The painting, *Jeune fille endormie*, was given to the University in 2010 by an anonymous donor on the condition that it would be sold and all the proceeds directed to scientific research. It was auctioned at Christie's in London on Tuesday 21 June.

"This is a great result which is transformative for the University and for the health of the nation," said University of Sydney Vice-Chancellor Dr Michael Spence, who was in London for the auction.

"The sale of this remarkable work is the result of one donor’s extraordinary generosity who said ‘this painting is going to change the lives of many people’. They were right. We are grateful for their extraordinary generosity and delighted with the outcome of the auction.

"The proceeds of the sale of the Picasso will go to a wonderful cause. They will create multiple endowed chairs across several disciplines within a new multidisciplinary University centre dedicated to research into obesity, diabetes and cardiovascular disease.

"The University’s new centre will transform research into the prevention, diagnosis and treatment of these conditions, involving everything from metabolic research to the economics of food supply. It will be the only multidisciplinary research centre of its kind bringing together everyone from philosophers to dieticians, from economists to physiologists, all of whom will bring a different perspective to this international problem."

Professor Steve Simpson, an Australian Research Council Laureate Fellow at the University of Sydney and a member of the governing board of the new centre was also in London.

"This is going to galvanise new ways of thinking about these diseases, by bringing the University resources together into a purpose built building with high-class laboratories where our existing and new staff can work to solve global problems," Professor Simpson said.

"Transformational research requires inspirational research leaders. This will allow the University to recruit the best people available to new chairs in the centre. It is a wonderful start to what will be a world-class collaborative research centre."

In a packed Christie’s room, the auction of the University’s Picasso took less than two minutes, the price moving quickly from an opening bid of £7 million.

A few hours later in Sydney, around 400 University staff gathered in the Great Hall to watch a video replay of the auction footage, introduced by Professor Jill Trewhella, Deputy Vice-Chancellor (Research).

According to the World Health Organization, obesity, diabetes and cardiovascular disease and related conditions such as renal disease, breast cancer and colorectal cancer are now the leading causes of disease and mortality globally.

The causes of these diseases are complex and multidimensional - they are the product of a constellation of factors, ranging from which genes people inherit to what they are able to buy in their supermarket and how they spend their working lives. Reducing the prevalence, incidence and impact of these diseases requires a broad-based and coordinated effort.

For more information about the Centre for Obesity, Diabetes and Cardiovascular Disease please visit: sydney.edu.au/codcd/
Agriculture and climate change specialist, Associate Professor Greg Hertzler, from Agricultural and Resource Economics within the Faculty of Agriculture, Food and Natural Resources said the highly competitive grant will allow his team to determine the thresholds farmers may cross in dealing with climate change.

Hertzler says the project is about keeping the farming industry's options open.

"Formal methods for quantifying and making decisions under risk have not done as well as good old common sense, until recently," says Hertzler.

"In the 1990s a new method was developed which allows us to think rigorously about our options. It evolved as economists began adapting the methods of financial options to the real world.

"Our new method allows us to think objectively about decisions in our complex, dynamic and nonlinear world, subject to thresholds and risks of irreversible damage.

"Real options can be applied to agriculture undergoing climate change in two ways.

The first way is a framework for communication among producers and researchers. The second way translates the adaptive decisions of producers into mathematical models and solves for the expected transformation of complex systems.

"In this project, we use real options to communicate with producers who are managing wheat dominated agricultural systems. From this knowledge, we model how they may choose to transform the industry as the climate changes."

Hertzler says once the decisions of growers are understood, the project will assess the implications for stranded assets, new technologies and the resilience of agriculture undergoing climate change.

The grants are administered by the National Climate Change Adaptation Research Facility, a federal government supported agency focused on generating the information needed by decision-makers in government and in vulnerable sectors and communities to manage the risks of climate change.
According to popular myth, in the Southern Hemisphere, all cyclones spin clockwise - and so does the water in toilet bowls, bath tubs and hand basins. The story is correct about the cyclones. But the water going down a drain - well, half the time it’s right, and half the time it’s wrong.

The supposed force behind this phenomenon is the Coriolis Force, named after Gustave-Gaspard Coriolis. He first described it way back in 1835. Actually, there’s no such thing as “Coriolis Force” - it’s just a fancy name for “Conservation Of Angular Momentum”. You can see angular momentum being conserved or saved with an ice skater spinning on one foot. When the skater pulls in their arms close to the centre, or spin axis of their body, they speed up - and when they stretch out their arms, they slow down again.

