by corporate members of the Society

2. The nomination should be on prescribed forms that can be obtained from:

   The Secretary
   Geological Society of Malaysia
   c/o Department of Geology
   University of Malaya
   50603 Kuala Lumpur, Malaysia
   Tel: 603 7957 7036
   Fax: 603 7956 3900
   Email: geologicalsociety@gmail.com

3. Nominations should be received by the Chairman of the Geoscientist Award Committee before 1st May 2012.

Dr. Gan Lay Chin
Chairperson,
GSM Geoscientist Award

Young Geoscientist Publication Award

Please be informed that nominations of author(s) for the above award are now invited from all members of the Society except Student and Associate Members. Nominations should be of young geoscientist(s) who have published papers in 2011. Relevant excerpts concerning the nomination of young geoscientist(s) and condition of award are listed below:

Eligibility		Procedure	
1.	No person shall be considered for the award unless he satisfies the Board: (a) that he/she is thirty years old or younger at the time of the publication of the paper or acceptance of the paper for publication. (b) that he/she has been a resident of Malaysia for at least 3 years prior to the publication of the paper. (c) that he/she belongs to any one of the membership of the Society. (d) that the paper was published or has been accepted for publication in the previous calendar year, in which case written proof from the publisher must be shown. (e) that the paper has been published in any Malaysian or international scientific publication.	1.	(a) Nominations for an award must be made by a member who is not a Student or Associate Member (b) An author cannot nominate himself for the award. (c) The written consent of the author is required.
		2.	(a) The award, in the opinion of the Board, shall be made to the author of the best paper in geology about Malaysia or the region and/or should be a general interest to the local community of geoscientists. (b) Papers with joint authorship may be considered, if a statement as to the relative responsibility of the authors, signed by all the authors, is attached. (c) In the case of joint authorships, the board may make the award to one author, or to two or more authors, provided these qualify under subsection on eligibility.

Nominations should be on prescribed forms that can be obtained from:
The Secretary

Geological Society of Malaysia
c/o Department of Geology
University of Malaya
50603 Kuala Lumpur, Malaysia
Tel: 603 7957 7036
Fax: 603 7956 3900
Email: geologicalsociety@gmail.com

Nominations should be received by the Chairman or the Young Geoscientist Publication Award before the 1st May 2012.

Dr. Gan Lay Chin
Chairperson,
GSM Geoscientist Award

PERSATUAN GEOLOGI MALAYSIA
GEOLOGICAL SOCIETY OF MALAYSIA
NATIONAL GEOSCIENCE CONFERENCE 2012

Name: _____

Profession: _____

Organisation: _____

_____

Address: _____

_____

_____

Membership Type: _____

Tel: _____ Fax: _____

Email: _____

Name & age (for children) of accompanying persons

_____

_____

_____

☐ I would like to attend NGC2012

☐ I would like to join the Pre-Conference Fieldtrip

☐ I would like to present the following paper(s):

1: _____

_____

_____

_____

2. _____

_____

_____

_____

Please email the abstract(s) to geologicalsociety@gmail.com

_____ _____

Signature Date

Registration

All participants are advised to register early to facilitate the planning of the Conference. Registration fees cover conference material, lunch and refreshment. To register, please complete the registration form and return it together with appropriate payment.
Payment can be made by crossed cheque or bank draft payable to the "Geological Society of Malaysia", or by banking in directly to the Geological Society of Malaysia, Standard Chartered Bank, current account no. 794 1054 02263. Please attached the bank-in-advise slip with the registration form for verification.

