



SPECIAL INTEREST ARTICLES:

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THE SOUTH AUSTRALIAN BRAIN BANK

SCIENCE ALIVE 2011

The SA Brain Bank was once more involved with Science Alive this year, joining the South Australian Neuroscience Institute (SANI) to help promote work being done by neuroscientists in this state. Science Alive is held annually as part of National Science Week, with activities including science shows, native animal shows, magic shows, robot exhibitions, circus workshops and interactive science booths.

The theme for the SANI booth this year was 'Biological Rhythms' with many of the activities, puzzles and displays illustrating aspects of this area of science.



Dr Carola Meyer, a visiting scientist from Marburg University in Germany, was on hand to talk about her work on hibernation and torpor in Djungarian hamsters, marmots and fat-tailed lemurs.

Dr Susan Hillier and **Dr Michelle McDonnell** from UniSA conducted cognitive tests and helped with the other activities.



Several neuroscientists and neuroscience students from Flinders University volunteered their time to assist with questions and activities.

Dr Nick Spencer presented a gut motility demonstration on how the nervous system is involved in the passage of food through the digestive system. **Simona Carbone** and **Yvette DeGraaf** ran an activity showing how blood flow changes in response to exercise. **Dr Nicole Thomas**, **Mel Kyloh**, **Dr Tiong Cheng Sia**, **Pam Simpson** and **Dr Mazher Mohammed** helped with many activities including an interactive illuminated brain (switches lighting up different brain areas); brain anatomy models (always popular); optical illusions; and other puzzles.

Dr Kingsley Whittenbury from Adelaide University and **Robyn Flook** from Flinders University were kept busy at the High School Career's Day answering questions about study and careers in medicine and neuroscience research.



SA BRAIN BANK FACTS & FIGURES

The year that was 2011

The SA Neurological Tumour Bank (currently managed by the SA Brain Bank) collected its first specimen for brain tumour research. The next step is to obtain funding to get staff to maintain and manage this very important facility.

Palliative Care In-House Presentation, Ms Robyn Flook, "Role of the South Australian Brain Bank", Repatriation General Hospital. 19th September 2011.

Publicity

FMC Investigator Article: "Researchers banking on new brain tumour resource", Autumn/Winter 2011.

Statistics

Brain donations: 16
Spinal cord donations: 4
New donor registrations: 43
Tissue requests: 6
Total tissue cases available: 264
Total donor consents registered: 314



Yawning

Yawning appears to follow a daily cycle, occurring most often soon after waking and just before going to bed. It is not yet understood why we yawn. Scientists speculate that when we are tired or bored our breathing is more shallow and slower, reducing the oxygen levels in the body. Yawning involves deep inhalation of air, expanding the lungs, followed by slow exhalation, regulating carbon dioxide and oxygen levels in the body. Its function appears to be to bring us to full alertness or to 'wake us up' in situations that require it.

Yawning is quite "contagious"- one person's yawn can trigger another nearby to yawn. Even just thinking about yawning or reading about yawning can make humans yawn. Did you just yawn while reading this? Whatever the reason, if yawning helps you think clearly, then yawn away!



Animals and Biorhythms

The **Atlantic fireworm** displays an infradian reproductive cycle, occurring once during each lunar moon. The female comes to the surface of the ocean and sheds eggs while giving off a bright phosphorescent glow. This attracts the male fireworms, which emit flashing lights at the same time and fertilize the eggs. There is some speculation that the bright light Christopher Columbus described on the night of 11th October 1492 may have been the glow of the fireworm because the date would fit with when the worms would have been mating.



As the seasons change, the **Arctic fox** changes the colour of its coat. In the spring and summer, it has a dark coat to match the environment. In autumn and winter, it sheds its brown coat for a white one to match the surrounding snow.

Emus breed in May and June, nesting during the coldest part of the year. The animals put on weight just before the breeding season. The male does most of the incubation, losing a third of his weight as he does not eat or drink during the eight-week incubation, surviving only on stored body-fat and morning dew that he can reach from the nest.