But the weather people call this phenomenon the Coriolis Force, just to keep the name short. A big storm is called a cyclone in Australia, a typhoon in Asia, or a hurricane in the USA. Anyhow, one of these big storms will start up near the equator, and then move in the direction of either the North Pole, or the South Pole. As it moves closer to one of the Poles, it also gets closer to the Spin Axis of the Earth, which runs through the North and South Poles. This is similar to the ice skater pulling their arms in closer to the spin axis of their body. The storm is moving in two directions at the same time - towards the Pole, and closer to the spin axis of the Earth. I won’t go into it now, but to balance the momentum equations, the storm spins clockwise in the Southern Hemisphere, and anti-clockwise in the Northern Hemisphere.

As I said, the weather scientists call the force that makes cyclones spin the Coriolis Force. The Coriolis Force is zero at the Equator, and strongest at the North and South Poles. The infantry see the Coriolis Force in action in long-range guns. The operators in charge of fire-control of long-range guns have to apply different corrections to the left or right, depending on how far from the equator they are, and in which hemisphere they are. These situations involve large distances - a cyclone can span hundreds of kilometres, while a big gun could easily lob a shell 50 kilometres.

But a toilet or hand basin is much smaller - only about 30 cm across. And if you do the numbers, the Coriolis Force on such a small body of water is about 10 million times smaller than the gravity force of the Earth pulling on the water in the toilet or hand basin. So could you possibly see such a small Coriols Effect, when the “gravity effect” is so much bigger?

The answer is “yes” - but only if you are extremely careful. The rotation effect is so small, that it is vastly overshadowed by the direction in which the water entered the toilet bowl or basin, or wind effects over the surface of the water. The experiment has been done in both hemispheres. It was done in 1962 by Ascher H. Shapiro at MIT in Massachusetts, and repeated in 1965 by Lloyd M. Trefethen at the University of Sydney.

Shapiro had a very shallow dish about 2 metres across and 150 mm deep. The outlet hole was about 9 mm across. He added the water through a hose, deliberately swirling it clockwise (the opposite of the expected draining direction). He then covered it with a plastic sheet, and let the water stand for 24 hours, to reduce the initial rotation of the water. He placed a small floating cork on the water, and then released the stopper plug from below. The water took 20 minutes to drain out, with no visible rotation for the first 12-15 minutes. Then he could see the float begin to spin anti-clockwise - slowly at first, then gradually increasing to one rotation every four seconds by the end. The University of Sydney team used very similar apparatus, and got consistent clockwise rotations.

Shapiro wrote in Nature, “When all the precautions described were taken, the vortex was invariably in the counter-clockwise direction”. But don’t expect to see the water spinning the right way down the plug hole, if you lurch off the plane at Singapore (about 1° from the Equator), rush to the toilet, fill the hand-basin with water and pull the plug.
Calling all teachers!

FROM THE INSTITUTE FOR INNOVATION IN SCIENCE AND MATHEMATICS EDUCATION

While student interest and engagement with science in schools is decreasing, it is recognised that there is a greater need for science literacy amongst students and citizens. A variety of programs are being developed to engage students with learning science and there is urgency in investigations probing appropriate pedagogies.

One pedagogical approach gaining momentum is inquiry-based science. The prime challenge to implementing this pedagogical approach is teachers’ perceptions, understandings and implementations of science inquiry. These are diverse and unless the diversity is examined, appropriate professional development programs cannot be designed. This is particularly important given that the new Australian Curriculum: Science gravitates around science inquiry.

The Institute for Innovation in Science and Mathematics Education (IISME) is steering an initiative to improve our understanding of teacher experiences and beliefs of science inquiry in the classroom.

This work is a critical contribution to teacher professional development initiatives and to implementation of the Australian curriculum in the area of science learning.

If you are a teacher (primary or high) please help us by completing the following surveys by 15 August:

Primary school teachers - https://www.surveymonkey.com/s/79WJVRP
Secondary school teachers - https://www.surveymonkey.com/s/ZJX55BN

Budding scientists descend on uni campus

BY LOUISE ATKINS

July saw 120 students from across NSW and the ACT travel to the University for the opportunity to attend three days of interactive science workshops.