Membership	Early Registration	Late Registration
Presenters	RM 120	RM 150
Full/associate/life members	RM 120	RM 150
Non-members	RM 160	RM 190
Spouse/family of members	RM 100	RM 120
Student members	RM 80	RM 100
Student non-members	RM 100	RM 120
Children below 5 years	free	free

Accommodation

Accommodation is at the participant's own expense. Participants are advised to make early room reservations. For further information, please contact the hotel:

Pullman Hotel Kuching
Tel: +6082 222 888
Fax: +6082 222 993
Email: H6332-RE1@accor.com
Website: http://www.pullmankuching.com/

Other hotels near the Conference venue are:
Riverside Majestic Hotel (Tel: +6082 418911)
Hilton Kuching (Tel: +6082 223888)
Grand Margherita Hotel (Tel: +6082 418911)
Harbour View Hotel (Tel: +6082 274600/ 274601)
Borneo Hotel (Tel: +6082 244122)

FIRST CIRCULAR

PERSATUAN GEOLOGI MALAYSIA
GEOLOGICAL SOCIETY OF MALAYSIA

NATIONAL GEOSCIENCE CONFERENCE 2012

Pullman Hotel
Kuching, Sarawak
23 – 24 June 2012

Geoscience In Everyday Life

Co-organiser:
Jabatan Mineral & Geosains Malaysia

CALL FOR PAPERS

PERSATUAN GEOLOGI MALAYSIA
GEOLOGICAL SOCIETY OF MALAYSIA
NATIONAL GEOSCIENCE CONFERENCE 2012

The Geological Society of Malaysia is pleased to announce that the National Geoscience Conference 2012 (NGC2012), 25th in the annual conferences, will be held at the Pullman Hotel Kuching from 23rd to 24th June 2012. The Conference is a premier geoscientific event in Malaysia, which is well attended by geoscientists from academia as well as the public and private sectors. NGC2012 is co-organised with Minerals & Geoscience Department Malaysia (JMG) Sarawak.

Theme: *Geoscience in Everyday Life*

Geoscience has long played an important part in human life. In economic and social aspects, knowledge of the earth systems has provided platforms to improve the quality of life through the utilisation and management of natural resources, such as minerals, rocks and groundwater. Due to population growth, more areas will be developed, including areas that are prone to natural hazards. Knowledge management in geoscience which incorporates a variety of fields aided by concerted efforts, together with other scientific communities is the way forward. It is essential to balance development, preservation and conservation of natural systems, so that the growth of society for the present and future generations can be sustained.

Programme

The technical program of NGC2012 consists of oral and poster presentations on all aspects of geoscience related to the theme. Presentations by keynote speakers on topics of relevance to the theme and interest to the nation is planned. There will be a one-day Pre-Conference Fieldtrip to Bau-Lundu Area.

Call for Papers

Once again we seek your support to ensure the success of NGC2012. Participants are invited to present papers of their original research either in English or Bahasa Malaysia for the Technical Sessions. Contributors may submit more than one paper, however the Organising Committee has the right to select only one paper by any first author for oral presentation, while the rest will be presented as posters. Priority will be given to papers with full manuscript.

Those who would like to present papers are required to submit an extended abstract. The extended abstract should be between 500 to 750 words long, with a maximum of 3 figures and/or tables and must have at least 3 references. Abstracts of accepted papers will be distributed to all participants of NGC2012. Full papers will be reviewed and published in the Bulletin of the Geological Society of Malaysia. Manuscript requirements can be downloaded from http://geology.um.edu.my/gsmpublic/NGC2012/Instruction.pdf.

Pre-Conference Fieldtrip

Location:	Bau-Lundu area
Date:	22 June 2012 (Friday)
Number of participants:	Maximum 30
Charges:	RM 30.00 per person

Bau-Lundu area is located in West Sarawak, where there are good exposures of shallow and deep marine Mesozoic sediments, intruded by the basic igneous bodies.

The Bau area has been known for gold occurrences by the locals since the 1850s. Since then, the area have developed to what it is today and is known as the Gold Town of Sarawak. The gold mineralisation is hosted by the fractured and faulted Bau Limestone and shale of the Pedawan Formation.

