

SciTalk

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Number 2– October 2017

Can anti-aging treatments save us from the looming threat of a nuclear WW3??

The life expectancy for Australians is around the mid 80s. While this easily outstrips our pet dogs and cats, and is much longer than the average insect, many humans feel it is not long enough. Even more so, many humans in their senior years start to feel like a young person trapped in an aged body, as cellular damage accumulates. The good news is that scientists are busily investigating this problem.

One such study has focused on telomeres. Each chromosome has a protective structure at its end called a telomere. However, each time chromosomes replicate for cell division, the telomeres become shorter. Once the telomeres are too short, the cell can no longer reproduce. Telomerase is an enzyme naturally produced in the body, which reduces telomere shortening. Several anti-aging studies have focused on stimulating increased telomerase production to reduce the effects of aging. One such study used

a synthetic male steroid hormone called danazol, which is known to promote production of telomerase.

However, before you are tempted to buy telomerase supplements from eBay, it is important to note a few caveats to the research. Excessive telomerase is a key marker of cancer cells. In fact, telomerase contributes to the ability of cancer cells to rapidly reproduce over and over. Furthermore, studies with drugs such as danazol have only been applied to patients in small trials focused on specific conditions, such as aplastic anaemia (which is a disease involving premature aging of bone marrow stem cells). While small trials with such patients have shown signs of success, they have also had significant associated side effects. So unless your doctor has suggested otherwise, telomerase supplements should definitely be placed in the 'don't try this at home' category for now.

Another focus of anti-aging studies is NAD⁺ (nicotinamide adenine dinucleotide). Studies have shown for some time that injecting older mice with NAD⁺ makes them appear younger. But how does it work?

Recent studies examining the biomolecular pathways of NAD⁺ have suggested that NAD⁺ can help protect DNA from damage



Figure 1 Strands of DNA

[Credit: pixabay.com CC0]

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★ 2017 editions Past HSC Questions & Worked Solutions ... see p5 ★

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★★ ATTENTION ★★

After you have read this, please write/tick your name below and pass it on.

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- 2.
- 3.
- 4.
- 5.

Please return to file or noticeboard.

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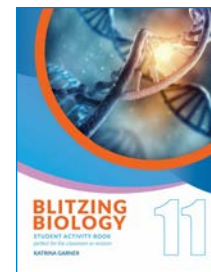
See pages 1, 6 and 8
Post in your entries now
(or send your details by email, if you prefer!)

Past issues of *SciTalk* are available at
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Book Giveaway

WIN a copy of ...

Blitzing Biology 11



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... published by
Blitzing Publications

Blitzing Biology is a student activity book. It is perfect for use in the classroom, or for individual revision.

Written by Katrina Garner, *Blitzing Biology* is designed to explore the content of the NSW Biology syllabus through a wide variety of student-focused activities. It includes theory-based activities, as well as stimulating hands-on activities and investigations. For more details, go to: www.blitzingbiology.com.au

TO WIN: Send your name, school & school address by **15 December 2017** to:
Book Giveaway, PO Box 442, Freshwater 2096
OR email to cathie@odlumgarner.com.au

★★★

Winner for *SciTalk 1/17*

Jeanette Armstrong, Lisarow HS, won *Physics Past HSC Papers & Worked Solutions 2011-2016* (rrp \$27.95), published by Odium & Garner.

Diary Dates

2017 is the UN International Year of Sustainable Tourism for Development

OCTOBER 2017

23, 27, 30 Beyond the Thrills at Luna Park Sydney. www.beyondthethrills.com.au ph (02) 9939 6107

NOVEMBER 2017

3, 6, 17 Beyond the Thrills at Luna Park Sydney. www.beyondthethrills.com.au ph (02) 9939 6107

20, 24, 27 Beyond the Thrills at Luna Park Sydney. www.beyondthethrills.com.au ph (02) 9939 6107

DECEMBER 2017

1–15 Beyond the Thrills at Luna Park Sydney. www.beyondthethrills.com.au ph (02) 9939 6107

8 ANSTO Teacher PD Day: about teaching nuclear science to Yr 9 & Physics

11–15 Curious Minds Program – for Yr 9/10 girls interested in STEM. www.asi.edu.au/programs

22 Summer solstice (03:27 am AEDT)

2018

For Shell Questacon Science Circus: NSW dates, go to: questacon.edu.au/outreach/programs/science-circus

JANUARY 2018 National Youth Science Forum. Forms to local Rotary club by 31/5/17, interviews from

July. Only for Yr 11 in 2017. Enquiries: 6125 2777, email: nsss@anu.au, www.nysf.edu.au/

5-21 2018 Australian Science Olympiads Summer School. www.asi.edu.au/programs

7-12 2018 STEM X Academy – at ANU, Canberra (asta.edu.au/programs/stemx)