We saw over 2,500 students sit the exam to compete for entry to the workshops this year. This saw another large increase in interest from students wanting to participate in the workshops.

The first of two workshops was held in the July NSW school holidays for 120 students. These talented students spent a day in each of the School of Biological Sciences, Chemistry and Physics, with the three-day workshop wrapped up by the University of Sydney’s Dr Karl Kruszelnicki.

Biological sciences had students dissecting invertebrates, racing crickets, identifying blood groups in addition to the chance for students to get up close and personal with snakes, cockroaches, goannas and lizards in the interactive animal show.

Chemistry wowed them will explosions, slime, using liquid nitrogen to identify gases and freeze plant matter as well as making esters.

Physics had a focus on astronomy and nuclear science. Students looked at different types of radiation, how they are produced and what they can travel through, such as black bodies or looking at the spectra produced by the discharge lamps (image shown on right is a student looking at the spectra of mercury).

Feedback from the July workshop has shown that the program provided students with insight into more practical applications of science than what they had been exposed to in the classroom and inspired them to continue their study in the sciences.

To find out about the 2012 program and to see photos from previous workshops, visit sydney.edu.au/science/outreach/gifted

Students getting their hands dirty in the biological sciences, chemistry and physics workshops in the July Science Gifted and Talented Discovery Program workshop.
Depression can break your heart, literally

BY DANIEL QUINTANA AND DR ANDREW KEMP - FIRST PUBLISHED IN THE CONVERSATION ON 16 MAY 2011.

Having a ‘broken’ or a ‘heavy’ heart is a description often used by people who are feeling down or depressed. It turns out they’re not that far off the mark.

People with depression are three to four times more likely to die of cardiovascular disease than those without depression, irrespective of a prior history of cardiovascular disease.

**Depression’s impact on physical health**

Depression, like most mental illnesses, puts considerable stress on our minds as well as our bodies.

Stress in the short term is important for the survival of our species. Any danger in the environment triggers the ‘fight or flight’ response. This ‘survival’ system is known as the sympathetic nervous system.

This system operates in a biological tug-of-war with the ‘rest and digest’ system, known as the parasympathetic nervous system.

The parasympathetic nervous system facilitates activities when our bodies are at rest including sexual arousal and appetite.

The ‘survival’ system is always prepared to respond to stressors in the environment and it is up to the ‘rest’ system to halt this activity, much like a brake in a car.

If you are threatened, the ‘brake’ is removed in order for the survival system to facilitate fight or flight behaviors. However, in a safe environment, the brake is applied and the rest system predominates.

The rest system also facilitates social interaction, an essential activity to effectively maintain our relationships with others.

Some people are better able to switch between these two systems. These people are better equipped to deal with everyday stress and, more importantly, return to a relaxed state once the stress has gone.

Too much stress over a prolonged period leads to a constant state of alertness. Short periods of stress (when actual danger is present) is normal and can function as a motivator but over the long term, frequent and chronic stress isn’t great for your health.

**Heart rate variability**

If you were to feel your pulse now, you would notice that your heart beats in a fairly consistent manner - at least it should. However, if we were to record your heart rate with hardware that is accurate to the millisecond, we would find small differences in the time between your heartbeats.

Research indicates that a highly variable heart rate increases your capacity to respond and adapt to life’s challenges.

In a sense, it makes your cardiovascular system more flexible. If you’re less able to switch to the rest system, you’re more likely to feel stressed because your body is indicating that there’s danger in the environment - even if there isn’t.

Research has shown that reductions in heart rate variability are a predictor of sudden cardiac death, even in individuals without a prior history of cardiovascular disease.

**Why is increased variability in heart rate a good thing?**

Reductions in heart rate variability may precede more systemic problems such as arrhythmia and ventricular fibrillation.

In some ways, your cardiovascular system is like a skyscraper. These large structures are built with an element of flexibility to deal with environmental stressors such as high winds and even earthquakes.

If it weren’t for the strict building codes in Tokyo, which require this flexibility, many more would have perished in the recent disaster.

Recent research from our team has discovered that physically healthy but depressed individuals have reduced heart rate variability - in other words, poor heart flexibility - in comparison to people without depression.