Deadlines

Submission of abstract:	30th April 2012
Submission of full manuscript:	31st May 2012
Early Registration:	31st May 2012

REGISTRATION FORM

PERSATUAN GEOLOGI MALAYSIA
GEOLOGICAL SOCIETY OF MALAYSIA

NATIONAL GEOSCIENCE CONFERENCE 2012

Pullman Hotel
Kuching, Sarawak
23 – 24 June 2012

Geoscience In Everyday Life

Please complete and return this form together with appropriate payment to:

National Geoscience Conference 2012
Geological Society of Malaysia
c/o Department of Geology
University of Malaya
50603 Kuala Lumpur, Malaysia
Tel: (603) 7957 7036 Fax: (603) 7956 3900
Email: geologicalsociety@gmail.com

You may also download the pdf registration form from http://geology.um.edu.my/gsmpublic/NGC2012/first_circular.pdf

GSM thanks sponsors of workshop by Dr. Paul Weimer

The Geological Society of Malaysia wishes to thank AAPG, ConocoPhillips, FESM (Formation Evaluation Society of Malaysia), Murphy Oil, and Talisman for their generous financial support for AAPG President Dr. Paul Weimer's visit to Kuala Lumpur. Dr. Weimer presented a workshop entitled "The Petroleum Industry in the Next Century – An Overview of the Science, Technology, and AAPG" at Hotel Singgahasana in Petaling Jaya on 12 September 2011. This highly successful workshop, which was sponsored by the University of Malaya AAPG Student Chapter, was attended by 200 geology students and lecturers from the major Malaysian universities as well as by industry representatives.

Academy of Sciences Malaysia establishes linkages with GSM

The Academy of Sciences Malaysia (ASM) has established a Committee on Linkage with S&T Organisations and Professional Bodies chaired by Council Member Datuk Dr. Soon Ting Kueh. The objectives of the Committee are to establish linkages to advance S&T in the country, promote the interest and welfare of the S&T community, and strengthen the position of ASM as the leader and representative of the S&T Community in Malaysia. The Committee will operate from July 2011 to April 2013 to promote and support mutually beneficial activities particularly in the areas of advancing science, technology and innovation for knowledge generation, sustainable socio-economic development and improved quality of life. The proposed activities encompass collaboration or joint organisation of S&T events including seeking of support or sponsorship for such events from ASM.

About a dozen S&T Organisations and Professional Bodies including the Geological Society of Malaysia have been invited as members of the Committee. Two meetings have been held, the first on 4 October 2011 and the second on 16 February 2012. The President of GSM attended both meetings. The first meeting was spent on presenting background information on the goals and activities of each S&T organisation and discussing the terms of reference of the Committee. It was agreed that ASM and members of the Committee would link their websites and inform each other of their proposed annual activities. The second meeting saw the announcement of an allocation of funds by ASM for proposed collaboration between ASM and S&T organisations. GSM plans to seek funds to support the attendance of postgraduate students to the National Geoscience Conference (NGC 2012) to be held in Kuching, Sarawak.

ASM Forum on Engineering Rubber Products Industry

Engineering Rubber Products Industry is the inaugral session for the Science & Technology & Industry Linkage Round table forum series. This is organised by the Malaysian Academy of Science and the respective industries. The aim is to link industries with the universities, so that research work will be of relevance to the industries and hence carry commercial values.

Malaysia is the world's largest exporter for gloves, condoms and catheters. Seventy percent of the rubber latex is consumed by the gloves-making industry. The Academy of Science study group together with the Malaysian Rubber Board have identified the expansion of the manufacturing and marketing of rubber marine fenders and seismic rubber bearings for bridges and buildings, will tremendously elevate the income from the rubber industry.

The seismic bearings for bridges are rectangular in shape and circular seismic bearings for buildings. Marine fenders are barrel-like in dimension. Doshin Rubber Products (M) Sdn. Bhd. is the supplier for the rubber base isolation system for the Penang Second Bridge. Currently Malaysians periodically experienced tremors from earthquakes. The forum has proposed NGOs like IEM and PIAM to promote public awareness on the importance of having seismic rubber bearings installations in buildings and bridges, and rubber fenders in port facilities. Retrofitting exisiting buildings, bridges and ports should be encouraged. The next forum will be on foundry.