MARCH 2018

2 Schools' Clean Up Australia Day. cleanupaustraliaday.org.au/about/about-the-event/

4 Clean Up Australia Day. cleanupaustraliaday.org.au/about/about-the-event/

16, 19, 23 Beyond the Thrills at Luna Park Sydney. www.beyondthethrills.com.au ph (02) 9939 6107

21 Autumn Equinox (03:15 am AEDT)

all Tm 2 NSW Crystal Growing Competition - start growing crystals are to be grown in Term 2

APRIL 2018

9, 13 Beyond the Thrills at Luna Park Sydney. www.beyondthethrills.com.au ph (02) 9939 6107

22 International Earth Day. www.earthday.org

MAY 2018

7,11,18, 21, 28 Beyond the Thrills at Luna Park Sydney. www.beyondthethrills.com.au ph (02) 9939 6107

b/w 9–16 Big Science Competition. Closing date: 2/5/18. www.asi.edu.au/programs Ph: 6125 6228

tba Astronomy Open Night: Macquarie Uni, 6:30–10 pm, details/tickets at www.mq.edu.au/

JUNE 2018

1, 4, 8, 15, 18 Beyond the Thrills at Luna Park Sydney. www.beyondthethrills.com.au ph (02) 9939 6107

5 World Environment Day. www.un.org/en/events/environmentday/

around 16 (tbc) NSW Schools Titration Competition. Entries close in May. raci.org.au/branches/nsw-branch

21 Winter Solstice (08:07 pm AEST)

30 (tbc) Close date Crystal Growing Competition (grow in Tm 2): raci.org.au/branches/nsw-branch

JULY 2018

8–11 CONASTA 67 – annual conference of Australian Science Teachers Association (ASTA).

Theme: *Spotlight on Our Future*. Venue: Sydney University.

11–14 Curious Minds Program – for Yr 9/10 girls interested in STEM. www.asi.edu.au/programs

31 (tbc) ANCQ (Australian National Chemistry Quiz). schools.raci.org.au/competition/ancq/

AUGUST 2018

8 Chemistry Olympiad Exam. Closing date: 18/7/18. Ph: 6201 2552, asi.edu.au/programs

10 Earth Science Olympiad Exam. Closing date: 18/7/18. Ph: 6201 2552, asi.edu.au/programs

3 Jeans for Genes Day. www.jeansforgenes.org.au/

13 Biology Olympiad Exam. Closing date: 18/7/18. Ph: 6201 2552, asi.edu.au/programs

15 Physics Olympiad Exam. Closing date: 18/7/18. Ph: 6201 2552, asi.edu.au/programs

10, 13, 17 Beyond the Thrills at Luna Park Sydney. www.beyondthethrills.com.au ph (02) 9939 6107

– come on any of these dates to celebrate National Science Week

11–19 National Science Week. 'Game Changers & Change Makers'. www.scienceweek.net.au/schools/

SEPTEMBER 2018

4–10 Seaweek 2018. www.aace.org.au/seaweek/ & www.aace.org.au/seaweek-resources/

10, 14 Beyond the Thrills at Luna Park Sydney. www.beyondthethrills.com.au ph (02) 9939 6107

tba National Schools Titration Competition. raci.org.au/branches/nsw-branch

23 Spring equinox (11:54 am AEST)

OCTOBER- DECEMBER 2018

Beyond the Thrills at Luna Park Sydney. For dates please go to: www.beyondthethrills.com.au

While all dates have been checked to ensure that information in DIARY DATES is correct, no responsibility will be accepted by the publisher or Editor for any omissions or inaccuracies in it.

Update on NESA matters

All teachers must regularly check NESA's website at: educationstandards.nsw.edu.au to ensure they have the latest information on syllabuses, past exam papers, news, official notices, statistics archive and more.

You need to be aware that syllabuses must be constantly checked now, as clarifications and amendments can occur at any time – to ensure that you are teaching the correct work. Make sure that from the 2018 Year 11 you are teaching the new Stage 6 syllabuses. These will be examined for the first time in the 2019 HSC.

NESA has just released the HSC exam specifications to align with the new syllabus content and directions. These specifications are available now on the NESA website.

Some NESA official notices from 2017 that Science teachers need to be aware of:

- *Errata - new Biology & Physics Syllabuses for implementation with Year 11 from 2018* [8-9-17]
 - *Clarification - New Physics Stage 6 Syllabus for implementation with Year 11, 2018* [25-8-17]
 - *Changes to Stage 6 Science Pattern and Pathways of Study* [21-6-17]
- For the 2019 HSC examination students can study up to 7 units of Science in Year 12 - this is to allow for the study of Science Extension in Year 12.
- *Clarifications and errata - new Biology, Chemistry and Physics Stage 6 Syllabuses for implementation with Year 11, 2018* [30-3-16]

... plus these earlier ones:

- *Minor edit for HSC Physics Data Sheet* [10-2-17]
- *Student work samples to be retained for Stage 5 and Preliminary courses* [27-2-17]
- *New Periodic Table for HSC* [19-5-16]

You can be sent weekly emails by NESA to keep you abreast of NESA matters.

