One of the first studies conducted on young reptiles reared without contact with their siblings is challenging the assumption that only mammals and birds are shaped by social interactions.

“Our results demonstrate that rearing these animals in different environments strongly affects their social development,” said Cissy Ballen, a PhD candidate in the University of Sydney’s School of Biological Sciences and lead author of the paper published in Animal Behaviour.

“These chameleons catch insects using a ‘ballistic’ rapid fire tongue movement and use dramatic colour changes to signal dominance. The lizards raised in isolation were more submissive, were slower at attacking certain food and displayed darker and duller colours than those raised with their siblings.”

Most people know that to rear a baby on its own would have devastating consequences for its development. Until very recently, scientists have believed that only the ‘social’ species, such as birds and mammals, were disadvantaged by being reared in isolation.

It has been assumed that reptiles, as ‘lower’ animals, are non-social, so their behaviour is determined by their genes, not by their interactions with members of the same species.

The research was conducted using young veiled chameleons (Chamaeleo calyptratus), large tree-dwelling lizards native to Yemen and Saudi Arabia that are popular as pets and in zoos. While their mother usually leaves after giving birth, they often encounter their brothers and sisters as they grow up.

The chameleons were raised alone or in groups of four.

In addition to their slower food attack times and duller colours when young isolated chameleons had contact with siblings, they fled and curled into balls. In contrast, those reared in groups interacted and exhibited their colours in a competitive display.

“Young chameleons, like many reptiles, often engage in intense combat with each other. The absence of this opportunity appears to slow the development of behaviours that help the lizard intimidate rivals and succeed in acquiring food.”

Early research assumed that reptiles’ behavioural traits were highly stereotyped and fixed, differing between species but not changing in response to the conditions that an individual experienced during its lifetime.

CONTINUED INSIDE...
SQUARING THE WHEEL

Winner of Adelaide Fringe Award “Best Presentation for Children 2013”
Wacky contraptions, gutsy clowning, eccentric circus and puppetry in a quirky story of finding one’s place.
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Dates: 5 - 7 May
Time: 10am & 12.30pm
Duration: 1 hour

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SCAPEGOATING STEROIDS IS HARMFUL

BY VERITY LEATHERDALE

Scott Griffiths is a PhD candidate at the University of Sydney’s School of Psychology who is currently conducting research on muscle dysmorphia, appearance and performance-enhancing drug use.

In the context of current debates around increasing steroid use and the link with alcohol abuse and aggressive behaviour Griffiths said:
Scapegoating steroid use for violent behaviour distracts us from the debate on alcohol abuse and makes it more difficult for steroid users to come forward.

Steroid use is on the rise and there have been recent documented cases of individuals involved in alcohol-linked violence also using steroids.
But the concept of ‘roid rage’ has been sensationalised. Most steroid users, even those on high doses, do not succumb to roid rage. A bad apple effect is going on where the violent behaviour of a few users has come to form a stereotype about all users.
This stereotype is reinforced by high-profile cases of violent behaviour involving steroids where the role of steroids is seized upon by the media. Other factors are often downplayed or forgotten.
We know little about the stigma that steroid users and people with muscle dysmorphia experience, but the stereotype of them being ‘dumb, dangerous drug-users’ seems to crop-up frequently in the media.
Stereotypes around steroid use may mean that men struggling with muscle dysmorphia, where a person has an obsession with their body image and often uses steroids to build their masculinity, may be less likely to come forward for treatment.
Body pressures on men are increasing and more and more men are going to think about taking steroids. Some will ultimately make decisions to take them.
We do not condone steroid use, but we want men who use steroids to be able to talk about them with health professionals without the fear that they will automatically be labelled dangerous ticking time-bombs. Negative stereotypes about steroids disrupt this important conversation.

CONTINUED:

However, there is emerging evidence of complex social systems among some lizards, including the ability to solve cognitive tasks, exhibit social learning and demonstrate specific variations in mating behaviour.
“The idea of lizards as machine-like creatures who do not respond to local conditions is being replaced by a new appreciation of the subtlety and flexibility of reptile behaviour as influenced by their local environment and genetic factors,” said Ballen.
“Future research could explore the possibility that some reptiles are far more responsive to social cues than we expect.
“Our results also have obvious implications for the captive rearing of reptiles. These animals are commonly raised by zoos, private keepers and pet owners in social isolation, under the assumption that social cues are irrelevant to their development. Our results call that into question and suggest that for many reptiles, an environment rich in social interaction may provide important benefits for their wellbeing.”