UPCOMING EVENTS

April 23-24, 2012: Petroleum Geoscience Conference & Exhibition 2012 (PGCE2012), Kuala Lumpur, Malaysia. Geological Society of Malaysia, Tel: 603 79577036; Fax: 603 79563900; email: geologicalsociety@gmail.com; www.pgcem.com

April 30-May 4, 2012: Gas Reservoir Management, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

April 30-May 4, 2012: Acidizing Applications in Sandstones and Carbonates, Houston, USA. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

May 7-8, 2012: Geomatics: Geodesy and Cartography, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

May 7-11, 2012: Sandstone Reservoirs, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

May 7-11, 2012: Structural and Stratigraphic Interpretation of Dipmeters and Borehole-Imaging Logs (Intermediate), Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

May 8-10, 2012: Applied Rock Mechanics, London, UK. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

May 12-15. 2012: 5th International UNESCO Conference on Geoparks, Unzen Volcanic Area Global Geopark, Japan. Abstract submission, Registration, Field Excursions, and Hotel information are now on the conference website at: http://www.geoparks2012.com/. For information contact Chika MIURA email: c-miura@unzen-geopark.jp

May 14-18, 2011: 3D Seismic Attributes for Reservoir Characterization, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

May 21-25, 2012: Seismic Rock Physics for Exploration and Production, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

May 21-25, 2012: Integrated Reservoir Modeling, London, UK. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

May 28-30, 2012: 2nd International Conference on Performance-based design in earthquake geotechnical engineering, Conference Center, Taormina, Italy. Associazione Geotecnica Italiana, Viale dell'universita, 11-00185 Roma, Italy; Tel: + 39 064465569 – 0644704349; fax: + 39 0644361035; email: agiroma@iol.it; www.associazionegeotecnica.it

June 2-6, 2012: Advanced Seismic Stratigraphy: A Sequence-Wavelet Analsyis Exploration-Exploitation Workshop, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

June 2-8, 2012: 11th Annual International Symposium on Landslides and the 2nd North American Symposium on Landslides. Banff Springs Hotel, in Banff, Alberta, Canada. The theme of the symposium "Landslides and Engineered Slopes: Protecting Society through Improved Understanding". Organised by The Canadian Geotechnical Society, the Association of Environmental and Engineering Geologists, and the Joint Technical Committee on Landslides and Engineered Slopes. More details on the http//;www.ISL-NASL2012.ca

June 4-8, 2012: Microbial Carbonate Reservoir Characterization, Houston, Texas, USA. American Association of Petroleum Geologists, P.O. Box 979, Tulsa, Ok, USA; email: education@aapg.org

June 4-8, 2012: New Opportunities in Old Fields, London, UK. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

June 11-15, 2012: Naturally Fractured Reservoirs: Geologic and Engineering Analysis, London, UK. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

June 11-15, 2012: Surface Production Operations, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

June 11-22, 2012: Well Design and Engineering, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

June 12-14, 2012: Second International Conference on Integrated Petroleum Engineering and Geosciences (ICIPEG2012), KLCC, Malaysia. www.utp.edu.my/icipeg2012/

June 18-22, 2012: Gas Lift, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

June 18-24, 2012: Deep-water Turbidite Depositional Systems and Reservoirs, Nice, France. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

June 25-29, 2012: Basic Petroleum Engineering Practices, Kuala Lumpur, Malaysia. Tel: 603 21684751;

email: ap-enquiries@petroskills.com; www.petroskills.com

June 25-29, 2012: Introduction to Seismic Stratigraphy: A Basin Scale Regional Exploration Workshop, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

June 25-29, 2012: Offshore Risk Management, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

June 25-29, 2012: Reservoir Characterization: A Multi-Disciplinary Team Approach, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

July 2-4, 2012: Basic Petroleum Economics, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

July 2-6, 2012: Expanded Basic Petroleum Economics, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

July 2-6, 2012: Development Geology, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

July 2-6, 2012: Production Logging, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

July 2-6, 2012: Horizontal and Multilateral Wells: Analysis and Design, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

July 9-13, 2012: Basic Petroleum Geology, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

July 9-13, 2012: Basin Analysis Workshop: An Integrated Approach, Singapore. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