NESA enquiries:

Ph: 9367 8111, fax: 9367 8484
educationstandards.nsw.edu.au

Science contact: Kerry Sheehan
Senior Inspector and Inspector Science
kerry.sheehan@nesa.nsw.edu.au
Ph: (02) 9367 8144

NOTE: When you purchase the Odlum & Garner Past HSC Questions & Worked Solutions books for Biology, Chemistry and Physics, you are helping to support the production of the Past HSC books for Earth & Environmental Science and Senior Science.

* * * * *

Thank you to all the teachers who support these projects.

Depth studies? No worries!

With the new Stage 6 Science syllabuses entering our classrooms in 2018, many teachers are feeling stressed about depth studies. While there is no singular approach to fulfilling the syllabus depth study requirements – there are certainly several ways that should feel like familiar territory and reduce your stress as you program for next year.

One of your assessments for each Year 11 Science course in 2018 will be a depth study. The depth study has to relate to at least one aspect of the course content (one Knowledge and Understanding outcome). But let's be

honest – have you ever given your students an assessment that didn't relate to at least one content outcome!? This should be a fairly easy box to tick.

The depth study also needs to include a range of skills (from the Working Scientifically outcomes). It is compulsory for depth studies to involve outcomes for *Communicating*. This should occur quite naturally, as long as your depth study involves students sharing their



work in a written, verbal or digital media format.

The depth study must also fulfill the outcomes for *Questioning and Predicting*. This is suggestive of choosing to either do a practical investigation (which should naturally involve a research question and hypothesis) or a research task – which should involve research question(s). If you are doing a research task, ensure students are given an opportunity to predict the solutions and hypothesise regarding their research questions before diving straight into secondary sources.

On top of this, your depth study needs to include two more skills of your choice from the Working Scientifically outcomes. If you are doing a practical investigation, it should be quite straightforward to fulfill the skills outcomes for *Planning Investigations* and *Conducting Investigations*. If you are doing a research task, this will be a good match for addressing the skills outcomes for *Analysing Data and Information* and *Processing Data and Information*.

The depth studies leave plenty of room for freedom. You may choose to give students

Continued from page 1 ...



associated with aging. Cells have natural mechanisms to repair DNA from damage. However, as we age, our DNA repair mechanisms diminish.

In particular, a DNA repair compound called PARP1 has been shown to decline, resulting in increased levels of DNA damage accumulating. NAD⁺ has been shown to directly influence the functionality of PARP1. High levels of NAD⁺ stimulate PARP1 to function correctly, repairing DNA, while low levels of NAD⁺ are

linked to decline in PARP1 functionality.

So when can we get our booster shot of NAD⁺?

Trials focused on NAD⁺ in mice have shown success to date. Mice have been

given a precursor to NAD⁺, known as NMN (nicotinamide mononucleotide). These mice showed subsequent repair of DNA damage, effectively reversing some of the effects of aging. Currently, trials are being planned to explore the effectiveness of giving humans NMN. Should such trials be successful, somewhere down the line you and I might be able to get our hit of NMN to stay sprightly and young. Perhaps more importantly in the current political climate, NMN holds the potential to help repair DNA damage from mutagens – such as nuclear radiation.

Want to learn more about this topic? And find out how a low calorie diet might just make you live longer? Then watch the SciShow video 'Why We Age – And How We can Stop It' (2012) on Youtube.com

References:

- www.sciencealert.com
- *The New England Journal of Medicine (nejm.org/doi/10.1056/NEJMoa1515319)*
- *Science 24 Mar 2017: Vol. 355, Issue 6331*

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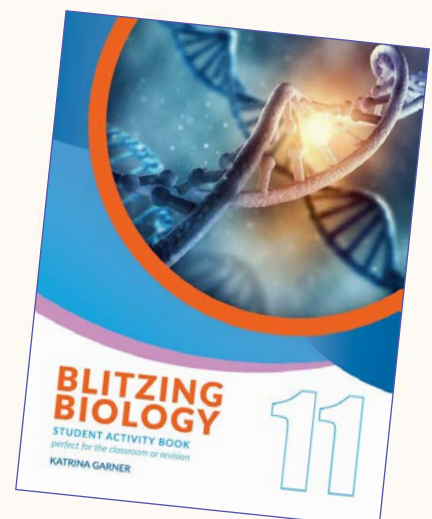


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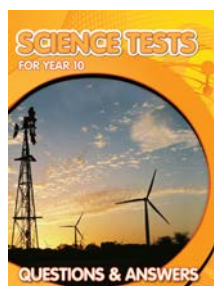
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Continued from page 4 ...

extensive choice in pursuing a research or practical topic in which they are interested, or you may choose to be entirely prescriptive and instruct students to research a specific topic of your choosing, or do a specific practical investigation of your choosing. More open-ended tasks may increase student interest, while more prescriptive tasks will most likely be more easy when it comes time to marking consistently.