SCIENCE ALLIANCE continues to provide a variety of activities for school and university students, teachers, science graduates, as well as the broader public. We have recently streamlined our booking system and made some changes to our terms and conditions to improve our overall processes. Developing innovative and engaging programs to share scientific knowledge is our key objective.
Please take the time to find out more at sydney.edu.au/science/outreach/terms-conditions.shtml

NEW DATES: NCSS SUMMER SCHOOL
An intensive 10 days of computer programming, robotics, web design and related activities at the University of Sydney. No programming experience is required.
Dates: 4-13 January 2015
www.ncss.edu.au

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INTRODUCING OUR NEW AMBASSADOR FOR MATHEMATICS AND SCIENCE, ADAM SPENCER

You might have heard that I’ve just been announced as The University of Sydney’s Ambassador for Mathematics and Science. It’s a first for the University, in fact for any Australian University, and I’m thrilled to be taking up the position.

I got a First Class Honours in Pure Mathematics from the University and not only was the course fascinating, but it’s shaped the way I’ve thought and learnt ever since. Whilst people might not assume that there’s much mathematics in hosting the breakfast show on ABC Radio or Triple J (in fact working out how long to talk for before playing a 3 minute 37 second song so as to have it finish at 7:59:52 am allowing for the 8 second broadcast delay was a bit taxing for some of my fellow announcers!) the rigour and logical thinking abilities that it gave me have proven indispensable in a media career.

And the things I’ve done with Dr Karl as ‘The Sleek Geeks’ have given me a passion for spreading the word about science and encouraging wherever possible young people to take up its study.

If you haven’t seen me in action my TED talk on prime numbers from Longbeach California last year is at sydney.edu.au/science/adam-spencer-ted

I’ll share with you what I’m getting up to throughout the year in this newsletter and hopefully we’ll bump into each other at one of the Sydney Science Forum talks, Talented Student Days or other events in the Faculty.

I hope 2014 is a year of wonderment and learning for you.

Adam S

Follow @adambspencer on twitter
Email Adam: science.alliance@sydney.edu.au

Create a short film about science…. ...and you could be a science star!

2014 UNIVERSITY OF SYDNEY SLEEK GEEKS SCIENCE EUREKA PRIZE

Calling all primary and secondary students!

Teachers, have your students create a short film (1-3 minutes) while painlessly learning about science!

Students, you can explore a scientific concept, discovery or invention, or test your own hypothesis.

Your outstanding short film on any topic could win the University of Sydney Sleek Geeks Science Eureka Prize. Anything goes, but keep the science in the story and keep the science real.

Enter now and you could win cash prizes and fame.

Entries close 7pm AEST Friday 2 May
australianmuseum.net.au/eureka
THE ‘FIVE-SECOND RULE’ IS A DIRTY MYTH

FROM DR KARL KRUSZELNICKI’S ‘GREAT MOMENTS IN SCIENCE’

An enduring myth is the five-second rule — occasionally called the three-second rule — it claims that it’s okay to eat food that you’ve dropped and picked up from the floor so long as you can pick it off the floor within that magic time of five — or three — seconds.

This myth might have stood the test of time, but it doesn’t pass the test of truth. Let’s just imagine the tasty food morsel dropping on to the floor — are we supposed to believe that the bacteria all start their stop watches and hold themselves back waiting a whole five seconds before they leap onto the foodie offering!

What we are talking about is the potential for food poisoning. In the USA, each year, there are some 76 million cases of food poisoning. And of these people, some 300,000 are hospitalised, and 5000 don’t get better, and die.

An early piece of research was done in 2003 by Jillian Clarke a student from the Chicago High School for Agricultural Sciences doing a seven-week summer apprenticeship at the University of Illinois. She started with a survey. Some 56 per cent of men and 70 per cent of women knew of the five-second rule, and women were more likely than men to pick up and eat food from the floor. Not surprisingly she also found that biscuits and lollies were much more likely to be picked up and eaten than broccoli or cauliflower.

Then Ms Clarke did some experiments. She coated the surfaces of rough and smooth tiles with the bacterium E. coli and then placed either gummi bears or fudge-striped cookies on them. In all cases the E. coli bacterium transferred from the tile to the food in five seconds or less.