July 9-13, 2012: Compressional and Transpressional Structural Styles, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

July 9-13, 2012: Gas Production Engineering, Kuala Lumpur. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

July 9-13, 2012: International Petroleum Contracts, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

July 30-August 3, 2012: Enhanced Oil Recovery with Gas Injection, Houston, USA. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

August 5-10, 2012: 34th International Geological Congress (IGC) in Brisbane, Australia. The primary IUGS conference that is held every 4 years. See the information above, and visit the Congress website at: http://www.34igc.org/

August 15-17, 2012: The 10th Symposium on Engineering Geology and the Environment. Villa Carlos Paz City, Cordoba Province, Argentina. Organized by: The Asociación Argentina de Geología Aplicada a la Ingeniería (ASAGAI), Argentina National Group of the International Association for Engineering Geology and the Environment (IAEG). Download the flier from: http://www.iaeg.info/index.php?option=com_content&view=article&id=106:10th-symposium-on-engineering-geology-and-the-environment&catid=44:announcements&Itemid=88. Contact email address for enquiries: simposio@asagai.org.ar

September 3-7, 2012: Coring and Core Analysis, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

September 3-7, 2012: Production Technology for Other Disciplines, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

September 3-14, 2012: Production Operations 1, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

September 7-20, 2012: Primary Cementing – Cementing 1, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

September 10-14, 2012: Seismic Interpretation, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

September 10-14, 2012: Cementing Practices – Cementing II, Perth, Australia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

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September 16-19, 2012: AAPG2012 International Conference & Exhibition. Marina Bay Sands Expo and Convention Center, Singapore. http://www.aapg.org/singapore2012/

September 17-19, 2012: Operating Company/Service Company Dynamics: How E & P gets Done, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

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September 17-28, 2012: Drilling Practices, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

September 19-20, 2012: European Base Oils & Lubricants Summit, Europe. ACI's Energy Events, email: jkorfanty@acieu.co.uk

September 19-20, 2012: Smart Grids, Europe. Contact: ACI's Energy Events, email: jkorfanty@acieu.co.uk

September 24-28, 2012: Carbonate Reservoirs, London, UK. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

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September 30-October 4, 2012: Oil and Gas Reserves Evaluation, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

October 1-5, 2012: Petroleum Geochemistry: Tools for Effective Exploration and Development, London, UK. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

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October 1-5, 2012: Basic Drilling Technology, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

October 1-15, 2012: Petroleum Systems: Modeling the Past, Planning the Future, Nice, France. American Association of Petroleum Geologists, P.O. Box 979, Tulsa, Ok, USA; email: education@aapg.org

October 8-12, 2012: Geochemical Techniques for Solving Reservoir Management and Field Development Problems, London, UK. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

October 10-11, 2012: Global Geothermal Energy Summit, Europe. ACI's Energy Events, email: jkorfanty@acieu.co.uk

October 15-19, 2012: Foundations of Petrophysics, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

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October 15-19, 2012: Petroleum Project Management: Principles and Practices, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

October 16, 2012: Sustainability Day, Europe. ACI's Energy Events, email: jkorfanty@acieu.co.uk

October 17-18, 2012: The 2012 Tight & Shale Gas Summit, Europe. ACI's Energy Events, email: jkorfanty@acieu.co.uk

October 22-24, 2012: Capillarity in Rocks, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

October 29-November 2, 2012: Applied Seismic Anisotropy for Fractured Reservoir Characterization, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

October 29-November 2, 2012: Basic Reservoir Engineering (Basic), Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

October 29-November 2, 2012: Well Stimulation: Practical and Applied, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

October 29-November 2, 2012: Performance Analysis, Prediction and Optimization Using NODAL Analysis, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

October 30-November 2, 2012: International Conference on Ground Improvement and Ground Control: Transport Infrastructure Development & Natural Hazards Mitigation, Innovation Campus, University of Wollongong, Australia. ICGI Conference Secretariat, Faculty of Engineering, University of Wollongong, Wollongong. Tel: 02 42215852; Fax: 02 42213238; email: icgi_2012@uow.edu.au