While other mechanisms such as an increased inflammatory response have been implicated in the relationship between depression, cardiovascular disease and mortality, heart rate variability is believed to be the major linking factor.

Our findings are important for a number of reasons. They highlight the need for cardiovascular risk reduction strategies in otherwise healthy depressed individuals.

Findings may also relate to the social deficits observed in depression. Poor heart flexibility reflect impairments in the ‘rest’ system, which leads to hypervigilance (enhanced sensory sensitivity) and difficulties in social interactions.

**You can increase your heart rate variability**

It is possible to increase your heart rate variability and your mood with regular exercise. This is particularly true for older people who already have reduced cardiac flexibility.

Refraining from excessive alcohol intake and stopping smoking have also been found to increase cardiac flexibility, thereby reducing the risk to cardiac health.

Antidepressant medication, particularly older generation antidepressants, have adverse cardiovascular consequences.

By contrast, beta-blocker medication - often used by people to control performance anxiety - and psychological therapies may increase cardiac flexibility.

Depression may indeed break your heart but with the help of some lifestyle changes and if required, professional help, it appears that your heart can be put back together again.

See the article in The Conversation at: http://theconversation.edu.au/articles/depression-can-break-your-heart-literally-1990
Rural revival needs more planning than $7000 handouts

BY KATH KENNY

There are better ways to encourage people to move from congested cities to regional areas than the NSW government’s $7000 rural relocation incentive, argues one of the authors of a book launched on 6 July on regional migration.

The University of Sydney’s Associate Professor Phil McManus, co-author of Rural Revival? Place Marketing, Tree Change and Regional Migration in Australia, says the incentive ignores the complexity of the decision-making process behind relocation.

Pragmatic decisions about affordable housing, educational opportunities for children, and health services - rather than more general lifestyle changes - drive people’s decisions to move, particularly for younger families and working people, argues Associate Professor McManus.

“People move to regional areas because they cannot afford to live in the city, or they can get the benefits of city living at a much cheaper price,” says Associate Professor McManus, whose new book is co-written by the University of Sydney’s Professor John Connell.

“The important considerations about where to live vary depending on what life cycle stage the so-called sea- or tree-changers are at, but invariably they are basic needs. These include job opportunities, health facilities and services, education facilities, sense of community, being close to family and relatives and the availability of affordable housing.”

Encouraging people to move from the city to regional NSW is a good initiative that can ease the pressure on city infrastructure and provide opportunities to make Sydney more sustainable, according to McManus.

“It will also help revive some country towns, where the addition of a few families may help keep the school teacher, the police officer and medical facilities in the town for existing residents. But it does not require spending of up to $188 million to achieve this goal.”

McManus argues government funding would be better spent supporting an innovative event called the Country and Regional Living Expo (formerly Country Week) initiated in 2004 and the focus of Rural Revival.

“This event encourages country towns to provide information and market the attractions of their town and region to city people. Relocation is often a long-term process, and providing information, visiting the town, checking out the schools and so on, are important steps in this big decision,” McManus says.

“Supporting the Expo aligns with the market-oriented beliefs of the Liberal Party - which is why it is surprising the Liberal Party is subsidising relocation and being accused by the ALP of potential market distortion.”

Rather than one-off incentives paid to individuals, government could support the smaller and more remote councils to attend the Expo. “This will have lasting benefits after the four years of grant money has ended,” McManus says.

Rural Revival? Place Marketing, Tree Change and Regional Migration in Australia (Ashgate), by John Connell and Phil McManus, was launched on 6 July at the Institute of Australian Geographers Conference in Wollongong.

The next Country and Regional Living Expo will be held at Rosehill Gardens Racecourse on 5-7 August 2011.
Tammar wallaby’s clever immune tricks revealed

BY BEN WILSON - PUBLISHED ON FRESH SCIENCE

Until now, it was a mystery why many marsupials have two thymuses - key organs in the immune system - instead of the one typical of other mammals. Now postdoctoral researcher Dr Emily Wong from the University and her colleagues have found that the two organs are identical, which suggests why they are there.

“The presence of two organs with identical function can allow the young to produce white blood cells rapidly, leading to faster development of immune defences,” Emily says. “This may be especially critical in marsupials, as they are born at an immature stage without immune tissues. They need to develop an immune system very quickly while growing in the pouch.”