Snake Eyes

Snakes, lizards, frogs and some species of fish have a parietal eye, sometimes referred to as the third eye. It is usually associated with the pineal gland and is involved in maintenance of circadian rhythmicity and body temperature regulation. The unseeing third eye is located beneath the skin on the top of the skull. Most have photoreceptors with a well-defined retina, lens and cornea capable of distinguishing between light and dark.



Hibernator Trivia

The **mountain pygmy possum** is the only marsupial known to hibernate or become inactive in cold months.

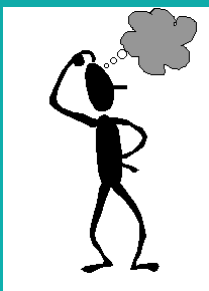
The **ladybird** hibernates over winter then comes out to feed and find a mate in spring. There are nearly 300 species of ladybird in Australia.

The **echidna** enters deep winter hibernation, with its body temperature dropping from the normal 30-32°C to as low as 4-5°C. Its heart rate falls and it may breath as infrequently as once every three minutes.



Aestivation

Australian **water-holding frogs** have an aestivation cycle. This allows them to live in the desert, burrowing into the soil to protect them from the heat and to avoid dehydration. The frogs spend most of the year underground and are usually only seen or heard after heavy rain.



BIOLOGICAL RHYTHMS

Biological rhythms are biological events that occur with a cyclic pattern. They are major determinants of physiological or behavioural changes. The term biological clock is sometimes used when referring to biological rhythms. A biological clock is any sort of internal timing mechanism that governs an organisms biological rhythms, or periods of activity and inactivity.

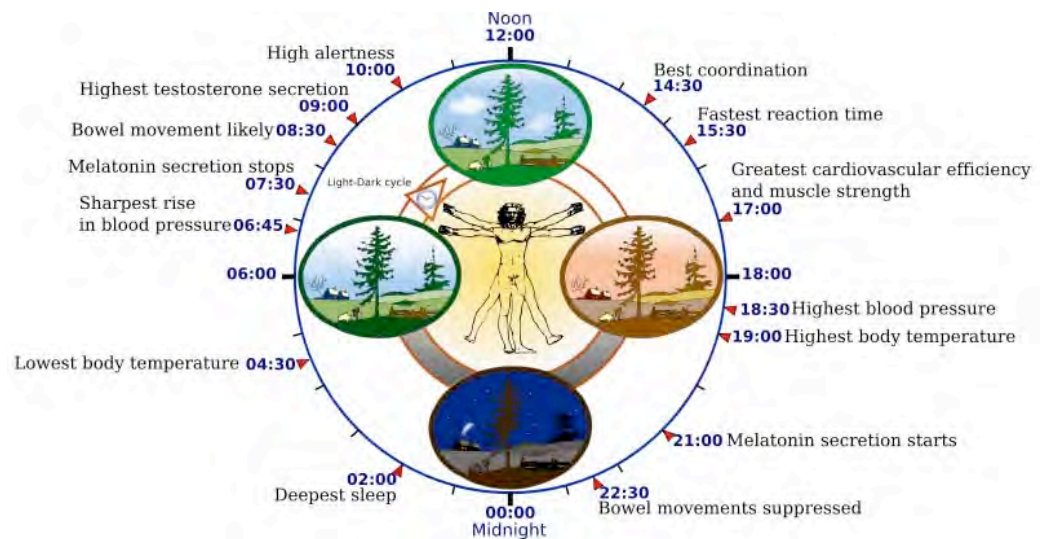
Homeostasis establishes stability, but some bodily processes undergo rhythmic change. Biological rhythms occur with a range of frequencies. Perhaps the most well known of these are the daily or **circadian rhythms** that fluctuate on a roughly 24-hour timetable, such as the opening and closing of flowers and the sleep-wake cycle in humans. Other biological rhythms occur tidally, monthly, seasonally or annually. Some rhythms, like the beating of our heart, occur much more frequently.

While internal biological clocks operate independently of the environment, they may also be affected by changes in the environment, such as daylight,

temperature and food availability. Organisms, from bacteria and fungi to plants and animals, have biological rhythms. Variations in timing and duration of physiological and behavioural activities, such as eating, sleeping, hibernating, reproducing, flowering and migration occur in cyclic patterns.