November 5-9, 2012: Formation Damage: Causes, Prevention and Remediation, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

November 6-8, 2012: UNESCO World Heritage Convention 40th Anniversary Celebration. Kyoto, Japan. This final 40th anniversary celebration event will focus on the outcomes of the different workshops and studies undertaken during the celebrations and will reflect on the future of the Convention. For details of the celebration events check the special UNESCO 40th anniversary website at: http://whc.unesco.org/en/40years

November 12-13, 2012: Coalbed Methane, Calgary, Canada. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

November 12-16, 2012: Unconventional Resources Completion and Stimulation, London, UK. Contact: Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

November 19-23, 2012: Operations Geology, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

November 20-21, 2012: International Mine Management 2012 Conference (IMM 2012). Melbourne, Australia. Organised under the management of The Minerals Institute (AusIMM). The call for papers has been issued, deadline for submission 20 February 2011. Conference details on the web at: http://ausimm.com.au/imm2012/

November 26-30, 2012: Evaluating and Developing Shale Resources, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

November 26-30, 2012: Seismic Velocities and Depth Conversion, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

November 26-30, 2012: Carbonate Reservoirs – Petrophysical Characterization, London, UK. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

November 26-December 7, 2012: Applied Reservoir Engineering, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

December 3-5, 2012: Introduction to Petroleum Business, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

December 3-7, 2012: Mapping Subsurface Structures, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

December 4-6, 2012: Overview of Gas Processing, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

December 5-7, 2012: International Petroleum Technology Conference (IPTC), China World Exhibition Hall in Beijing, China. http://iptcnet.org/2012/

December 10-14, 2012: Fundamentals of Casing Design, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

December 10-14, 2012: Reservoir Engineering for Other Disciplines, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

December 10-14, 2012: Streamlines: Applications to Reservoir Simulation, Characterization and Management, Kuala Lumpur, Malaysia. Tel: 603 21684751; email: ap-enquiries@petroskills.com; www.petroskills.com

May 19-22, 2013: AAPG 2013 Annual Convention & Exhibition, Pittsburgh, PA USA. http://www.aapg.org/meetings/

UNESCO PERIODICAL ON SCIENCE GOES DIGITAL

The UNESCO quarterly periodical on science "A World of Science" issued by the UNESCO Sector of Natural Sciences became a purely electronic edition in 2012. The open access journal was disseminated both online and in print for nearly 10 years to a wide readership that included governments, academies of science, scientific unions and universities around the world. UNESCO continues to offer a free e-subscription to the English, French and Spanish editions, with e-subscribers receiving an e-mail alert four times a year. Back issues may be consulted in five languages, including Arabic and Russian. Details at: http://www.unesco.org/new/en/natural-sciences/resources/periodical/

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40 YEARS OF WORLD HERITAGE 1972-2012

In 2012 UNESCO celebrates the 40th anniversary of the World Heritage Convention which was adopted on 16 November 1972. In the 40 years since then 936 sites have been inscribed on the World Heritage List and 188 countries have committed to preserving this heritage for future generations. Visit UNESCO's new 40th anniversary website (http://whc.unesco.org/en/40years) for specific stories of how the World Heritage Convention has made a difference in protecting the world's most valuable cultural and natural sites, and to see the calendar of the anniversary events taking place around the world. The final 40th anniversary celebration event will be hosted by Japan at a 3-day event in Kyoto on 6-8 November 2012, where the outcomes of the different workshops and studies will be presented that will feed the reflection on the future of the Convention.

