

MARCH
NEWSLETTER
2007

What's On?



E. de C. Clarke
Earth Science
MUSEUM

Sunday, March 25th 2007

"THE SCIENCE BEHIND CLIMATE CHANGE"

A talk by Associate Professor Alex Bevan of the Department of Earth and Planetary Sciences at the Western Australian Museum.

NB I have advertised this as a UWA PUBLIC LECTURE: ANYONE CAN COME

where? In the Woolnough Lecture Theatre, ground floor of Geology Building, enter from Geology Foyer adjacent to the Museum. Remember you can park in UWA Car Park 19 (or in any other red and yellow bays) for free on weekends and after 5pm weekdays.

when? The lecture starts at 12.30pm, but why not come early and bring a picnic lunch to eat in the Tropical Grove. I will be in Geology from 11.30am, and the main door should be open at 12.00 noon. If you need to use the lift so as to avoid the steps to the lecture theatre, ask me.

■ Don't forget that everyone has to contribute towards our insurance, \$2 per head each meeting please.

Need information?

check with me (6488 2681 or jbevan@cyllene.uwa.edu.au) or Mignonne (9341 6746 or 041 895 5979 or sacko@multiline.com.au)

www.earthmuseum.segs.uwa.edu.au

Our last Friends Meeting was the annual **Fun Quiz** with both geological and general knowledge questions. Have a go! Answers at the end. Unfortunately I cannot include the interesting “hands-on” Round 4 (pic. below) samples for you!

ROUND 1 – How’s your general and geological knowledge?

- 1) Which biblical characters are known as ‘the parents of the human race?’
- 2) Where do most scientists agree that modern *Homo sapiens* evolved?
- 3) How many **non**-Victorian teams were in the last four in the 2006 AFL finals series?
- 4) Victoria has many lava flows and cones. When did the last volcano erupt in Victoria?
 - a) 5 million years ago
 - b) 4500 years ago
 - c) 10 000 years ago
- 5) Dying last year at the age of 85 was which famous author, noted for his novel *Storm Boy*?
- 6) The oldest known bird fossil is *Archaeopteryx*. What age is it?
 - a) Cretaceous
 - b) Eocene
 - c) Jurassic
- 7) Was the Aztec empire in: a) Mexico or b) Peru?
- 8) ‘Mexican onyx’ is a banded form of:
 - a) calcite
 - b) quartz
 - c) gypsum
- 9) Nicole Kidman was born in which US state?
 - a) California
 - b) New Hampshire
 - c) Hawai’i
- 10) The volcano Mauna Kea is found in:
 - a) New Zealand
 - b) Hawai’i
 - c) Tonga



ROUND 2 – How's your general and geological knowledge?

- 1) How old was crocodile hunter Steve Irwin when he died?
 - a) 48
 - b) 54
 - c) 44
- 2) Crocodiles didn't evolve until the dinosaurs had become extinct: true or false?
- 3) Was the average rainfall for Australia in 2006
 - a) 18mm higher than normal
 - b) 18mm lower than normal
 - c) the same as normal
- 4) Rainwater dissolves calcium carbonate as it filters through the limestone above and it crystallizes out to form stalactites and stalagmites in caves at Yanchep and elsewhere. Is the rainwater slightly:
 - a) acid?
 - b) alkaline?
- 5) The Governor General, Major General Michael Jeffery, was born in a place named after a rock. What is the placename, and in which State is it?
- 6) Which of the following areas of WA contains the oldest rocks in Australia?
 - a) Yilgarn craton
 - b) Pilbara craton
 - c) Kimberley craton
- 7) Denmark Strait is between Greenland and which country?
 - a) Canada
 - b) Norway
 - c) Iceland
- 8) Is ice a:
 - a) rock
 - b) mineral
 - c) can be classified as both rock and mineral
- 9) Beginning with 'c', what is the term for the human tailbone?
- 10) Which well-known dinosaur had spikes on its tail to defend itself?
 - a) stegosaur
 - b) iguanodon
 - c) triceratops



ROUND 3 – what do you know about Australia?