The brain plays an integral role in maintaining internal rhythms. An area in the hypothalamus of the brain, the suprachiasmatic nucleus (SCN), is thought to play a major role in coordinating several key rhythms. The brainstem is also involved in the control of biological rhythms. Physiological rhythms are also present in the activity of individual organs, such as the beating of the heart muscle and the electrical waves of the brain.

Disruptions to biological rhythms can lead to a variety of different health problems. Difficulties may arise when sleep-wake patterns are disrupted by busy life schedules, underlying medical conditions or medications.



http://en.wikipedia.org/wiki/File:Biological_clock_human.svg

JET LAG



Travellers sometimes experience 'jet lag', a drowsy, uncomfortable feeling caused by disruption of normal sleeping patterns due to long-distance plane travel. When we travel across several time zones, our body's biological clock continues to run for a while on the old time zone. Our body may tell us to sleep while other cues tell us to stay awake. Thus you have trouble falling asleep at

night or staying awake during the day. Disruption to biological rhythms usually has a negative effect. Jet lag is associated with symptoms of fatigue, gastric upset, headaches, irritability and insomnia. To help minimise the effects, it is important to compensate for sleep deprivation by having a good sleep schedule prior to travelling. Modification to eating habits can also be helpful.

READER'S CORNER

The Dash

*I read of a man who stood to speak
at the funeral of a friend.
He referred to the dates on her tombstone,
From the beginning...to the end.*

*He noted that first came her date of birth
And spoke the following date with tears,
But he said what mattered most of all
Was the dash between those years.*

*For that dash represents all the time
That she spent alive on earth...
And now only those who loved her,
Know what that little line is worth.*

*For it matters not, how much we own;
The cars...the house...the cash,
What matters is how we live and love
And how we spend our dash.*

*So think about this long and hard...
Are there things you'd like to change?
For you never know how much time is left,
That can still be rearranged.*

*If we could just slow down enough
To consider what's true and real,
And always try to understand
The way other people feel*

*And be less quick to anger,
And show appreciation more
And love the people in our lives
Like we've never loved before.*

*If we treat each other with respect,
And more often wear a smile..
Remembering that this special dash
Might only last a little while.*

*So, when your eulogy's being read
With your life's actions to rehash...
Would you be proud of the things they say
About how you spent your dash?*

Author: Linda Ellis



SERENDIPITY

**Archimedes of Syracuse,
Mathematician, Physicist, Engineer,
Inventor and Astronomer (c.287 BC –
c.212 BC)**

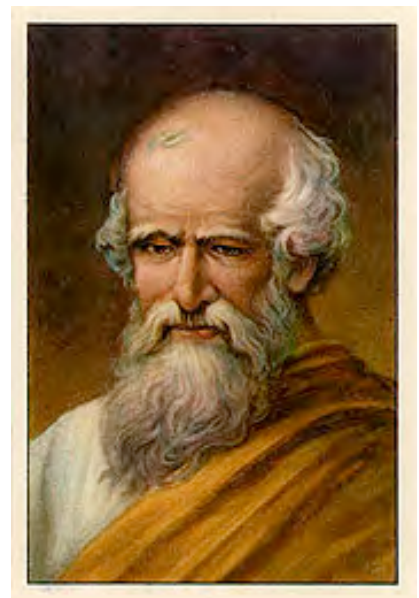
Archimedes is regarded as one of the greatest mathematicians of all time. The son of an astronomer, he was born in Syracuse, an independent Greek state in ancient times. Archimedes had a fascination for solving problems and made major contributions to mathematics and science.

Archimedes spent much of his time solving problems for King Hiero II of Syracuse, to whom he was related. One of his most well known discoveries was his method for determining the volume of an object with an irregular shape.

King Hiero had commissioned a goldsmith to create a votive crown for his temple and had provided him with pure gold for it. He was worried however that the goldsmith was replacing some of the gold with a cheaper metal. He asked Archimedes to determine if the crown was made of pure gold or if it contained a combination of metals. Archimedes had to solve the problem without damaging the crown so he could not melt it down to calculate its density. While taking a bath, he noticed that the level of water in the tub rose as he got

in, and he realised he could use this effect to determine the volume of the crown and from this he could calculate its density. It is reported that Archimedes jumped out of the tub with excitement and took to the streets naked, crying "Eureka, Eureka" (Greek for "I have found it").