The next major research was carried out in 2006 by Professor Paul Dawson and colleagues at Clemson University in South Carolina. Their experiments were from the biofilm to the bologna was with the tile. Over 99 per cent of the bacteria had moved across in less than five seconds. It was much lower with the carpet.

But there is another complication: most of us wear our street shoes into the house. A study by Charles Gerba, a professor of microbiology at the University of Arizona found that after three months of use 93 per cent of shoes have faecal contamination. After all you walk into private and public bathrooms and on grass and gutters wearing your shoes. Even more disconcerting, he studied coffee tables in the apartments of single men. About seven out of 10 of these coffee tables had faecal contamination, almost certainly from the blokes putting their still shod feet up on the coffee tables after a day’s work.

Furthermore, the rate at which the bacteria transferred to the food depends to some degree upon the food itself. Food that is high in salt or sugar makes a hostile environment inside the food that takes up the bacteria at a lower rate.

We are surrounded by bacteria — they make up some 90 per cent of the cells in our bodies and they are on all the surfaces around us. In the majority of cases we humans and the bacteria exist in harmony. People do talk about the so-called ‘hygiene hypothesis’ — that we are too clean and need to be exposed to more germs in the environment to strengthen our immune systems. But eating food that has dropped onto the floor is not the right way.
In recognition of its commitment to outreach, the University of Sydney is working in partnership with NSW Trade & Investment and the Commonwealth Department of Industry, Innovation, Climate Change, Science, Research and Tertiary Education to drive the NSW component of Inspiring Australia, the Australian Government’s national strategy for engaging communities with the sciences.

Over the past year, the NSW’s Inspiring Australia Manager Jackie Randles has been working in the Faculty of Science to increase opportunities for Australians from all walks of life to experience science engagement initiatives.

‘It’s fantastic to see so many different groups getting involved with hands on science, not only during National Science Week but also at other times of the year,’ said Jackie.

‘I’ve been really impressed by the way communities of all kinds come together to explore science and science-related issues, particularly in regional NSW.’

Inspiring Australia (NSW) last year funded a number of community partnerships of three or more organisations committed to delivering science outreach programs in their region. These NSW Regional Science Hubs presented many outstanding community events in National Science Week, from biodiversity surveys on the Far South Coast, animations created in response to astronomy talks in Albury to a sustainability fair in Dubbo.

An installation at the New England Regional Gallery in Armidale that showcased local smart tree technology was hugely popular, and the broad range of innovative science activities delivered in Jindabyne, Caroolthal, Cootamundra and beyond inspired thousands of people during National Science Week.

In recognition of last year’s success, the NSW Government has increased its support towards the 2014 NSW science grants program and will offer $70,000 towards science events delivered by new and existing Regional Science Hubs. The program’s goal is to create enduring community partnerships that can develop and deliver high-profile science events across the state.

‘Inspiring Australia is growing a dynamic network that can plan strategically for ongoing programs of events and activities to promote the value of science to Australians everywhere,’ said Jackie. ‘I am looking forward to working with even more exciting community outreach programs in 2014.’

For more information visit sydney.edu.au/science/outreach/inspiring

You can also contact Jackie Randles at: inspiring.nsw@sydney.edu.au

**SCIENCE SNAPSHOT**

The sciences at Sydney have seen many great minds pass through its ranks. In this new section we ask students and graduates to tell us about their study experiences and the diverse destinations it has lead them.

“I write about a broad range of scientific topics for children in CSIRO’s educational publications, including e-newsletters, magazines and a blog. This involves a lot of research such as reading papers across the full range of scientific fields – one week I might be talking about genetics, the next week it’s astrophysics.

My science degree taught me how to process and interpret information in a scientific context. The Talented Student Program project I did drove home the importance of making science relevant to a wide range of audiences, and thinking about the social implications of scientific research.”

PATRICK MAHONY
SCIENCE WRITER AT CSIRO PUBLISHING, CANBERRA
GRADUATED 2008, BACHELOR OF SCIENCE (HONOURS)
SCIENTISTS REVEAL THE CAUSE OF ONE OF THE MOST DEVASTATING PANDEMICS IN HISTORY

BY VERITY LEATHERDALE

Modern science has solved a historical cold case by revealing that two of the world’s most devastating plagues, the Black Death and Plague of Justinian - each responsible for killing as many as half the people then in Europe - were caused by distinct versions of the same pathogen, Yersinia pestis.