- 1) Where is the most southerly point in mainland Australia?
- 2) The Waratah is the floral emblem of which state?
- 3) In what year was the city of Darwin founded?
 - a) 1869
 - b) 1874
 - c) 1885
- 4) Tasmania is Australia's largest island. Which is the second largest island?
 - a) Melville Island
 - b) Kangaroo Island
 - c) Barrow Island
- 5) Who was the American architect who designed the city of Canberra?
- 6) What is the name of the stretch of water separating Tasmania from the mainland?
- 7) In what year did Paul Keating replace Hawke as Labor Party leader and Prime Minister?
 - a) 1991
 - b) 1992
 - c) 1993
- 8) In what obvious way is a dingo different from a normal dog?
- 9) The town of Cobar is mainly known for which type of mining?
 - a) molybdenum
 - b) nickel
 - c) copper
- 10) The Bruce Highway runs between:
 - a) Brisbane and Newcastle
 - b) Brisbane and Cairns
 - c) Melbourne and Sydney



ROUND 5 – what do you know about WA’s rocks and minerals?

- 1) List two of the many minerals found in the Londonderry (Coolgardie) pegmatite.
- 2) What is Kalgoorlie famous for? And what is its chemical symbol?
- 3) What is Kambalda famous for? And its chemical symbol?
- 4) What is the Aga Khan Mine, Poona famous for?
- 5) Name the structures, known from the Pilbara as the earliest evidence of life, found at Shark Bay or Lake Clifton?
- 6) Name two different kinds of fossil you might find at Molecap Hill Quarry, Gingin.
- 7) What age would these fossils be?
 - a) Jurassic
 - b) Eocene
 - c) Cretaceous
- 8) What did most of our coastal limestone use to be, before it was consolidated into rock?
 - a) river deposits
 - b) off-shore sediments
 - c) sand dunes
- 9) Which of these iron ores from the Pilbara contains the most iron?
 - a) hematite
 - b) limonite
 - c) magnetite
- 10) In the Argyle diamond mine, what is the main kind of rock that the diamonds are found in?
 - a) kimberlite
 - b) lamproite
 - c) mica phlogopite
 - d) peridotite



ROUND 6 – what do you know about the Solar System?

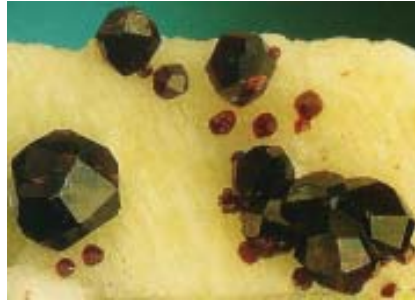
- 1) Which 'planet' recently lost its status as a planet?
- 2) Which was the first planet to be visited by a spacecraft? (in 1962)
- 3) Which was the first country to have an astronaut or cosmonaut in orbit?
- 4) In which year was Neil Armstrong the first man to walk on the moon?
 - a) 1969
 - b) 1972
 - c) 1971
- 5) What is the most common chemical element in the Solar System?
- 6) How far is the moon from the earth?
 - a) 100 000 km
 - b) 800 000 km
 - c) 400 000 km
- 7) How long does it take light to reach the Earth from the Sun?
 - a) 4 minutes
 - b) 8 minutes
 - c) 12 minutes
- 8) Does a comet's tail:
 - a) follow the comet
 - b) point away from the Sun
 - c) point towards the Sun
- 9) What is the heaviest known chemical element in the Solar System?
 - a) platinum
 - b) gold
 - c) osmium
- 10) Approximately how old is the Earth?
 - a) 3.55 billion years
 - b) 12 billion years
 - c) 4.55 billion years



(above) comet pic courtesy George Horsham

ROUND 7 – what do you know about minerals and elements?

- 1) Which is the odd mineral out and why?
 - a) garnet
 - b) galena
 - c) beryl
 - d) magnetite
 - e) fluorite
- 2) Which mineral is the same as common salt?
 - a) halite
 - b) gypsum
 - c) salite
- 3) How many grams does one metric carat of diamonds weigh?
 - a) half a gram
 - b) one quarter of a gram
 - c) one fifth of a gram
- 4) What is the name given to the PINK gem variety of beryl?
- 5) Which is the densest of these minerals?
 - a) jade (jadeite)
 - b) diamond
 - c) quartz
 - d) corundum
- 6) What are the two SOFTEST minerals on the Mohs hardness scale? (any order)
- 7) Which are the two main metals in bronze?
- 8) The isotope Uranium 238 is used for dating rocks. What is its half-life?
 - a) 10 million years
 - b) 10 000 million years
 - c) 4 500 million years
- 9) The chemical symbol for lead is Pb. What are the chemical symbols for:
 - a) sodium
 - b) mercury
- 10) What is Australia's 'national gemstone'?