“It used to be believed that the marsupial immune system was more primitive than that of humans and other mammals,” Emily says. “But, in fact, some aspects of the marsupial immune system appear more complex than our own — the two thymuses, for instance.”

Humans and most other mammals have only one thymus, the immune organ which produces T cells, the white blood cells that act as sentries to protect us from infection. The presence of multiple thymuses was an evolutionary mystery.

Using the latest DNA sequencing technology, Emily explored the genetic contents of the two organs in the Tammar wallaby. “The sequencing allowed us to compare the genetic material in the two thymuses quickly and thoroughly,” she said. “And we found they were the same.”

The researchers selected the Tammar wallaby because it was the first Australian marsupial to have its entire genome sequenced and published. “The availability of the genome has allowed for unprecedented insights into the marsupial immune system,” Emily says. The Tammar wallaby genome project is a joint collaboration between Australian and US scientists.

Emily’s research is part of a larger, ongoing project to understand how newborn marsupials survive in dirty pouches without an immune system.

Emily Wong is one of 16 early-career scientists unveiling their research to the public for the first time through Fresh Science, a national program sponsored by the Australian Government. Her challenges included presenting her discoveries in verse at a Melbourne pub.

Scholarships to study at Sydney

BY KRISTL MAUROPOULOS & LOUISE ATKINS

For many students, deciding where to study isn’t simply based on what course they are interested in. Quite often students need to consider various financial expenses such as travel, relocation, accommodation and living costs in addition to tuition fees and textbook costs. The University of Sydney provides a myriad of scholarships and financial support services to assist students to get the most out of their studies.

Scholarships enable students to focus on their studies without having the pressure or stress of juggling study with paid work. It also means students can spend more time getting involved in clubs and societies on campus to ensure that they have a fulfilling and well-rounded student experience.

There are also specific scholarships to assist students undertake a semester abroad on exchange such as the Dean of Science Exchange Scholarship which is awarded each semester.

The Faculty of Agriculture, Food and Natural Resources offers a scholarship specifically for rural students - the Rural Sustainability Scholarship - valued at $10,000. Rhys, who grew up on a beef cattle and cropping farm, says the scholarship “allows me to concentrate on my studies and eliminates the dilemma of trying to work around my uni”.

Students should do some research and find out about the range of financial support available to them.

For information about the University’s scholarships, please visit sydney.edu.au/scholarships/

Information about the Rural Sustainability Scholarship is available at sydney.edu.au/agriculture/future_undergraduates/
How science can change the way we cook

BY KRISTL MAUROPOULOS

To celebrate the International Year of Chemistry, the Faculty of Science will be hosting a visit from one of the fathers of the molecular gastronomy movement, Professor Hervé This for the final Sydney Science Forum for 2011.

Professor This is an internationally renowned physical chemist who works at the French National Institute for Agricultural Research (Institut National de la Recherche Agronomique) and explores the science in particular the chemistry behind cooking. His basic premise is that in order to make better food, we must look at why we cook things in a particular way as well as consider the chemical process behind each cooking method or technique. Through his scientific experiments, Professor This has made several weird and wonderful discoveries such as how to uncook an egg as well as using sand to stop a flour-based sauce from forming lumps. Such challenges to traditional cooking methods have been embraced by, and led to the enormous success of chefs such as Heston Blumenthal and Ferran Adria.

Professor This will be showcasing his latest experiments at the upcoming event an explosive night of Molecular Gastronomy on Tuesday 25 October 2011 in the Great Hall. He will be joined on stage by acclaimed chef Martin Benn of Sepia restaurant who will be putting a variety of molecular gastronomy techniques into practice as he demonstrates his culinary expertise in blurring the boundaries of conventional cooking.

One of the sleek geeks, Adam Spencer will join us as the special guest compère for the evening.

What makes this Sydney Science Forum so special?
After the formal event, the Quadrangle will come alive with a variety of interactive chemistry demonstrations as well as molecular gastronomy themed food samplings.

Do you want to witness the culinary creations of Professor Hervé This and Sepia’s chef, Martin Ben?
If your answer is yes, then register now!
02 9351 3135
sydney.edu.au/science/outreach/forum/

To register for membership to Science Alliance, visit: sydney.edu.au/science/outreach