THE EARTH SCIENCE MATTERS FOUNDATION

The Earth Science Matters Foundation is an outcome of the International Year of Planet Earth (IYPE), proclaimed by the United Nations for 2008 and operational in the period 2007 until mid 2010. The Earth Science Matters Foundation was formed at the request of many of the 80 National and Regional IYPE Committees who have been particularly successful in promoting the contribution made by the Earth sciences to Society during the IYPE Triennium.
Through its subtitle: "Bringing knowledge of the Earth to everyone", the Earth Science Matters Foundation aims to spread such knowledge beyond the professional Earth scientific communities to a wider audience, including politicians, decision-makers, funding organisations, students and to the public at large. This will be realised through publications, events, projects, the media and a variety of other communication tools. National Committees play a crucial role in such outreach campaigns and International Partners provide the institutional and financial basis for the Foundation. The Earth Science Matters Foundation is searching for cooperation with other, well-established, Earth science organisations to realise their ambitions and they invite the geoscientific community join in their activities. For more information visit the Foundation website at: http://www.earthsciencematters.org.

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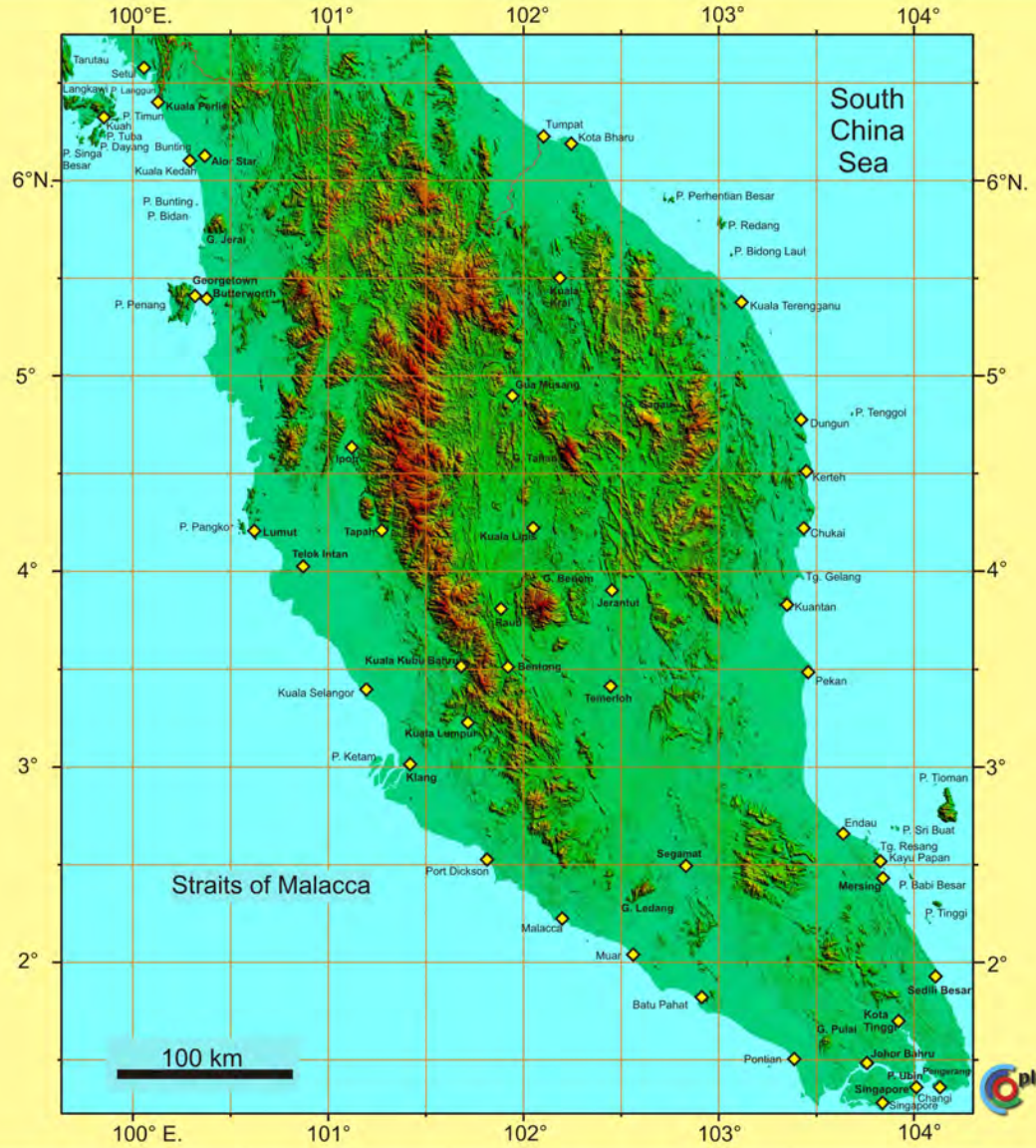
Editors: C. S. Hutchison and D. N. K. Tan