QUIZ ANSWERS:

Round 1: 1) Adam and Eve; 2) East Africa; 3) four; 4) 4500 years ago; 5) Colin Thiele; 6) Jurassic; 7) Mexico; 8) calcite; 9) Hawai'i; 10) Hawai'i

Round 2: 1) 44; 2) false; 3) 18mm higher than normal; 4) acid; 5) Sandstone, W.A.; 6) Yilgarn Craton; 7) Iceland; 8) can be either rock or mineral; 9) coccyx; 10) stegosaur

Round 3: 1) in Wilsons Promontory N.P.; 2) New South Wales; 3) 1869; 4) Melville Island; 5) Walter Burley Griffin; 6) Bass Strait; 7) 1991; 8) it doesn't bark; 9) copper; 10) Brisbane and Cairns

Round 5: 1) choose from: quartz, feldspars, muscovite, lepidolite, zinnwaldite, petalite, eucryptite, columbite, tantalite, ixiolite, bismuth, bismutite, garnet, apatite - and many others!; 2) gold, symbol Au; 3) nickel, symbol Ni; 4) emeralds; 5) stromatolites; 6) bivalves, sponges, brachiopods, ammonites, sharks teeth, worms, barnacles, crinoids, sea urchins, corals, dinosaur and other reptile bones, etc.; 7) Cretaceous; 8) sand dunes; 9) magnetite; 10) lamproite

Round 6: 1) Pluto; 2) Venus; 3) USSR; 4) 1969; 5) hydrogen; 6) 400 000 km; 7) 8 minutes; 8) point away from the Sun; 9) osmium, with an S.G. of 22.59; 10) 4.55 billion years

Round 7: 1) beryl - all the rest are cubic crystal system; 2) halite; 3) one fifth of a gram; 4) morganite; 5) corundum; 6) talc, gypsum; 7) copper, tin; 8) 4 500 million years; 9) Na, Hg; 10) opal

Some alternate answers may be possible, especially when choosing from a list, but these are OK to the best of my knowledge. Thanks to Mignonne and Allan Hart for suggesting some of the questions. Allan Wynne won the day with 56 out of a possible 70.



Quizmaster Jenny keeps George and Mignonne on their toes



Banded Iron Formation: rock layers produced when the oceans 'rusted'.

What are BIF's?

The beautiful and spectacular banded iron formations of the Hamersley Ranges and Karijini Gorges are sedimentary rocks composed of layers of silica (red, white) and iron oxide (black) that originally formed as mud on the sea floor more than 2,400 million years ago.



Although we think of them as "our" special rocks, they occur in many other places world-wide, and there are other types which formed outside of the main

depositional setting and timespan. So, you can see BIFs similar to ours in South Africa, in Brazil and in India. BIFs are also found in the USA, Russia and Canada.

Most formed between 2.8 and 2.0 billion years ago, although there are some between 0.8 and 0.6 billion years old. These younger ones formed under different conditions from the main deposits, which are thought to have formed as follows:



The first atmosphere

The Earth's early atmosphere was largely made of the gases emitted by volcanoes and contained no oxygen. Carbon dioxide and methane were important greenhouse gases, helping to keep the Earth warm while the Sun was weaker than it is today. More than 2,700 million years ago, Earth was mainly inhabited by anaerobic organisms

(archaea bacteria) that cannot tolerate oxygen-rich environments.

The rusting of the oceans

The oxygen in our atmosphere is produced by photosynthesis. When oxygen-producing photosynthetic bacteria first evolved more than 2,700 million years ago, the oxygen they produced reacted with volcanic gases and other chemical com-

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pounds that react with oxygen, known as "oxygen sinks", and the atmosphere remained oxygen-poor. The Hamersley banded iron formations are important rocks because they record the change from an oxygen-poor to oxygen-rich atmosphere.



Iron is soluble in sea water that contains no oxygen. The Hamersley BIFs formed between 2,500 and 2,450 million years ago when iron produced by huge submarine volcanoes came into contact with oxygen produced by photosynthetic bacteria, and was precipitated as iron oxide (hematite, "rust") in sea floor mud.

Once this period of intense volcanism finished and the BIF and other oxygen "sinks" (chemicals that react with oxygen) were filled, the oxygen content of the atmosphere was able to rise. This probably killed off many groups of anaerobic organisms but allowed the evolution of more complex organisms that eventually included animals such as human beings. Development of an oxygen-rich atmosphere was probably Earth's most important environmental change.

Iron ores

About 2,000 million years ago the Pilbara and many of the other very old pieces of continental crust were probably joined together in a supercontinent. When this supercontinent started to break up, waters heated up by volcanic activity dissolved silica from BIF in the Hamersley and other continents (South Africa, Brazil, Russia) leaving huge iron ore deposits of almost pure hematite (more than 65% iron). Folding, and replacement of some minerals by others (to produce 'tiger-eye' for example) also occurred. Western Australia exports close to 200 million tons of iron ore each year, which is one of the State's most important sources of income; more than \$6billion in 2004.