The research, by an international collaboration of scientists including the University of Sydney, used miniscule DNA fragments from the 1500-year-old teeth of two victims of the Justinian plague, and produced the oldest pathogen genomes ever obtained.

The findings suggest new plagues could emerge in humans in the future.

“We discovered that the bacterium responsible for the Plague of Justinian, which jumped from rats to humans and killed many millions of people in the sixth century, faded out on its own,” said Professor Edward Holmes, from the University of Sydney’s School of Biological Sciences and co-lead author of the study published today in Lancet Infectious Disease. The findings not only give a new historical perspective, but could lead to a better understanding of the dynamics of modern infectious disease.

The findings are dramatic because little has been known about the origins or cause of the enigmatic Justinian Plague, which helped bring an end to the Roman Empire, killing virtually half the world’s population as it spread across Asia, North Africa, Arabia and Europe.

The samples came from ancient plague victims buried in a small cemetery in the German town of Aschheim, who are believed to have died in the final stages of the epidemic when it reached southern Bavaria sometime between 541 and 543.

For this study, scientists reconstructed the oldest pathogen genome ever obtained and compared it to a database of Yersinia pestis genomes of more than a hundred contemporary strains.

They found that the Justinian outbreak was an evolutionary ‘dead-end’ and distinct from strains involved in the Black Death and other plague pandemics. A third pandemic, likely to be a descendant of the Black Death strain, started in Yunnan in China in 1855 and spread globally, killing more than 12 million people in China and India alone.
Dave Wagner, an associate professor in the Center for Microbial Genetics and Genomics at Northern Arizona University said, "We know the bacterium Y. pestis has jumped from rodents into humans throughout history, and rodent reservoirs of plague still exist today in many parts of the world. Fortunately we now have antibiotics that could be used to effectively treat plague, which lessens the chances of another large-scale human pandemic."

Two unanswered questions remain: why was the Justinian Plague so remarkably virulent and what caused it to die out?

"This study raises intriguing questions about why a pathogen that was both so successful and so deadly died out. One testable possibility is that human populations evolved to become less susceptible," said Professor Holmes.

Hendrik Poinar, associate professor and director of the McMaster Ancient DNA Centre and an investigator with the Michael G. DeGroote Institute for Infectious Disease Research, is co-lead author of the research.

The research was funded by in part by the Social Sciences and Humanities Research Council of Canada, Canada Research Chairs Program, US Department of Homeland Security, US National Institutes of Health, and the Australian National Health and Medical Research Council.
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PUBLIC LECTURES BY THE BRIGHTEST MINDS IN SCIENCE

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Presented by Associate Professor Dale Dominey-Howes
School of Geosciences, the University of Sydney
It seems that natural hazards are becoming more frequent and severe, but is this true? And what can we do about preparing for and responding to natural disasters? Associate Professor Dominey-Howes uncovers the nature, causes, impacts and effects of some of the most significant natural hazards.

GAME OF KNOWNS
Presented by Dr Karl Kruszelnicki
Julius Sumner Miller Fellow, the University of Sydney
In Game of Knows, he divulges why psychopaths make good kings, how smart phones dumb down our conversations, why the left side of your face is the most attractive, how the female worker bee gets a raw deal, and why we drink beer faster when it is served in a curved glass.

THE IMPORTANCE OF TALKING SH*T
Presented by Associate Professor Andrew Holmes
School of Molecular Bioscience | Charles Perkins Centre, the University of Sydney
Rapid advances in understanding the host-microbiome relationship are now leading to better understanding of risk factors and novel strategies for treatment of microbiome-associated disease. Find out how we may use designer faeces in the future to improve health.

FORWARD MOMENTUM
Presented by Associate Professor Zdenka Kuncic
School of Physics, the University of Sydney
From disease detection to drug discovery, physics has and will continue to revolutionise medicine and facilitate medical breakthroughs. Find out how physics has transformed the quality of human life through discoveries such as x-rays and the structure of the DNA double helix.

RUST NEVER SLEEPS
Presented by Professor Robert Park
Judith and David Coffey Chair in Sustainable Agriculture
Faculty of Agriculture and Environment, the University of Sydney
Find out how problems of inadequate food supply, the world’s increasing population and the emergence of new crop diseases are presenting significant challenges in ensuring adequate supplies of safe and nutritious food for all. Professor Park will reveal how plant diseases affect our very existence and the work his team do in developing new approaches for sustainable and environmentally friendly crop disease control.

Register here: sydney.edu.au/science/outreach/forum