The programmed timing of the syllabus gives you 15 class hours to work on the depth study. This gives you the flexibility to scaffold and guide students through your chosen task. You may find this is a chance to have students preparing more of their work in class, benefitting from your guidance as a teacher and reducing the temptation for tutors or parents to provide a little too much assistance. Another way to easily achieve the 15 class hours is to link your depth study to an excursion or field trip.

So take a breath, have a cup of tea, and remember that the depth studies give you the freedom to choose – would you like to try something new and different? Or would you like to just tweak an existing research or investigation task to tick the depth study boxes? It's up to you!

By the time the Year 12 Depth Study comes around, you will hopefully feel like an expert at conducting a Depth Study.

The best preparation
for tomorrow, is doing
your best today.

.... H Jackson Brown, Jr.
(b.1940)

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Museum of Human Disease

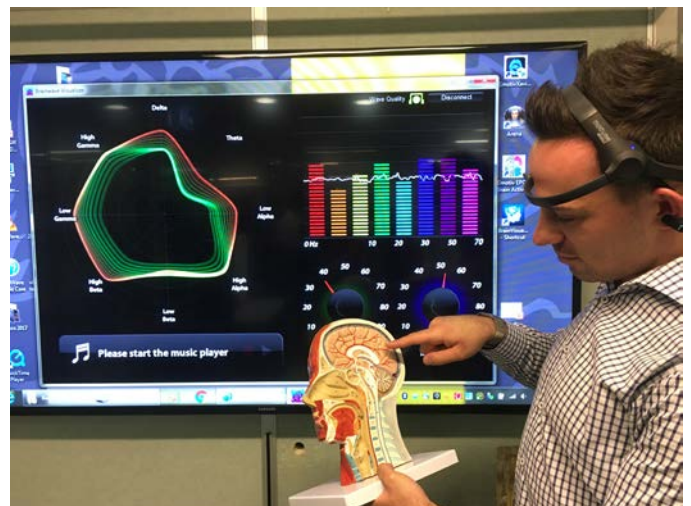
For full details of our 2018 Depth Studies and Investigating Science days, new Biology and Earth and Environmental Science resources:

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to go on our email list.

Details at: www.diseasemuseum.unsw.edu.au

Contact: 9385 1522 diseasemuseum@unsw.edu.au

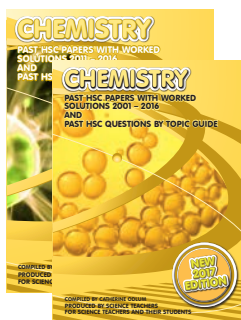


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Compiled by Catherine Odlum



RRP: \$39.95 (2001-2016),
\$27.95 (2011-2016) ... see p7 to order

QUIZ QUESTION:

What name is given to chemical elements with an unstable nucleus?

SciTalk 1/17 answer: Mitochondria

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TO ENTER: Send your answer to the Quiz Question, your name, school & school address by email to cathie@odlumgarner.com.au or on an envelope to: Competition Corner, PO Box 442 Freshwater 2096 – by 15 December 2017

SciTalk 1/17 winner: Anastasia Giouroukelis, St Charbel's College, won *Biology 2001-2016 Past HSC Papers with Worked Solutions* (mp \$39.95), published & donated by Odlum & Garner.

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SciTalk

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SciTalk aims to provide Science teachers with up-to-date information, important dates, the latest products available, plus 'what's on' in various excursion venues, and more.

Please pass *SciTalk* on to all the Science teachers at your school, so they can benefit from it.

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WINNER: Amelia Beckett, OLMC Burraneer, won the Luna Park Sydney family pass for *SciTalk* No. 1–2017.

CONTRIBUTIONS

SciTalk is now a bi-annual newsletter and due into schools in March and mid-year. All contributions should be directed to the Editor (see below).

CLOSING DATES

- *SciTalk* No. 1 – March 2018 ... closes 20 Dec 2017
- *SciTalk* No. 2 – August 2018 ... closes 6 July 2018

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Catherine Odlum
PO Box 442, Freshwater NSW 2096
(34 Ocean View Rd Freshwater 2096)
Ph 02 9939 6107 Fax 02 9939 6105
Email cathie@odlumgarner.com.au
ABN 54 942 891 924

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