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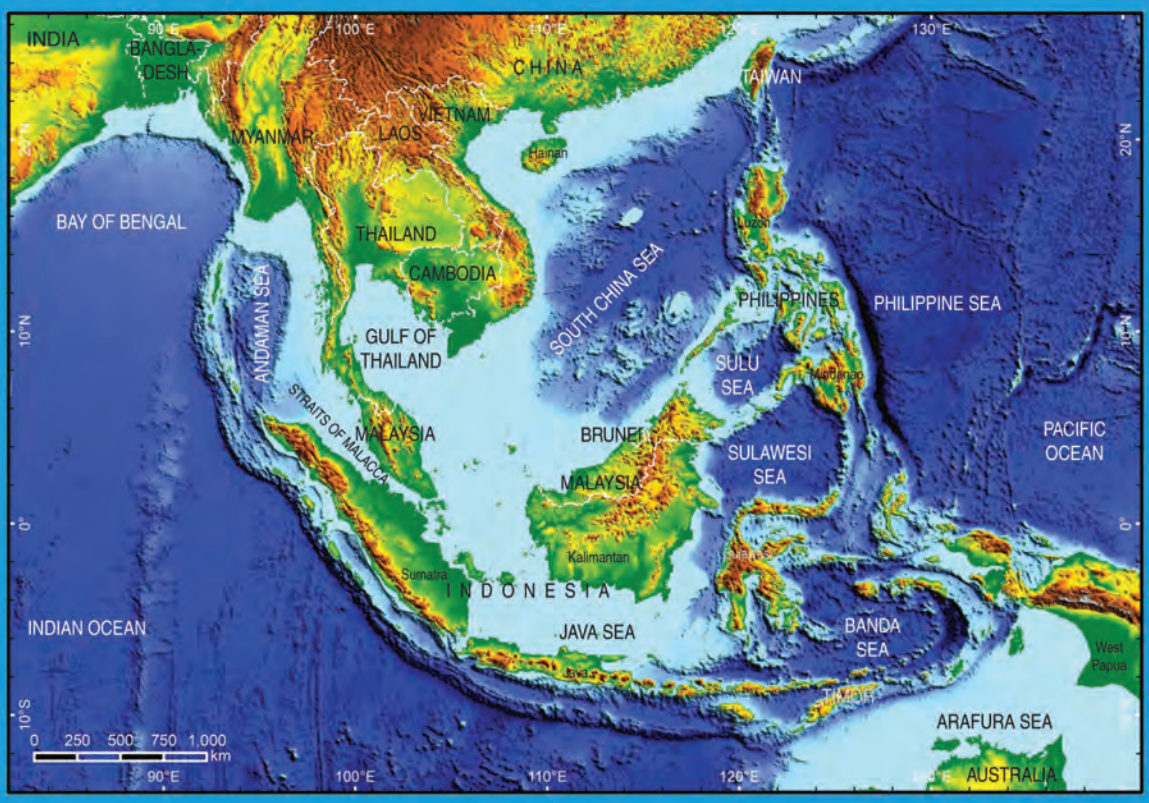

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Hosking, K.F.G., 1973. Primary mineral deposits. In: Gobbett, D.J. and Hutchison, C.S. (Eds.), Geology of the Malay Peninsular (West Malaysia and Singapore). Wiley-Interscience, New York, 335-390.

Article in Malay:

Lim, C.H. & Mohd. Shafeea Leman, 1994. The occurrence of Lambir Formation in Ulu Bok Syncline, North Sarawak. Geol. Soc. Malaysia Bull., 35, 1-5. (in Malay with English abstract)

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