What else is on?

PERTH SUN FAIR: April 1st, 9.00am-5.00pm

The Perth Sun Fair is the premier sustainability event for Western Australia. This is the 4th year for the Fair. Last year some 8,000 people came to the Fair and 60 organisations presented their ideas in stalls. A seminar series including dozens of seminars on all areas of sustainability are presented in 3 parallel marquees run throughout the day. There is music, food, childrens activities and roving theatre all day. At the Fair you can learn about most areas of sustainable living, from solar power, wind power, grey water recycling to organic foods, cosmetics and hybrid cars, biodiesel and more. **Seminars and entertainment are free.**

FREE PUBLIC LECTURE: 9th May, 6pm-7pm, in the Octagon Theatre, UWA
“Our Drying Climate: Sustainability in Water Stressed Environments in Israel and its Neighbors” a lecture by Shimon Tal

Israel and its neighbors are located at the edge of the desert and suffer from a very severe scarcity of water. The countries in this region share mutual watersheds and aquifers. Mismanagement of water sectors in many countries is the main factor for water scarcity around the world. Sustainable approach will allow us to promote the achievement of the MDG's and to enable people an easy access to safe water and an adequate sanitation.

This is a free event with all welcome. Register your interest to Felicity by Tuesday 1 May to felicity@impcom.com.au or 9227 0956. See UWA website www.uwa.edu.au

*******New Geoscience Portal released!*******

The Chief Government Geologists Committee announces a **new look Geoscience Portal: <http://www.geoscience.gov.au>.**

The Geoscience Portal gives people and companies interested in exploring for minerals in Australia a single point of access to geological and geophysical data and information about legal requirements for exploration in all Australian jurisdictions. It provides:

- Links to all Commonwealth, State and Territory geological surveys
- A download facility for all Australia's geological maps at 1:250,000 scale
- Airborne geophysical data and digital elevation data downloads from all State and Territory Geological Surveys and Geoscience Australia
- All mining legislation and reporting guidelines
- The Australian mines atlas
- Current minerals tenements.

The new portal is a valuable resource to promote the exploration and discovery of minerals in Australia. Check it out!

☛ Check out the NEW (downloadable) **Kalbarri Field Trip Guide** on the W A Geological Survey site; www.doir.wa.gov.au/gswa/onlinepublications

www.earthmuseum.segs.uwa.edu.au

MUSEUM ROSTER:

Allan Hart organises the Roster:

Allan's Phone Number: 040 161 2505
Allan's Email Address: allan.hart.perth@hotmail.com

****** Roster to end March ******

Feb 4	Allan H
Feb 11	Stella H
Feb 18	Michael D
Feb 25	Rachel B
Mar 4	Bill F
Mar 11	Pauline M & Margot W
Mar 18	Dawn S
Mar 25	Allan W

Help! we need to get people for the next few months, so if you can, please help by contacting Allan and offering to do a Sunday duty soon. Remember you can also contact me (6488 2681) Mignonne (9341 6746 or 041 895 5979) if you have any queries
Thanks so much, all of you, who have helped by being on the roster! Even if you don't get many visitors, it is important to be open when we promise we will be open, and who knows, your visitor may spread the word to others (and even be the reason why a student does Earth Science at U.W.A.!). Any problems, let Allan, Mignonne or myself know..

NB.If you are unable to be a "Friend" by doing a roster, the alternative is to give a donation towards newsletter expenses etc.: \$20 is suggested. Don't forget your contribution for 2007!! **NB**Please make cheques payable to: "UWA" (must be UWA, otherwise we cannot pay it in).

IMPORTANT!!!!!! For People on Museum duty!!!!!!!!!!!!!!

1) **SECURITY HAVE MOVED TO OFFICES ACROSS THE HIGHWAY but are still contactable on the same number: **6488 3020**. Check with them by 'phone

2) Sometimes people want to use the toilets or go through to see people in the building. Get them to use other toilets on the campus, like in the Art Gallery, or if they are desperate and there are two of you on duty, one of you can escort them to the toilets and back. If it is to see their friend, they can use the 'phone at the desk to contact the person in the building, **who needs to then come down and COLLECT THEM. Normally no-one is allowed through into the Department, and there is a notice up to that effect on the door. Any problems, lift the 'phone and press the red dial button to call Security.**