As a result of this serendipitous observation, Archimedes developed the "Principle of Buoyancy" that determines the volume of an object of irregular shape. He used this principle to deduce that the crown was not made of pure gold.



Notable Quote ...

"There are only two mistakes one can make along the road to truth; not going all the way, and not starting."

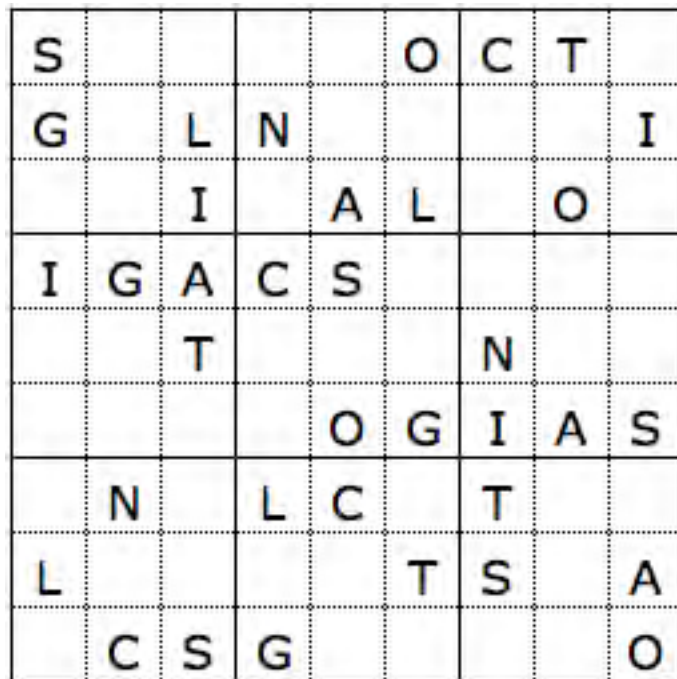
Buddah

WHAT'S NEWS?

Sorry this newsletter is a bit late. Hopefully you all had an enjoyable Christmas and we wish you all the best for a happy 2012.



PUZZLE TIME!



Brain Sudoku

The principles of sudoku remain the same, but instead of numbers from 1-9, this grid needs to be completed using the letters of the word "NOSTALGIC". Each letter is used just once in each nine square grid and just once in each line – horizontal or vertical. The solution is on the back page. Good luck.

Notable Quote ...

"We ourselves feel that what we are doing is just a drop in the ocean. But the ocean would be less because of that missing drop"

Mother Teresa

Linnaeus' Floral Clock

In 1751 Swedish botanist **Carolus Linnaeus** designed a circular floral clock using certain species of flowering plants that opened or closed at different times of the day. In his book 'Philosophia Botanica' he proposed that it should be possible to plant a garden floral clock, in a circle, with the rhythmic opening and closing of flowers used as the effective hands of the clock.



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<http://www.flinders.edu.au/neuroscience/SABrainBank.htm>

FOR MORE INFORMATION
ON THE AUSTRALIAN
BRAIN BANK NETWORK,
VISIT THIS WEBSITE:

<http://www.nnf.com.au/abbn>

Your donation helps!

Tax-deductible donations can be made directly to the Flinders University - SA Brain Bank or via the FMC Foundation (**please make sure you specify that you would like your donation to go to the SA Brain Bank**). This will enable us to continue our support of research into diseases of the nervous system. Receipts for donations will be posted to you, so please include your details with any donation. Cheques should be made payable to **Flinders University – SA Brain Bank**. Contact the SA Brain Bank Coordinator, Flinders University, Human Physiology, FMC, Bedford Park SA 5042 (T: 8204 4107 or M: 0431 500 880) for more information.

Have your details changed?

If you have changed your address please let us know so we can update our records. **Contact:** SA Brain Bank Coordinator, Flinders University, Human Physiology, FMC, Bedford Park SA 5042 (or email: robyn.flook@flinders.edu.au).

Please let us know if you would like to add or remove your name from our newsletter mailing list or if you would prefer to receive it by email.

Sudoku Solution

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



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